Appropriate transfusion policy; how to lower transfusion rates

Dr. Rianne Koopman M.D.
Department of Transfusion Medicine
Sanquin Bloodbank Amsterdam
Presentation

- Background
- Transfusion policies / Dutch experience
- PROTON (II) studies
- Conclusions
Background

• Blood products are costly

• Optimal use is preferable and necessary

• What is optimal use?

• Evidence about optimal use is limited
Transfusion Policies

• To transfuse or not to transfuse; that is the question

• Restrictive versus liberal red cell transfusion triggers.

• What is the evidence?
Restrictive versus liberal transfusion triggers

- TRICC (transfusion requirements in critical care)-trial.
- N=838
- Hb 7-9 g/dl or 10-12 g/dl mmol/l
Transfusion Strategies for Acute Upper Gastrointestinal Bleeding

Cándid Villanueva, M.D., Alan Colomo, M.D., Alba Bosch, M.D., Mar Concepción, M.D., Virginia Hernandez-Gea, M.D., Carles Aracil, M.D., Isabel Graupera, M.D., María Poca, M.D., Cristina Alvarez-Urturi, M.D., Jordi Gordillo, M.D., Carlos Guarner-Argete, M.D., Miquel Santaló, M.D., Eduardo Muñiz, M.D., and Carlos Guarner, M.D.

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>Restrictive Strategy</th>
<th>Liberal Strategy</th>
<th>Hazard Ratio (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>23/444 (5)</td>
<td>41/445 (9)</td>
<td>0.55 (0.33–0.92)</td>
<td>0.02</td>
</tr>
<tr>
<td>Patients with cirrhosis</td>
<td>15/139 (11)</td>
<td>25/138 (18)</td>
<td>0.57 (0.30–1.08)</td>
<td>0.08</td>
</tr>
<tr>
<td>Child–Pugh class A or B</td>
<td>5/113 (4)</td>
<td>13/109 (12)</td>
<td>0.30 (0.11–0.85)</td>
<td>0.02</td>
</tr>
<tr>
<td>Child–Pugh class C</td>
<td>10/26 (38)</td>
<td>12/29 (41)</td>
<td>1.04 (0.45–2.37)</td>
<td>0.91</td>
</tr>
<tr>
<td>Bleeding from varices</td>
<td>10/93 (11)</td>
<td>17/97 (18)</td>
<td>0.58 (0.27–1.27)</td>
<td>0.18</td>
</tr>
<tr>
<td>Bleeding from peptic ulcer</td>
<td>7/228 (3)</td>
<td>11/209 (5)</td>
<td>0.70 (0.26–1.25)</td>
<td>0.26</td>
</tr>
</tbody>
</table>
### Transfusion thresholds and other strategies for guiding allogeneic red blood cell transfusion (Review)

Carson JL, Cailes PA, Helen PC

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#### Outcome: Hospital mortality

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Restrictive</th>
<th>Liberal</th>
<th>Risk Ratio M-H Random 95% CI</th>
<th>Risk Ratio M-H Random 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n/N</td>
<td>n/N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blair 1986</td>
<td>0/26</td>
<td>2/24</td>
<td></td>
<td>0.19 [0.01, 3.67]</td>
</tr>
<tr>
<td>Bracey 1999</td>
<td>3/215</td>
<td>6/222</td>
<td></td>
<td>0.52 [0.13, 2.04]</td>
</tr>
<tr>
<td>Carson 1998</td>
<td>0/42</td>
<td>0/42</td>
<td></td>
<td>0.0 [0.0, 0.0]</td>
</tr>
<tr>
<td>Carson 2011</td>
<td>14/1003</td>
<td>20/999</td>
<td></td>
<td>0.70 [0.35, 1.37]</td>
</tr>
<tr>
<td>Hebert 1999</td>
<td>93/418</td>
<td>118/420</td>
<td></td>
<td>0.79 [0.63, 1.00]</td>
</tr>
</tbody>
</table>

**Total (95% CI)** 1704 | 1707 | 0.77 [0.62, 0.95]

- Total events: 110 (Restrictive), 146 (Liberal)
- Heterogeneity: Tau² = 0.0; Chi² = 1.35, df = 3 (P = 0.73); I² = 0.0%
- Test for overall effect: Z = 2.37 (P = 0.018)
- Test for subgroup differences: Not applicable

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#### Outcome: 30-day mortality

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Restrictive</th>
<th>Liberal</th>
<th>Risk Ratio M-H Random 95% CI</th>
<th>Weight</th>
<th>Risk Ratio M-H Random 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n/N</td>
<td>n/N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carson 1998</td>
<td>5/40</td>
<td>2/42</td>
<td></td>
<td>1.4%</td>
<td>2.50 [0.51, 13.17]</td>
</tr>
<tr>
<td>Carson 2011</td>
<td>66/1009</td>
<td>76/1007</td>
<td></td>
<td>35.4%</td>
<td>0.87 [0.63, 1.19]</td>
</tr>
<tr>
<td>Hebert 1999</td>
<td>93/418</td>
<td>118/420</td>
<td></td>
<td>63.2%</td>
<td>0.86 [0.68, 1.09]</td>
</tr>
</tbody>
</table>

**Total (95% CI)** 1469 | 1469 | 100.0 % | 0.88 [0.72, 1.06]

- Total events: 166 (Restrictive), 189 (Liberal)
- Heterogeneity: Tau² = 0.0; Chi² = 1.72, df = 2 (P = 0.42); I² = 0.0%
- Test for overall effect: Z = 1.38 (P = 0.17)
- Test for subgroup differences: Not applicable

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Less is more?

"On the other hand, if less is more we’re doing great!"
Sanquin Blood Supply

<table>
<thead>
<tr>
<th>Year</th>
<th>Red Blood Cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>565181</td>
</tr>
<tr>
<td>2006</td>
<td>549178</td>
</tr>
<tr>
<td>2007</td>
<td>540457</td>
</tr>
<tr>
<td>2008</td>
<td>544497</td>
</tr>
<tr>
<td>2009</td>
<td>539934</td>
</tr>
<tr>
<td>2010</td>
<td>535478</td>
</tr>
<tr>
<td>2011</td>
<td>529874</td>
</tr>
<tr>
<td>2012</td>
<td>486020</td>
</tr>
</tbody>
</table>

2005-2012: 14% decrease

2011-2012: 9% decrease

28.5 per 1000 inhabitants (lowest in Europe for comparable countries)
Dutch Experience

- National Blood Supply (Sanquin) including Department of Transfusion Medicine.
- Sanquin transfusion specialists are full members of Blood Transfusion Committees in Dutch hospitals and involved in developing Transfusion Guidelines.
- Transfusion specialists of Sanquin has an important advisory role in lowering transfusion rates.
- National Transfusion Guideline (CBO) promotes 4,5,6 rule, alternative therapies and new operation techniques.

- Introduction new law on quality of healthcare institution.
- Concentration of high risk patients.
- Economic crises.
How to lower transfusion rates?

• Data are needed.

• The Netherlands
  • 1996-2006 PROTON-study (PROfiles of TransfusiON recipients)
  • 2011-2015 PROTON II study
PROTON study

- 1996-2006 PROTON-study (PROfiles of TransfusiON recipients)
- Data from 20 hospitals
  - 290 043 patients
  - 2 405 012 blood products
Transfusions of red cells by age and sex

Fraction of RBC [%]

Men

Women

Age of transfusion recipient

Fraction of RBC [%]

(Vox Sanguinis, 2010 (99))
PROTON results
Transfusion of red cells related by age and diagnoses

Vox Sanguinis 2010 (99)
Additional analyses PROTON on red blood cell use
PROTON II

Aim

- The aim of PROTON II is to construct and maintain a nationally representative repository of quantitative data on the blood transfusion chain from donor to patient using existing databases to optimise the efficiency, sufficiency and safety of blood transfusions in the Netherlands

- Analyses
  - benchmark data hospitals
  - relationship donor characteristics and patient outcomes
  - cost-effectiveness analysis
  - use data mining techniques
  - case-control studies on risk-factors
PROTON II Data collection

- Patient characteristics
- Diagnoses / Test outcomes
- Transfusions
- Products
- Processes
- Donor characteristics

Hospital databases → TTP → Patient information databases

Sanquin databases

PROTON II data repository

- Demographic data
- Disease data
- Survival and death statistics
Conclusions

• There is growing evidence that restrictive transfusion triggers are of benefit for the patient.
• Transfusion rates show great variety between the different countries.
• Countries should develop strategies to improve the implementation of restrictive transfusion triggers.
• Blood Banks can play an advisory role in lowering transfusion rates.
• Analyses of quantitative data of the whole transfusion chain could improve that process.
• It is expected that PROTON II further will improve the optimization of the Dutch transfusion chain.