Too Much of a Good Thing: Evaluation of Inpatient Blood Transfusion Practices

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Division of Hospital Medicine
UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS

NavLab D2V Navigation Lab: Using advanced data science and evaluation methods to drive the delivery of high value healthcare

Data Science to Patient Value (D2V)
UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS

Aim

To increase evidence-based transfusion adherence at University of Colorado Hospital (UCH) in non-operating room settings, measured by a 30% reduction in the number of pRBC units transfused for a hemoglobin of ≥ 7 g/dl and number of multi-unit transfusions by September 2021

Background/Methods

Optimal utilization of blood products requires a balance between maximizing clinical outcomes while avoiding unnecessary costs and risks associated with transfusions

Increased morbidity and mortality with aggressive transfusion strategies

Many studies promote transfusion only when the hemoglobin (Hgb) is <7 g/dl

Per unit pRBC cost: $250 (up to $600 per unit including handling, storage, processing fees)

Baseline data was acquired from the Clarity tabulation of the EPIC HER from five UCHealth hospitals across three regions: North, South, and Denver Metro between 2/1/2019 – 1/31/2020.

We included adult patients who received a blood transfusion during an inpatient encounter

Perioperative units, operating rooms, and outpatient transfusions were excluded from analysis

Findings

18,055 units of pRBCs were transfused during 13,804 transfusion

7,015 (51%) for pre-Hgb >/= 7.0, and of all transfused

3,471 (25%) of transfusions with two or more units for pre-Hgb greater than 6.0

Interventions

Update hospital guidelines to reflect evidence-based thresholds

Red blood cell transfusion (adult)

√ One unit will raise Hgb by approximately 1 g/dL
√ Hgb 8 g/dL ≈ Hct 24%, Hgb 10 g/dL ≈ Hct 30%

RBCs are most likely appropriate:

• 72 hr before and after surgery	Hgb < 8 g/dL
• Chronic anemia if other therapy fails	Hgb < 8 g/dL
• Clinical symptoms of anemia	Hgb < 10 g/dL
• Massive blood loss (>750 cc or >15% blood volume)	any Hgb

RBCs are most likely NOT appropriate:

• Asymptomatic patients with	Hgb > 8 g/dL

Updated to reflect current evidence

Red blood cell transfusion (adult)
1 unit will raise Hgb by approximately 1g/dL
RBCs are most likely **appropriate** in patients with the following clinical scenarios:
Hgb < 7 g/dL
Hgb < 8 g/dL with CV disease AND symptoms of chest pain, orthostatic hypotension, tachycardia unresponsive to fluid resuscitation
Hemodynamically unstable patient with an acute bleed
Perioperative acute blood loss anemia with expected Hgb drop <7 g/dL
Cytotoxic chemotherapy with an expected hemoglobin drop to <7 g/dL
Anemia with symptoms that are intolerable without transfusion

Figure 1: 2015 Guidelines from UCH Blood Bank 2015 (left) updated to reflect evidence-based thresholds

Implementing Epic Changes

Clinician level randomized user-centered, design-focused pragmatic factorial trial manipulating the blood transfusion ordering interface to evaluate the most effective method for reducing unnecessary blood transfusions (Figure 2)

- Use a 'nudge' approach to increase provider compliance with evidence-based thresholds with Help Text and BPAs
- Interventions will focus on two main outcomes: overutilization of pRBC for pre-Hgb ≥ 7.0 and multiple units per transfusion order with pre-Hgb ≥ 6.0

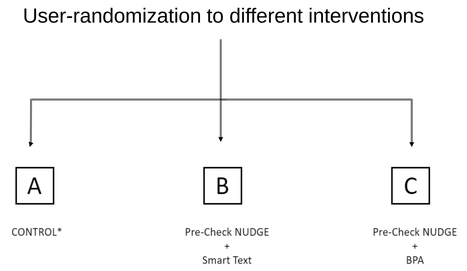

Figure 2: Users will be randomized to receive all 3 interventions in succession (Control, Help Text Nudge, and BPA Nudge) when ordering pRBC with a pre-Hgb ≥ 7.0

Discussion & Reflection

- These data support the need for improvement in transfusion practices across the UCHealth system
- Implementing EHR changes using the nudge approach has been successful at a number of institutions to decrease inappropriate RBC transfusions
- Reducing unnecessary transfusions would reduce pRBC unit costs by $1.1M at UCH alone
- Future endeavors include expanding these processes to other UCHealth facilities

Reference

1.Raddish M, Horn SD, and Sharkey PD. Continuity of care: is it cost effective? Am J Manag Care. 1999 Jun;5(6):727-34.

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Background

- Optimal utilization of blood products requires a balance between maximizing clinical outcomes while avoiding unnecessary costs and risks associated with transfusions
- A growing body of evidence suggests increased morbidity and mortality with aggressive transfusion strategies
- Many studies promote transfusion only when the hemoglobin (Hgb) is <7 g/dl
- 51% of inpatient transfusions at five UCHealth hospitals were given for a Hgb ≥7 g/dl (excluding operating rooms) between Feb 2019 to Jan 2020
- Per unit pRBC cost: $250 (up to $600 per unit including handling, storage, processing fees)

Population & Methods

- Baseline data was acquired from the Clarity tabulation of the EPIC HER from five UCHealth hospitals across three regions: North, South, and Denver Metro between 2/1/2019 – 1/31/2020.
- We included adult patients who received a blood transfusion during an inpatient encounter
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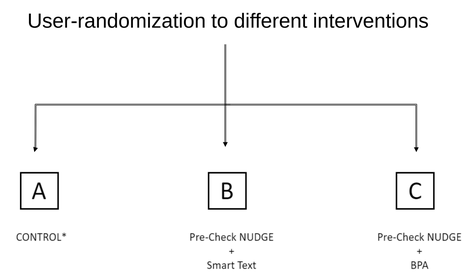

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Discussion

- These data support the need for improvement in transfusion practices across the UCHealth system
- Implementing Epic changes using the nudge approach has been successful at a number institutions to decrease inappropriate RBC transfusions
- We are currently working with UCHealth leadership for approval of the trial design
- Reducing unnecessary transfusions would reduce pRBC unit costs by $1.1 at UCH alone
- Future endeavors include expanding these processes to other UCHealth facilities

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