If One will Do, Why Transfuse Two?

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Nova Scotia Health Authority
Professor, Department of Pathology
Dalhousie University, Halifax, Nova Scotia
If One will Do, Why Transfuse Two?

- **Presentation Objectives:**
  - Explain the Choosing Wisely Canada Campaign
  - Provide the evidence to support single unit red cell transfusion
  - Describe justification for inclusion into choosing wisely statement
Choosing Wisely

- **Choosing Wisely Canada** is a campaign to help physicians and patients engage in conversations about unnecessary tests, treatments and procedures.

- *Choosing Wisely Canada* is modelled after the Choosing Wisely® campaign in the United States, which was launched by the ABIM Foundation in April 2012.

- [http://www.choosingwiselycanada.org/](http://www.choosingwiselycanada.org/)
Choosing Wisely Canada

- Initially in Ontario and has quickly been adopted by all provincial and territorial medical associations.

- It is now a truly national campaign in Canada.

- Has spread to Australia, Germany, Italy, Japan, Netherlands, Switzerland and elsewhere. Choosing Wisely Canada leads the international effort.
170+ PHYSICIAN RECOMMENDATIONS

ALL Provinces/Territories Engaged

45+ COMMITTED SOCIETIES

Choosing Wisely Canada

Leveraged FUNDS

370K+ VISITORS

Star:

75+ Early Adopter Organizations

74k+ potential reach

media:

401k+ followers:

45+ STARS Societies

led by Canada

30+ project partners
What do they do?

- Approach Professional Canadian National Societies representing a broad spectrum of physicians

- Professional societies: Develop lists of “Five Things Physicians and Patients Should Question.”
• Tests, treatments or procedures that
  – (a) are frequently used, and,
  – (b) may expose patients to harm or stress.
  – (c) not only about saving resources or money.
Launched on April 2, 2014
Media release on October 29, 2014

New Recommendations released June 2, 2015

More than 150 recommendations total
CWC- What do they do?

- Develop patient and physicians resources
  - [http://www.choosingwiselycanada.org/resources/campaign-videos/](http://www.choosingwiselycanada.org/resources/campaign-videos/)

- Establish mechanisms to support the adoption of the *Choosing Wisely Canada* lists.
Patient Education Resources

Sometimes LESS is more.
Ask your doctor:
Do I really need this test, treatment or procedure?
What are the downsides?
Are there simpler, safer options?
What happens if I do nothing?

‘White Board Videos’

Doc Mike Evan’s – Do More Screening Tests Lead to Better Health?
March 30th
National Choosing Wisely Canada Conference: Sold Out!

Interactive sessions on topics including:
- How different organizations have implemented our recommendations and lessons learned from the field
- What groups are doing to scale local innovations
- How to measure the impact of the campaign locally
- Highlighting innovative Choosing Wisely Canada projects across the nation
- Learning more about incorporating the patient perspective into Choosing Wisely
- The national medical student Choosing Wisely Canada campaign
• Incorporating **patient safety**, **quality improvement** and **resource stewardship** content into residency training and faculty development;
• Developing skills to **lead educational change** and integrate patient safety, quality improvement and resource stewardship training in your residency program; and
• Creating an **educational plan** for patient safety, quality improvement and resource stewardship that can be implemented in your program or organization.
10,000,000 CHALLENGE
Help prevent ten million unnecessary tests and treatments by 2020.

1. Register
2. Get the starter kit
3. Pick a target
4. Implement
5. Tell us how you did

info@ChoosingWiselyCanada.org
DIY campaign

Inspiration for Your Implementation: CWC’s User-Generated Toolkits.

- Lose the Tube: A toolkit for early removal of urinary catheters on hospital wards.
- Bye-Bye, PPL: A toolkit for deprescribing proton pump inhibitors in DCM and primary care settings.
- Why Give Two When One Will Do?: A toolkit for reducing unnecessary retransfusions in hospitals.
- Drop the Pre-Op: A toolkit for reducing unnecessary renal and cardiovascular investigations in pre-operative clinics.
- Less Sedatives for Your Older Relatives: A toolkit for reducing inappropriate use of benzodiazepines and sedative hypnotics among your elderly in hospitals.
http://www.transfusion.ca
CSTM'S CHOOSING WISELY CANADA
LIST OF TEN THINGS PHYSICIANS
AND PATIENTS SHOULD QUESTION
Read More
If one unit will do why transfuse two?
Choosing Wisely Canada
October 29, 2014

• **Canadian Society for Transfusion Medicine**

• **Second recommendation:**
  ▫ Don’t transfuse more than one Red cell unit at a time when transfusion is required in stable, non-bleeding patients.

• Why?
Background

- The dogma to “transfuse two units of red blood cells (RBC) or don’t transfuse at all” potentially exposes patients to unnecessary transfusion when one unit of RBC would be sufficient.

- Hemoglobin (Hgb) ≥70-80 g/L is considered acceptable in most clinically stable anemic patients.

- Decision about transfusion should be guided by patient symptoms and not only hemoglobin concentration.
Why do we transfuse two Red blood cell units?

The Single-Unit Transfusion
A Continuing Problem

James F. Crispen, M.D.
Harrisburg, Pennsylvania

Transfusion Service
Harrisburg Polyclinic Hospital, 1962

<table>
<thead>
<tr>
<th>Description</th>
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The famous TRICC trial

The New England Journal of Medicine

A MULTICENTER, RANDOMIZED, CONTROLLED CLINICAL TRIAL OF TRANSFUSION REQUIREMENTS IN CRITICAL CARE
<table>
<thead>
<tr>
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<th>Design</th>
<th>Population</th>
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<th>Primary outcome(s)</th>
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<tr>
<td>Hebert et al&lt;sup&gt;9&lt;/sup&gt; (TRICC)</td>
<td>RCT</td>
<td>Stable, critically ill patients &gt; 16 y of age with Hb &lt; 9 g/dL</td>
<td>Restrictive (Hb &lt; 7 g/dL) vs liberal (Hb &lt; 10 g/dL)</td>
<td>Death within 30 d of randomization</td>
<td>Death at 60 d, assessment of organ dysfunction</td>
<td>Restrictive transfusion strategy is at least as effective and possibly superior to a liberal transfusion strategy with the possible exception of patients with acute myocardial infarction or unstable angina</td>
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<td>Lacroix et al&lt;sup&gt;10&lt;/sup&gt; (TRIPICU)</td>
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<td>Restrictive (Hb &lt; 7 g/dL) vs liberal (Hb &lt; 9.5 g/dL)</td>
<td>Death within 28 d of randomization, development or progression of MODS</td>
<td>Daily assessment of organ dysfunction, sepsis, transfusion reactions, infections, adverse events, length of stay, overall mortality In-hospital myocardial infarction, unstable angina, or death</td>
<td>Restrictive transfusion strategy decreases transfusion requirements without increasing adverse events Liberal transfusion strategy did not reduce rate of death or inability to walk at 60 d follow-up</td>
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<td>Carson et al&lt;sup&gt;11&lt;/sup&gt; (FOCUS)</td>
<td>RCT</td>
<td>Adults &gt; 50 y of age with history or risk factors for cardiovascular disease with Hb &lt; 10 g/dL after hip fracture surgery</td>
<td>Restrictive (Hb &lt; 8 g/dL) vs liberal (Hb &lt; 10 g/dL)</td>
<td>Death or inability to walk across a room at 60 d follow-up</td>
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<td>Villanueva et al&lt;sup&gt;14&lt;/sup&gt;</td>
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<td>Adult patients with severe upper gastrointestinal bleeding</td>
<td>Restrictive (Hb &lt; 7 g/dL) vs liberal (Hb &lt; 9 g/dL)</td>
<td>Death within 45 d of randomization</td>
<td>Rates of further bleeding or hospital complications</td>
<td>Restrictive transfusion strategy was associated with improved outcomes</td>
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MODS indicates multiple-organ dysfunction syndrome; FOCUS, Transfusion Trigger Trial for Functional Outcomes in Cardiovascular Patients Undergoing Surgical hip Fracture Repair; RCT, randomized, controlled trial; TRICC, Transfusion Requirements in Critical Care; and TRIPICU, Transfusion Requirements in Pediatric Intensive Care Unit.
Several guidelines with conservative thresholds

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*For patients with acute blood loss. †For patients with symptoms of end-organ ischaemia.

Table 3: Medical society clinical practice guidelines for red blood cell transfusion
Red Blood Cell Transfusion: A Clinical Practice Guideline From the AABB (March 2012)

- **Recommendation 1:** The AABB recommends adhering to a restrictive transfusion strategy (7 to 8 g/dL) in hospitalized, stable patients (Grade: strong recommendation; high-quality evidence).
Red Blood Cell Transfusion: A Clinical Practice Guideline From the AABB (March 2012)

- ** Recommendation 2:** The AABB suggests adhering to a restrictive strategy in hospitalized patients with preexisting cardiovascular disease and considering transfusion for patients with symptoms or a hemoglobin level of 8 g/dL or less (Grade: weak recommendation; moderate-quality evidence).
Red Blood Cell Transfusion: A Clinical Practice Guideline From the AABB (March 2012)

- **Recommendation 3:** The AABB cannot recommend for or against a liberal or restrictive transfusion threshold for hospitalized, hemodynamically stable patients with the acute coronary syndrome (Grade: uncertain recommendation; very low-quality evidence).
Red Blood Cell Transfusion: A Clinical Practice Guideline From the AABB (March 2012)

- **Recommendation 4:** The AABB suggests that transfusion decisions be influenced by symptoms as well as hemoglobin concentration (Grade: weak recommendation; low-quality evidence).
NAC companion document

“Red Blood Cell Transfusion: A Clinical Practice Guideline from the AABB”
2014-05-28

http://www.nacblood.ca/resources/guidelines/NAC.html

- Adherence to a restrictive transfusion strategy (70-80 g/L) in hospitalized, stable patients
  - Adult and pediatric ICU patients: consider transfusion at 70 g/L or less
  - Post-operative surgical patients: consider transfusion at 80 g/L or less

- Adherence to a restrictive transfusion strategy (≤80 g/L) in hospitalized, stable patients with preexisting cardiovascular disease

- Considering transfusion for patients with symptoms (chest pain, orthostatic hypotension, tachycardia unresponsive to fluid resuscitation, congestive heart failure)

- Transfusion decisions should be influenced by symptoms as well as hemoglobin concentration
Second recommendation:
Don’t transfuse more than one Red cell unit at a time when transfusion is required in stable, non-bleeding patients.

- Indications for red blood transfusion depend on clinical assessment and the cause of the anemia.

- In a stable, non-bleeding patient, often a single unit of blood is adequate to relieve patient symptoms or to raise the hemoglobin to an acceptable level.

- Transfusions are associated with increased morbidity and mortality in high-risk hospitalized inpatients.
Second recommendation: Don’t transfuse more than one Red cell unit at a time when transfusion is required in stable, non-bleeding patients.

- Transfusion decisions should be influenced by symptoms and hemoglobin concentration.

- Single unit red cell transfusions should be the standard for non-bleeding, hospitalized patients.

- Additional units should only be prescribed after re-assessment of the patient and their hemoglobin value.
Choosing Wisely Canada

- Other societies?
Canadian Society of Internal Medicine

Third recommendation:

Don’t transfuse red blood cells for arbitrary hemoglobin or hematocrit thresholds in the absence of symptoms, active coronary disease, heart failure or stroke.
Canadian Hematology Society

Fifth recommendation:
- Don’t transfuse patients based solely on an arbitrary hemoglobin threshold.
Choosing Wisely Canada
October 29, 2014

- Canadian Society of Palliative Care Physicians
- Fifth recommendation:
  - Don’t transfuse red blood cells for arbitrary hemoglobin or hematocrit thresholds in the absence of symptoms, or if no benefit was perceived from previous transfusions.
ASH’s Choosing Wisely first recommendation advises against liberal transfusion of RBCs:

"Transfusion of the smallest effective dose of RBCs is recommended because, compared with restrictive strategies, liberal transfusion does not improve patient outcomes.

Therefore, liberal transfusion generates costs and exposes patients to potential harms from transfusion without likelihood of benefit."

Consistent with this recommendation, ASH panel further advise that clinicians avoid administering 2 units of RBCs if 1 unit is sufficient and that appropriate weight-based dosing of RBCs be used in children.
Restrictive transfusion strategy versus Single unit transfusions
A retrospective study evaluating single-unit red blood cell transfusions in reducing allogeneic blood exposure Ma, M., Eckert, K., Ralley, F. and Chin-Yee, I. (2005),

- Of 302 included patients, only 65 received a one-unit transfusion.
- Based on thresholds of ≥90, ≥80 and ≥70 g L$^{-1}$, a single-unit transfusion would be sufficient in 42.0% (RRR = 0.54), 79.6% (RRR = 0.23) and 98.0% (RRR = 0.02) of cases, respectively.
- This corresponds to 0.21, 0.57 and 0.82 mean RBC units saved per patient.
- Adopting a policy of transfusing RBC in single-unit aliquots could significantly improve RBC utilization and decrease patient exposure to allogeneic blood
Single Unit Blood Transfusions

NHS Blood and Transplant (NHSBT) 2014

- A pilot study at Kings College Hospital
- to introduce a single unit transfusion policy
- for non-bleeding medical patients in an AMU
- has resulted in a 40-45% reduction in red cell use over a 6 month period.
- Implementing this change in practice has involved a period of training for both clinical and laboratory staff and changes to policy.
SINGLE Unit Blood Transfusions reduce the risk of an adverse reaction

Don’t use two without review

THINK!
- Is your patient symptomatic?
- Is the transfusion appropriate?
- What is the haemoglobin trigger level?
- What is the patient’s target haemoglobin level?

Each unit transfused is an independent clinical decision

DO!
✓ Clinically re-assess the patient after each unit transfused.
✓ Only one unit should be ordered for non-bleeding patients.
✓ Document the reason for Transfusion.¹

¹ British Committee for Standards in Haematology: Addendum to Administration of Blood Components. 2012
The Halifax Experience
CDHA Retrospective review of two units transfusions
E. Kahwash et al 2012

- Local RBC transfusion data from June and July 2011 were reviewed.
- Excluded all bleeding, OR, cancer treated and Medical day clinic patients.
- Excluded patient who received one unit.
One hundred twenty-six stable, non-bleeding patients who received a two-unit RBC transfusion were included;

- 81 were medical patients
- 45 were surgical patients
## CDHA Retrospective review

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<th>Symptomatic</th>
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CDHA Retrospective review of two units transfusions
E. Kahwash et al 2012

Results

- Average pre-transfusion Hgb was 73 ± 10 g/L,
- Post-transfusion the average Hgb level was 94 ± 11 g/L.

- Asymptomatic patients with Hgb >80
  - # 32 patients,
  - received 2 RBCs with no indications at all.
  - So, 64 RBCs not indicated.

- Asymptomatic patients with Hgb<79
  - # 83 patients,
  - received 2 RBCs, while one could have been enough.
  - So, around 83 units could have been not indicated.
CDHA Retrospective review of two units transfusions
E. Kahwash et al 2012

• Results
• Based on two months study
  • 256 units transfused for stable patients.
  • >140 units (55%) could have been avoided.
  • = 1000-1200 units unnecessary transfusions per year,
  • 5% of total RBCs issued from blood bank at QEII.
Red cell utilisations initiatives
Red cell utilizations initiatives

- 9 months discussion with the medical Staff
Policy Enforcement

• Transfuse one red cell unit and then reassess based on the indication: hemoglobin level/clinical symptoms.

• Policy approved By DMAC Fall 2012.

• Policy was enforced by blood transfusion services starting January 2013
Policy Enforcement

- Transfuse one red cell unit and then reassess based on the indication: hemoglobin level/clinical symptoms.

- Did not include out patient clinic or Emergency room

- Did not include Hematology in-patients due to nursing workload concern.

- Did not indicate a hemoglobin cut off as there were no agreed upon National or Provincial guidelines
Policy algorithm

Request for RBC is received. Is the patient in an outpatient clinic (i.e. MDU), bleeding, in the ER at any site, or in the OR?

- Yes
- No

Yes

Look in LIS to confirm the Hgb value. Is the hemoglobin on the requisition < 90? NOTE: Do not communicate the decision point of Hgb < or ≥90 to the clinical care personnel. This is a decision point for the internal lab process only, not a clinical transfusion trigger.

- Yes, Hgb < 90.
- No, Hgb ≥ 90.

No

Is the patient on SA/RRMT?

- Yes
- No

Yes

Call the Hematopathologist on service – AND Call floor, “Clinician to contact Hematopathologist if red cell needed – does not meet our recommendations for appropriateness.”

- No Hgb provided

No

Look up the last Hgb in LIS. Is it within the last 24 hours AND is it ≥ 90?

- Yes
- No

Yes

Record Hgb, initial and dispense as requested.

No

Are both conditions met?

- Yes
- NO

NO

If both conditions are met, dispense as requested.

YES

Call the Hematopathologist on service – AND Call floor, “Clinician to contact Hematopathologist if red cell needed – does not meet our recommendations for appropriateness.” (If no CBC, request CBC be done.)

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Number and Percentage of patients receiving one versus 2 units of red cells

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</tr>
</tbody>
</table>

![Graph showing number and percentage of patients receiving one versus 2 units of red cells for 2012 and 2013.](image)
Transfusion of one red cell unit at a time Policy

- Increased awareness
Effect of education on ER transfusions
Conclusions

The policy was implemented in Jan 2013:
- from Jan to Aug 2012: 10,624 RBCs were transfused
- from Jan to Aug 2013: 8,512 RBCs were transfused

- From Jan to Aug 2013:
  - 20% decrease in red cell transfusions
  - 10% increase in one unit transfusions
  - 10% Decrease in number of patients transfused (335 patients).

<table>
<thead>
<tr>
<th>RBCs</th>
<th>2012 # of patients</th>
<th>2013 # of patients</th>
<th>2012 % of patients</th>
<th>2013 % of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>2.204</td>
<td>2.304</td>
<td>64.31%</td>
<td>75.76%</td>
</tr>
<tr>
<td>Two</td>
<td>1.091</td>
<td>656</td>
<td>31.84%</td>
<td>21%</td>
</tr>
<tr>
<td>Total patients</td>
<td>3295</td>
<td>2960</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Hematology and Stem Cell transplant patients

• Significant reduction of red blood cell transfusion requirements by changing from a double-unit to a single-unit transfusion policy in patients receiving intensive chemotherapy or stem cell transplantation
  – Martin David Berger, Bernhard Gerber, Kornelius Arn, Oliver Senn, Urs Schanz, Georg Stussi
  – Haematologica January 2012 97:116-122

• **Conclusions** Implementing a single-unit transfusion policy saves 25% of red blood cell units and, thereby, reduces the risks associated with allogeneic blood transfusions.
Transfusion of one red cell unit at a time

- Hematology inpatients
  - Concerns
    - Large number of red cell transfusion
    - Increase nursing workload
    - Delay second unit transfusion
    - Transfuse into the late evening.
Transfusion of one red cell unit at a time

- **Hematology inpatients**
  - In November 2013 and in collaboration with the Clinical hematologists BTS implemented a modified Red Cell Guidelines for elective non-bleeding General Hematology and Bone Marrow Transplant patients.

  - If a non-bleeding patient has a hemoglobin 70-80g/L
    - will receive ONE unit of red cells and
    - have a repeat CBC on the following morning.

  - If a non-bleeding patient has hemoglobin of <70g/L
    - will receive TWO units of red cells and
    - have a repeat CBC on the following morning.
Transfusion of one red cell unit at a time

| 3 Month Audit of Hematology & Bone Marrow Transplant Pre & Post Red Cell Guidelines |
|---------------------------------|---------------------------------------------------------------------------------|
| 16% Decrease                    | # of red cell units transfused                                                  |
| 81% Decrease                    | # of patients receiving two red cell units in one setting                      |
| 13% Decrease                    | # of red cell units transfused per patient                                      |
| 87% Decrease                    | # of post transfusion hemoglobin >100 g/L                                        |
Transfusion of one red cell unit at a time

<table>
<thead>
<tr>
<th>Red Cells</th>
<th>2011-2012</th>
<th>2012-2013</th>
<th>2013-2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Received from CBS</td>
<td>16,236</td>
<td>15,082</td>
<td>13,487</td>
</tr>
<tr>
<td>Decrease from 2011/2012</td>
<td>n/a</td>
<td>1154</td>
<td>2749</td>
</tr>
<tr>
<td>% change in Receipts</td>
<td>n/a</td>
<td>7% ↓</td>
<td>17%↓</td>
</tr>
<tr>
<td>Transfused</td>
<td>15,495</td>
<td>14,457</td>
<td>12,951</td>
</tr>
<tr>
<td>Decrease from 2011/2012</td>
<td>n/a</td>
<td>1038</td>
<td>2544</td>
</tr>
<tr>
<td>% Change in Transfusions</td>
<td>n/a</td>
<td>6.7%↓</td>
<td>16.4%↓</td>
</tr>
</tbody>
</table>
Transfusion of one red cell unit at a time

- Decrease number of patients transfused
  - By around 300 patients per year.
  - 10% of patients

- Decrease red cell transfusions
  - by 1038 units in 2012/2013
  - By 2544 units in 2013/2014.

- For the year 2012-2013, the cost savings to the Nova Scotia blood budget was $519,000 and in the year of 2013-2014, the savings increased to $1,272,000.
Red cell transfusions
If one unit will do why transfuse two?
Transfusion hemoglobin thresholds
Choosing Wisely Canada
October 29, 2014

- **Canadian Hematology Society**
  - **Fifth recommendation:**
    - Don’t transfuse patients based solely on an arbitrary hemoglobin threshold.

- **Canadian Society of Internal Medicine**
  - **Third recommendation:**
    - Don’t transfuse red blood cells for arbitrary hemoglobin or hematocrit thresholds in the absence of symptoms, active coronary disease, heart failure or stroke.
Choosing Wisely Canada

• DIY campaign

WHY GIVE TWO WHEN ONE WILL DO?

A toolkit for reducing unnecessary red blood cell transfusions in hospitals
If One will Do, Why Transfuse Two?

- **Presentation Objectives:**
  - Explain the Choosing Wisely Canada Campaign
  - Provide the evidence to support single unit red cell transfusion
  - Describe justification for inclusion into choosing wisely statement
If One will Do, Why Transfuse Two?