Clinical Safety & Effectiveness
Cohort # 11

Reducing CMV Negative Blood Transfusions in Pediatric Hematology-Oncology

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UNIVERSITY OF TEXAS MD ANDERSON CANCER CENTER
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Financial Disclosures

- Team members have no conflicts of interest to report.

The Team

- Division
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  - *Aaron Sugalski, DO (PDHO Faculty)
  - Bradley Scoggins, MD (PGY-2, Pediatrics)
  - Leopoldo Cobos (Transfusion Services Supervisor)

- Sponsor Department
  - Pediatrics

*CS&E Particpants

What We Are Trying to Accomplish?

OUR AIM STATEMENT

We propose to decrease by 50% the number of un-necessary CMV negative red blood cell transfusions in pediatric hematology-oncology (PDHO) patients at the Children's Hospital of San Antonio over 90 days.

Project Milestones

• Team Created	February 2012
• AIM statement created	March 2012
• Bi-Monthly Team Meetings	March 2012
• Background Data, Brainstorm Sessions, Workflow and Fishbone Analyses	June 2012
• Interventions Implemented	June 2012
• Data Analysis	January 2012 - Ongoing
• CS&E Presentation	Sept. 14, 2012

Transfusion Associated CMV Infection

- Children with cancer require red cell transfusions to treat chemotherapy induced anemia.
- Transfusion associated-CMV (TA-CMV) increases mortality.
  - TA-CMV rates of 30-60% in Hematopoietic Stem Cell Transplant (HSCT) with non-tested, non-leukoreduced blood products[1].
  - Leukoreduction decreased TA-CMV to 2.5%[2].
  - Using CMV negative donors and leukoreduction, TA-CMV rate decreased to 1.5%[2].

References: [1] Hannon J, Hume H. CMV seronegative, irradiated and washed blood components. In: Clinical guide to transfusion. Toronto: Canadian Blood Services; 2006. p 146-153. [2]Nichols WB, Price TH, Gooley T, et al. Transfusion-transmitted cytomegalovirus after receipt of leukoreduced blood products. Blood 2003;101:4195-4200.

CMV Negative Blood Is Rare.

- 30-80% of blood donors are CMV sero-positive[1].
  - CMV survives in circulating white blood cells in CMV positive blood donors[3].
- Leukoreduction reduces risk of TA-CMV.
  - Each unit of red cells = 2-5 $X10^9$ White Blood Cells (WBC)
  - Third generation leukocyte filters decrease below 1-5 $X10^6$ WBC

References: [1] Hannon J, Hume H. CMV seronegative, irradiated and washed blood components. In: Clinical guide to transfusion. Toronto: Canadian Blood Services; 2006. p 146-153. [3]Ljungman P. Risk of cytomegalovirus transmission by blood products to immunocompromised patients and means for reduction. Br J Haematol 2004;125:107-116.

Current Recommendations

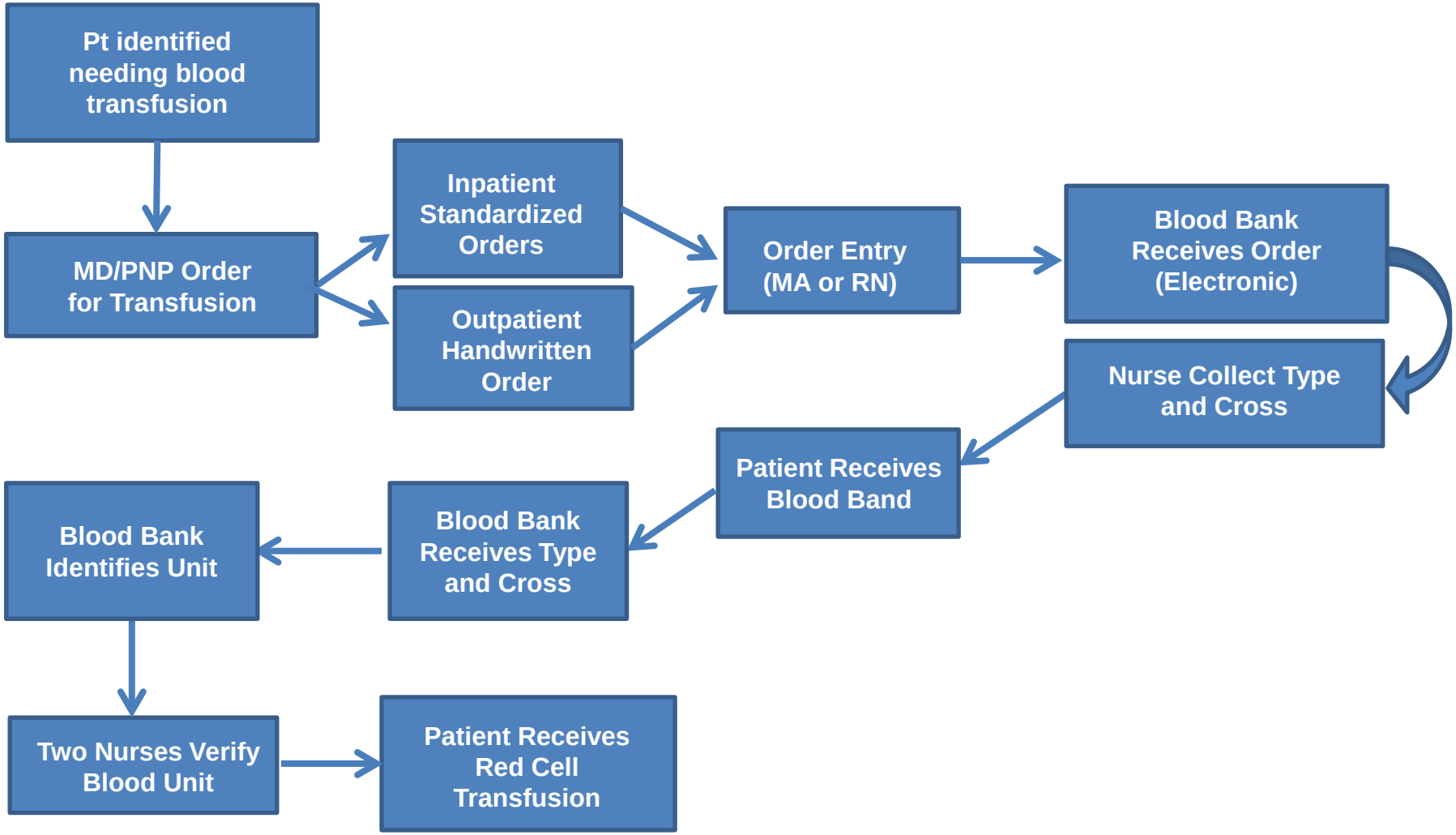
- CMV sero-negative oncology patients who are candidates for HSCT should receive CMV negative blood products.
- CMV negative blood products should be reserved for CMV sero-negative patients.

Pedi Heme-Onc Ordering Practices

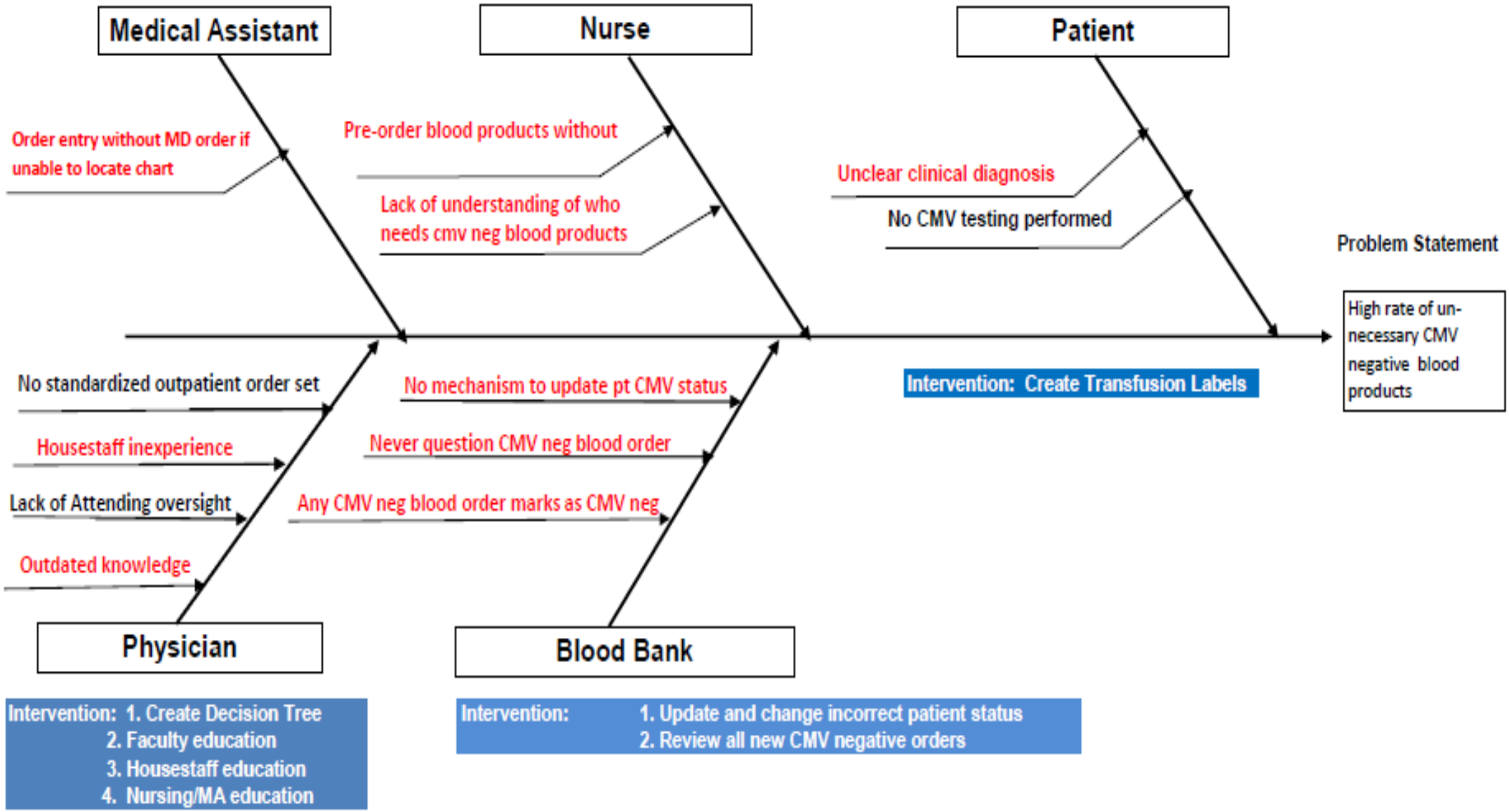
High rate of un-necessary CMV negative blood products.

- Review of 41 patients with CMV negative orders
  - 14 patients CMV sero-negative
  - 13 patients had CMV positive serology
  - 14 patients were untested b/c they did not need CMV negative products
- 66% (27/41) did not require CMV negative products but received them anyways.
- CMV negative product order rate should be 30%.

Process Flow Chart



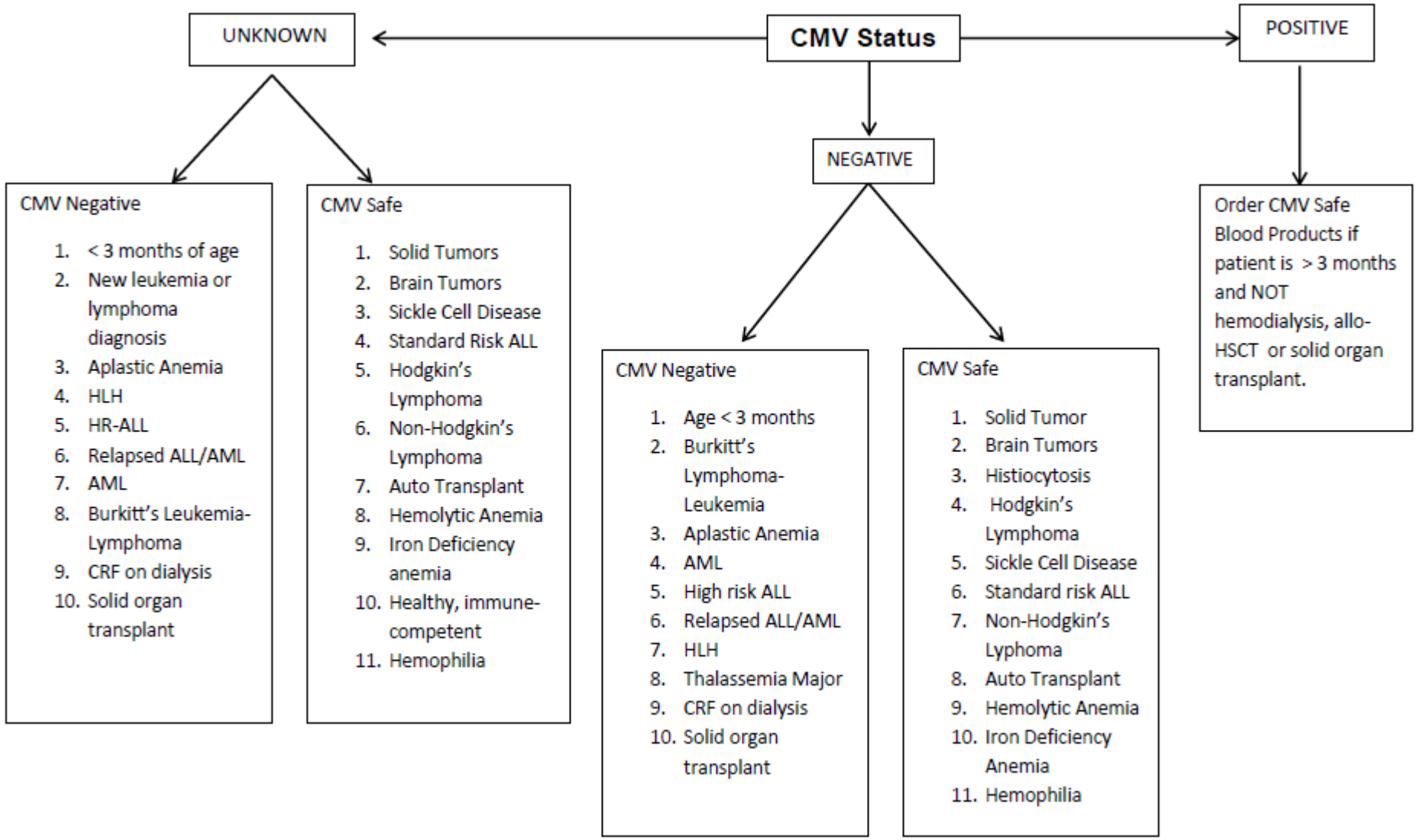
Fishbone


Medical Assistant
Nurse
Patient
Order entry without MD order if unable to locate chart
Pre-order blood products without
Lack of understanding of who needs cmv neg blood products
Unclear clinical diagnosis
No CMV testing performed
Problem Statement
High rate of un-necessary CMV negative blood products
Intervention: Create Transfusion Labels
No standardized outpatient order set
Housestaff inexperience
Lack of Attending oversight
Outdated knowledge
No mechanism to update pt CMV status
Never question CMV neg blood order
Any CMV neg blood order marks as CMV neg
Physician
Blood Bank
Intervention: 1. Create Decision Tree
2. Faculty education
3. Housestaff education
4. Nursing/MA education
Intervention: 1. Update and change incorrect patient status
2. Review all new CMV negative orders

Intervention

- **Education**
  - Faculty & PNP
    - Create and disseminate decision tree.
  - Resident Inpatient School
    - Discuss CMV Decision Tree and standardized transfusion orders.
  - Nursing staff
    - Reviewed decision tree
    - Transfusion labels on patient charts.
- **Blood Bank**
  - Review and correct labels for existing patients
  - Revise Order Process for Old Patients
    - Question any CMV order if varies from known status
  - Create Order Process for New Patients
    - CMV status reviewed by MD and included in pt record

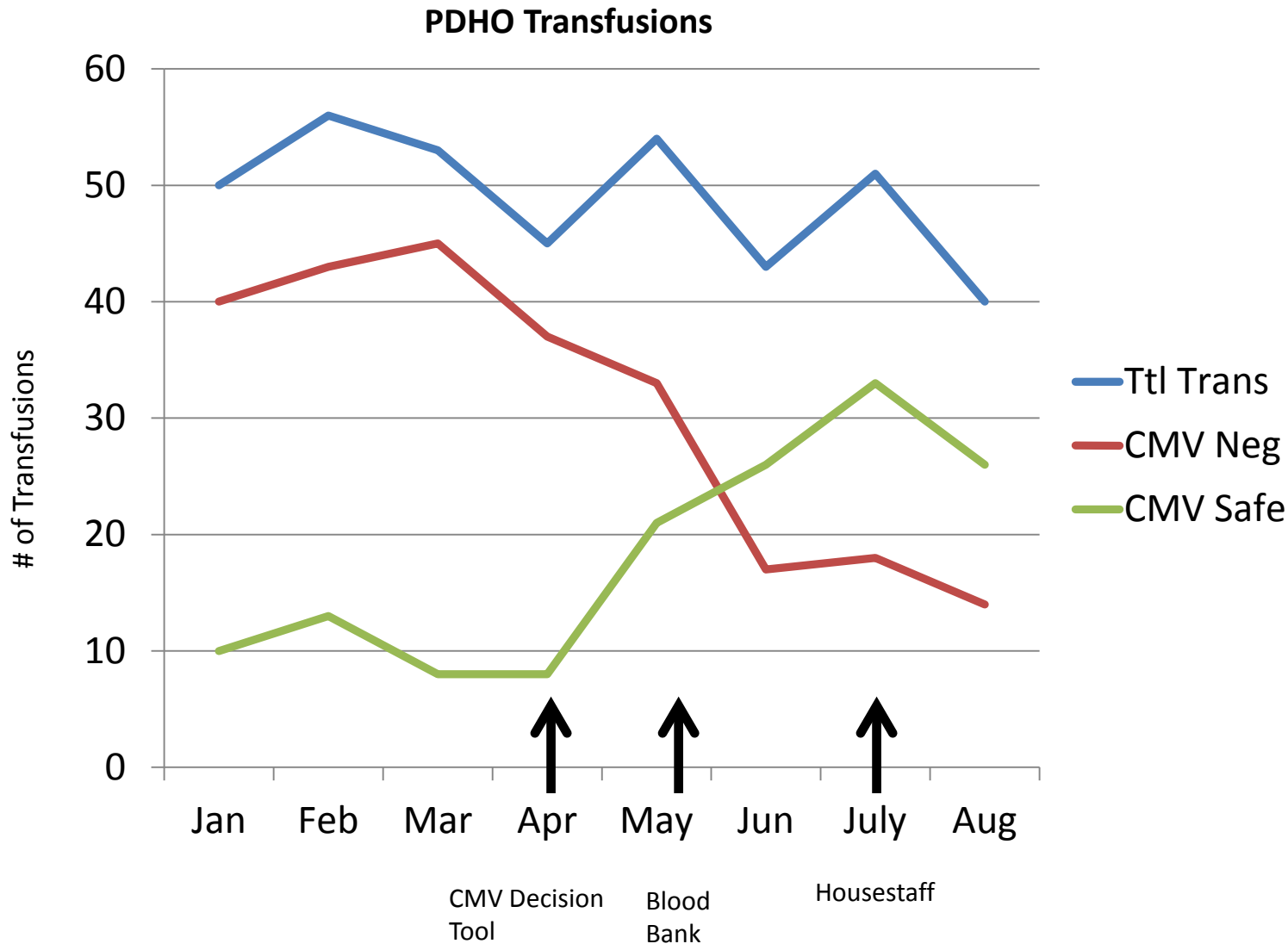
Decision Tree



Implementing the Change

- April 26, 2012 - Faculty Create CMV Decision Tree
- May, 2012 – Transfusion Labels
- May 8, 2012 – Updated CMV status with Blood Bank
- June, 2012 – Nursing Meeting
- August 9, 2012 – Housestaff Inpatient School

Results/Impact



Expansion of Our Implementation

- Type of Blood Product
  - Platelets
- Other medical and surgical services
- Integrate into housestaff curriculum
- CPOE
  - Standardized order sets created to be implemented with CPOE hospital wide.

Return on Investment

- South Texas Blood and Tissue Charge to Hospital for CMV neg blood = $36/unit
- Annual cost prior to intervention = $17,280
  - 80% of units ordered CMV negative
- Annual cost after intervention = $8,640
  - 40% of units ordered CMV negative
- Annual Savings = $8,640

Conclusion/What's Next

- Through simple, inexpensive measures, we successfully reduced un-necessary CMV negative blood product ordering in Pedi Heme-Onc patients.
- In the future, we will disseminate CMV Decision Tree to other pediatric services in our hospital.
- Long-term Goal
  - Integrate into CPOE

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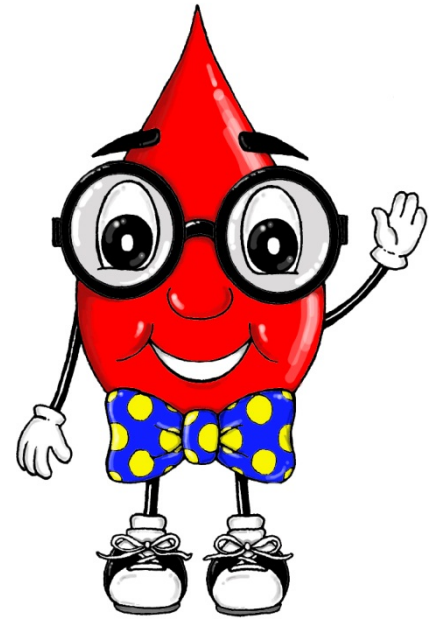

Thank you!

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