PATIENT BLOOD MANAGEMENT:
WHY? WHAT? WHEN? HOW?

Presented by
Kathleen Sazama, MD, JD
Chief Medical Officer
LifeSouth Community Blood Centers, Inc.
Figure 11-2. Allogeneic whole blood and red blood cell collection and transfusion, 1989-2006.
Rationale for Patient Blood Management

- Increased public demand for safe alternatives to blood transfusion therapy
- Advanced technology and pharmacological agents making bloodless medicine and surgery not only possible but preferable
- Fluctuations in national blood supply
- Escalating costs due to growing number of federally mandated tests to screen donated blood for disease
- Increasing evidence in favor of minimal storage time for blood components that will lead to reevaluation of blood systems practices
Patient Blood Management as a Paradigm Shift

- Patient blood management (PBM) is a new way of practicing medicine that rejects traditional transfusion practices as the way to treat blood loss or anemia in favor of alternative strategies.
- PBM should be at the center of care for the patient at risk for transfusion.
WHAT IS A PARADIGM SHIFT?

1. the set of experiences, beliefs and values that affect the way an individual perceives reality and responds to that perception.

2. a change in how a given society goes about organizing and understanding reality.

3. A “dominant paradigm” refers to the values, or system of thought, in a society that are most standard and widely held at a given time.

4. Dominant paradigms are shaped both by the community’s cultural background and by the context of the historical moment.
What Facilitates a Paradigm Shift?

- Professional organizations that give legitimacy to the paradigm
- Dynamic leaders who introduce and support the paradigm
- Writers and editors who explicate the system of thought. They both disseminate the information essential to the paradigm and give the paradigm legitimacy
- Government agencies who give credence to the paradigm
- Educators who propagate the paradigm’s ideas by teaching it to students
- Conferences conducted that are devoted to discussing ideas central to the paradigm
- Media coverage
- Lay groups, or groups based around the concerns of lay persons, that embrace the beliefs central to the paradigm
- Sources of funding to further research on the paradigm
What is PBM?

- a. Management of a patient who is at risk of transfusion so as to minimize the need for allogeneic transfusion and improve the probability of an optimal clinical outcome.

- b. Three well-known elements:
  1. correction of a low preoperative erythrocyte mass (preoperative anemia),
  2. minimization of perioperative erythrocyte loss, and
  3. use of minimal (i.e., low) hemoglobin-based transfusion triggers.
PBM practice should

- a. Reduce patient exposure to blood transfusion
- b. Optimize blood utilization
- c. Reduce variations in transfusion practice
- d. Achieve safe blood management practices
- e. Support a patient's decision to minimize or eliminate the use of blood or blood components
Transfusion Rates for Primary Total Hip Replacements by Surgeon

*Information is based on cases for Fiscal Year 2009*
“The right blood to the right patient at the right time”.

- RIGHT blood
- RIGHT patient
- RIGHT time
- With patient’s agreement
RIGHT BLOOD

- “The best transfusion is the one not given.”
- Blood component given should be based on carefully defined need using both clinical and laboratory assessments.
  - Not hemoglobin alone
    - There is no absolute “transfusion trigger”
  - Look at the patient
- Includes all components
- Value of patient’s own blood depends on timing
Autologous Variance

Autologous /Orthopat Tended FY'05-08

<table>
<thead>
<tr>
<th></th>
<th>FY05</th>
<th>FY'06</th>
<th>FY'07</th>
<th>FY'08</th>
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<tbody>
<tr>
<td># Units Received</td>
<td>881</td>
<td>837</td>
<td>636</td>
<td>534</td>
</tr>
<tr>
<td># Units Outdated</td>
<td>411</td>
<td>380</td>
<td>334</td>
<td>268</td>
</tr>
<tr>
<td># Units Used</td>
<td>470</td>
<td>457</td>
<td>302</td>
<td>266</td>
</tr>
<tr>
<td>Orthopat</td>
<td>280</td>
<td>299</td>
<td>368</td>
<td>432</td>
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### Table 2. Univariate analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Donors</th>
<th>Nondonors</th>
<th>p Value</th>
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<tbody>
<tr>
<td>Mean duration of surgery (minutes)</td>
<td>191</td>
<td>193</td>
<td>0.95</td>
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<tr>
<td>Mean number comorbidities</td>
<td>1.54</td>
<td>1.27</td>
<td>&lt;0.01</td>
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<tr>
<td>Mean number of levels operated</td>
<td>2.0</td>
<td>2.3</td>
<td>0.07</td>
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<tr>
<td>Mean blood loss (cc)</td>
<td>963</td>
<td>796</td>
<td>0.16</td>
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<tr>
<td>Mean blood replacement (cc)</td>
<td>1391</td>
<td>410</td>
<td>&lt;0.01</td>
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<tr>
<td>Mean preoperative hemoglobin (g/dL)</td>
<td>11.7</td>
<td>13.2</td>
<td>0.04</td>
</tr>
<tr>
<td>Mean postoperative hemoglobin (g/dL)</td>
<td>11.3</td>
<td>10.9</td>
<td>0.40</td>
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<tr>
<td>Mean age (years)</td>
<td>61.4</td>
<td>61.3</td>
<td>0.86</td>
</tr>
<tr>
<td>Mean BMI (kg/m2)</td>
<td>25.9</td>
<td>23.6</td>
<td>0.05</td>
</tr>
</tbody>
</table>
RIGHT BLOOD

- Must avoid indiscriminant ‘shotgun’ approach to therapy
  - Component use must be cost-effective based on evidence and knowledge, e.g.
    - Understand what the problem is
      - TEG-directed treatment of coagulopathy
    - Understand what factors are contained in different components
      - Don’t give platelets when FFP is needed
# Blood use by surgeon by DRG reporting

<table>
<thead>
<tr>
<th>Physician</th>
<th>Discharges</th>
<th>Total Receiving Blood (1)</th>
<th>Average Units per Case (2)</th>
<th>ALOS w/</th>
<th>ALOS w/o</th>
<th>Ave Charges w/ Blood w/</th>
<th>Ave Charges w/ Blood w/o</th>
<th>% Autologous</th>
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<tr>
<td></td>
<td>386</td>
<td>86.8%</td>
<td>2.2</td>
<td>1.9</td>
<td>1.9</td>
<td>$82,961</td>
<td>$78,596</td>
<td>3.3%</td>
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<tr>
<td></td>
<td>350</td>
<td>4.3%</td>
<td>1.5</td>
<td>3.3</td>
<td>2.4</td>
<td>$54,309</td>
<td>$49,840</td>
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<tr>
<td></td>
<td>189</td>
<td>29.6%</td>
<td>1.3</td>
<td>4.7</td>
<td>4.0</td>
<td>$111,934</td>
<td>$103,235</td>
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<tr>
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<td>123</td>
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<td>1.5</td>
<td>3.4</td>
<td>2.8</td>
<td>$71,220</td>
<td>$76,212</td>
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<td>36.0%</td>
<td>1.8</td>
<td>4.3</td>
<td>3.3</td>
<td>$56,221</td>
<td>$49,339</td>
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<tr>
<td></td>
<td>82</td>
<td>42.7%</td>
<td>2.0</td>
<td>4.6</td>
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<td>$106,666</td>
<td>$74,389</td>
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<td>1.8</td>
<td>5.1</td>
<td>4.3</td>
<td>$55,418</td>
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<td>6.2</td>
<td>4.4</td>
<td>$135,311</td>
<td>$121,190</td>
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<tr>
<td></td>
<td>51</td>
<td>23.5%</td>
<td>2.5</td>
<td>4.6</td>
<td>4.2</td>
<td>$56,386</td>
<td>$54,757</td>
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<tr>
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<td>16.0%</td>
<td>1.9</td>
<td>4.2</td>
<td>3.7</td>
<td>$81,000</td>
<td>$70,393</td>
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<tr>
<td></td>
<td>46</td>
<td>41.3%</td>
<td>1.7</td>
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<td>4.0</td>
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<td>$49,625</td>
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<td>1.8</td>
<td>3.8</td>
<td>3.9</td>
<td>$48,475</td>
<td>$45,170</td>
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<tr>
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<td>44</td>
<td>15.9%</td>
<td>1.4</td>
<td>2.9</td>
<td>2.1</td>
<td>$71,095</td>
<td>$64,127</td>
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<tr>
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<tr>
<td></td>
<td>32</td>
<td>78.1%</td>
<td>2.4</td>
<td>3.2</td>
<td>3.4</td>
<td>$105,314</td>
<td>$89,677</td>
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<tr>
<td></td>
<td>29</td>
<td>27.6%</td>
<td>1.1</td>
<td>3.9</td>
<td>3.4</td>
<td>$70,340</td>
<td>$64,517</td>
<td>37.5%</td>
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<tr>
<td></td>
<td>27</td>
<td>11.1%</td>
<td>5.0</td>
<td>9.3</td>
<td>3.9</td>
<td>$88,742</td>
<td>$52,354</td>
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<tr>
<td></td>
<td>26</td>
<td>11.5%</td>
<td>1.3</td>
<td>3.3</td>
<td>3.7</td>
<td>$36,732</td>
<td>$37,561</td>
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<tr>
<td></td>
<td>25</td>
<td>48.0%</td>
<td>1.2</td>
<td>4.9</td>
<td>5.1</td>
<td>$78,875</td>
<td>$71,438</td>
<td>66.7%</td>
</tr>
</tbody>
</table>
Blood management can mean different things to different people and groups.

- **To physicians**: PBM is a treatment plan for blood loss or anemia that decreases patient risk through avoidance of traditional transfusion practices.

- **To nurses**: PBM may mean recognition of their vital role in supporting blood management practice by understanding transfusion options and alternatives, use of minimal blood draw techniques, and recognition and encouragement of treatment opportunity for anemia.

- **To a hospital**: PBM may mean optimization of the care that improves outcomes and reduce costs significantly.

- **To blood bankers**: it could well mean the sum of all those acts that create an inventory, keep it as fresh as possible and reduce wastage.
RIGHT BLOOD

- **Continued**
  - To blood centers: it may mean focused provision of blood components for the patients who really need transfusion. PBM also may provide the basis for a strategic plan for survival for the future as an important part in paradigm shift. Donor selection and motivation will play a huge role in what might well be thought of as supply side patient blood management.
  
  - **To the insurance companies**: PBM can drive acceptance of the paradigm shift as a means of promoting better patient outcomes
  
  - **To industry**: PBM can be the rationale for creating business plans, products, etc. that promote the PBM paradigm shift
RIGHT PATIENT

- The patient must be involved in the transfusion decision
  - Informed choice is mandatory. This discussion must occur far enough in advance of a planned procedure to allow for time to prepare for alternative strategies to transfusion.
  - Choice/consent must include a “personalized” risk of transfusion based on the planned procedure, patient co-morbidities and physician/hospital capabilities and experience.

- Known risk must always prevail over perceived benefit
- Blood transfusion must be avoided or minimized whenever possible.
Fig. 2. Estimates of the current risk per unit of blood transfusion.

The vertical bars represent log risk estimates (1-10, 1-100, etc.). The dashed edges to lighter shaded horizontal bars signify that the upper and lower estimates of risk are uncertain.
Transfusion must be goal directed

- Transfuse for a specific clinical reason that is based on proven, published evidence and or consensus guidelines
- Stop and reassess after each unit transfused
- Use the smallest amount of blood component needed to address the clinical problem
- Tailor treatment to the individual patient
Use a multidisciplinary team approach
The surgeon and anesthesiologist evaluate the patient before admission and create a treatment plan in consultation with the blood banker

Employ a combination of modalities that may require extra steps such as preoperative correction of anemia with iron and/or RhuEPO, hypotensive anesthesia, regional anesthesia, euvolemic hemodilution, antifibrinolytic drug administration, pre- and post-operative cell recovery/reinfusion, special cautery, off-pump heart surgery, retrograde autologous prime of the bypass machine, mini-circuits.

Have an effective hemovigilance process to avoid patient/blood mismatch errors
NPSG.01.01.01
- Use at least two patient identifiers when providing care, treatment, and services

Elements of Performance
- Use at least two patient identifiers when administering medications, blood, or blood components; when collecting blood samples or other specimens for clinical testing and when providing treatment or procedures. *(NOT – patient’s room number or physical location)*
- Label containers used for blood... in the presence of the patient.
NPSG 2012 (cont)

- NPSG.01.03.01
  - Eliminate transfusion errors related to patient misidentification

- Elements of Performance
  - Before initiating a blood or blood component transfusion:
    - Match the blood/component to the order
    - Match the patient to the blood/component
    - Use a 2-person verification process (or a 1-person plus automated ID technology, e.g. bar coding)
When using a two person verification process, one person conducting the identification verification is a qualified transfusionist who will administer the blood/component to the patient.

When using a two-person verification process, the second person conducting the ID verification is qualified to participate in the process, as determined by the hospital.
RIGHT TIME

- When need has been established based on clinical and laboratory assessments
- Be prepared!
  - Planning for elective surgery must include
    - Anemia evaluation and treatment to maximize the patient’s own RBC mass
    - Scheduling of autologous recovery/reinfusion strategies
  - Surgical techniques to minimize blood loss
  - Avoid phlebotomy losses
- Adjust for volume losses
  - Correct fluid overload to avoid RBC transfusion based on falsely decreased hematocrit
BASIC CONSIDERATIONS

- Optimal patient outcome considering
  - the risks of transfusion,
  - the costs,
  - the benefits,
  - rational options
  - a changing healthcare environment