The Importance of Transfusion Error Surveillance

*This is step #1 in error management*

Jeannie Callum, BA, MD, FRCPC, CTBS
Error Tracking and Analysis using the Transfusion Error Surveillance System:
2005-2010

6051 Clinical Errors
9083 Laboratory Errors
15134 Errors over 6 years
“I don’t want to make the wrong mistake”

Yogi Berra
Outline

• Case

• Learning from other industries
  – Aviation
  – Anesthesiology

• Essential ingredients of transfusion error reporting
  – With examples from the Sunnybrook transfusion experience
ER – acute area
Nurse assigned to care for 3 patients

BED 15

BED 16

BED 17

Patient on list to go
To the operating room
For hip fracture
ER – acute area
Nurse assigned to care for 3 patients

BED 15
BED 16
BED 17

On arrival
Group and Screen sent
Diagnosis: Chest pain
B POS
ER – acute area
Nurse assigned to care for 3 patients

BED 15

BED 16

BED 17

6 hours later
Group and Screen sent
Diagnosis: Hip fracture
Order: 2 units CM
ER – acute area
Nurse assigned to care for 3 patients

Technologists: calls down to RN to let her know we need a ‘tan tube’ to allow us to prepare blood [last sample less than 24 hours and new patient]
RN: There are no transfusion orders for Bed 16
Technologist: Requisition states patient is in Bed 15
RN: Oh dear! I drew a G&S from Bed 15 and put Bed 16 name on it!
So we can be assured that a sample on a new patient was independently drawn and labelled.
ER – acute area
Nurse assigned to care for 3 patients

BED 15
BED 16
BED 17

Still no sample from this Patient – OR delayed

But no ABO-incompatible transfusions!
Why did we implement the tan tube?
Our error tracking system told us we needed to!
And...multiple other system changes failed
One error per day at just one hospital!

<table>
<thead>
<tr>
<th>Sample Collection</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>Total</th>
<th>%</th>
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<tbody>
<tr>
<td>01 Sample labelled with wrong ID</td>
<td>41</td>
<td>28</td>
<td>11</td>
<td>15</td>
<td>25</td>
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<tr>
<td>07 Label incomplete/illegible key patient identifiers</td>
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<td>46</td>
<td>83</td>
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<td>16</td>
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<td>09 Requisition arrives without sample</td>
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<td>17</td>
<td>17</td>
<td>48</td>
<td>35</td>
<td>7</td>
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<td>99 Other</td>
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<td>36</td>
<td>57</td>
<td>3.1</td>
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<tr>
<td>Total</td>
<td>205</td>
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<td>151</td>
<td>363</td>
<td>531</td>
<td>414</td>
<td>1849</td>
<td>100</td>
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</tbody>
</table>

Table 4: Errors in sample collection
Short-term: increase detection of these errors
Long-term: technology to eradicate these errors

Figure 3: Hospital error rates from 2005-2010 per 1,000 blood samples collected
Outline

• Case

• Learning from other industries
  – Aviation
  – Anesthesiology

• Essential ingredients of transfusion error reporting
  – With examples from the Sunnybrook transfusion experience
Success in the airline industry
Aviation safety

• In 1979, the Federal Aviation Regulations clarified the reporting of errors to clearly provide immunity
  – Actually, failure to report is considered a serious error – immunity only if reported within 10 days
  – Individuals who fail to report safety hazards need to bear risk from not reporting

• This resulted in a 6.75-fold increase in reports
Success in the US airline industry

1990 – Fatal accident rate
0.077 per 100,000 departures

2004 – Fatal accident rate
0.009 per 100,000 departures

Systems level error-reduction policies
Why has the Aviation Safety Reporting System has been so effective?

Because the pilot is always the first to the crash site
Error reporting is part of self-preservation!
Success in anesthesia
Success in anesthesia

1954 – Mortality rate 1 in 1560

2000 – Mortality rate 1 in 200,000

* Systems level error-reduction Policies*

* Error tracking systems & developments in technology
Critical incident reports concerning anaesthetic equipment: analysis of the UK National Reporting and Learning System (NRLS) data from 2006–2008

Patient safety incidents involving neuromuscular blockade: analysis of the UK National Reporting and Learning System data from 2006 to 2008

Clear recommendations

• Keep reporting critical incidents to national reporting system
• The problems reported could often have been prevented by the correct application of existing safeguards – no ‘workarounds’
• Preoperative checking procedures should prevent wrong site errors, detect patient allergies, fasting times, etc.
Identifies clear issues

• When anesthetists hand over to recovery staff, they should give explicit instructions on how and where they can be contacted in the event of a problem.

• Iv lines should be kept visible [regular checks for misconnection and extravasation].

• Plans should be in place to obtain essential equipment for safe anesthesia in the event of equipment failure.
Success in race car driving?
Success in race car driving?
Safer on the driver?
Outline

• Case
• Learning from other industries
  – Aviation
  – Anesthesiology
• Essential ingredients of transfusion error reporting
  – With examples from the Sunnybrook transfusion experience
Essential ingredients

• Anonymous, non-discoverable, non-punitive, guarantee of immunity for those that commit and report errors
  – Any reporting system that ignore immunity can not operative effectively, especially if voluntary
  – Meet: The transfusion error surveillance system (TESS)
Acknowledgement
2 key people to TESS

Ana Lima, Patient Safety Nurse

Helen Downie, Error Manager
Essential ingredients

• **Culture of safety**
  – Focus on the system problems – ‘latent errors’
    • Organizational infrastructure:
      – hardware, software, policies, procedures, human resources policies (workload per person), and patient factors
    • Superficial look at errors focuses on the people rather than on the systems
  – **Not** the individual compliance with existing systems
    • “blame and shame” and “blame and train”
    • Inherently error prone people are rare
    • Identify only habitual rule-breakers – “cowboys”

*Improvements in healthcare will come from improving the system, not from individual performance*
Habitual rule-breakers – “cowboys”

• Rare in medicine – study of 2,000 physicians – not one ‘bad apple’

• Rare in transfusion medicine
  – Example:
    • Surgeon who takes a patient to the operating room for a high blood loss surgery without going through pre-admission clinic (no group and screen)
    • “A failure to plan on your part does not constitute an emergency on my part”

Punitive unsafe culture:
- Individual (not organizational) responsibility
- High workload despite known risk
- Tolerance of variability of care
- Pride in workarounds
- Casual communication

High reliability organization:
- Leadership committed to safety
- Reporting system
- Adequate resources
- Standardization around best practice
- Extensive team training
- Structured communication
Case

- 68 year old man presented to Sunnybrook after a trip and fall
Case

• Past history of chronic lymphocytic leukemia
• Platelet count 54 on arrival (his normal baseline)
• Patient admitted to neurosurgical intensive care with hematology consult
• Patient administered 4 pools of platelets over 3 days
• No bleeding – sent home
Error identified on return to hospital

None of the products were irradiated!
We did not blame the physicians or nurses! We blamed the systems in which they work.
Essential ingredients

• Knowing what to report
  – Anything that does not constitute quality care:
    • Providing care associated with the best outcomes
    • Not providing care that is not associated with the best outcomes
    • Providing it within the optimal period of time
    • Successfully delivering it as intended

Doing the right things, only doing the right things, at the right time, and in the right way

Clarke JR. The American Surgeon 2006; 72; 1088-91
Translation into transfusion medicine?

- Only giving blood when alternatives have failed or do not exist
- Remembering to give intravenous vitamin K to reverse warfarin so you don’t need PCCs
- Giving the plasma right before surgery, not the night before
- Running the RBC slowly with furosemide for the patient with heart failure

Doing the right things, only doing the right things, at the right time, and in the right way
Essential ingredients

- Reporting near-misses (aka. ‘near-hits’) – Errors that do not harm the patient
  - These are signal of weaknesses in the system that will eventually lead to harm
  - They provide insight into solutions – captures successful recovery
  - They are 300x more common than adverse events
  - Allow you to calculate the recovery rate for each error type

Near-misses increase our awareness of the constant potential for disaster
Goal

Near-miss Reporting

Adverse events
**Clinical adverse event: Near miss ratio**

- **Number of near-misses for every harm event**

  - **2005**: 250
  - **2006**: 150
  - **2007**: 100
  - **2008**: 500
  - **2009**: 600
  - **2010**: 600
What about the blood bank laboratory?

1 in 4,541
How are we decreasing harm?

• 21 harm events over 6 years
• 100% were adverse reactions from unnecessary transfusions
• Step 1: prospectively screen all orders for all blood products
• Step 2: mandatory competency assessment of all physicians
Plasma Use – Prospective auditing
Mandatory Competency Assessment q2years

Coming Fall 2012

• Pre-test
• Module 1: Indication for products
• Post-test 1
• Module 2: Adverse reactions
• Post-test 2

• Who: all resident and staff physicians
Essential ingredients

• *Easy to report*
  – Remove disincentives – concerns about anonymity and liability
  – Multiple methods to report – paper, electronic
  – Simple to report – clinical team already stressed at the workload level
  – Make improvements to motivate people to keep reporting
E-safety
Essential ingredients

• **Feedback error data to clinical and laboratory staff**
  – Help encourage reporting
  – Benchmarking between departments
  – Help them to identify where they (and you) need to start first

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a. Sample collection ranking

<table>
<thead>
<tr>
<th>Sample Collection</th>
<th>Error rate per 1,000 samples collected from 2005-2010</th>
</tr>
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<tbody>
<tr>
<td>1. Holland Centre</td>
<td>1</td>
</tr>
<tr>
<td>2. Outpatient Clinics</td>
<td>3</td>
</tr>
<tr>
<td>3. Medical/Surgical</td>
<td>5</td>
</tr>
<tr>
<td>4. Obstetrics</td>
<td>9</td>
</tr>
<tr>
<td>5. Intensive Care Unit</td>
<td>15</td>
</tr>
<tr>
<td>6. Emergency Department</td>
<td>23</td>
</tr>
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</table>
Essential ingredients

• Adding defense mechanisms
  – Information system alerts you if you of a potential high severity error
    • Failing to meet a requirement (e.g., irradiation)
  – Bedside positive patient identification alarms
  – Bedside labeling devices with a 15 sec time out
  – Locks on quarantined products
Lock on quarantined skin
Any Mismatch
Essential ingredients

• **Overcome organizational and financial obstacles**
  – Success will require that we overhaul organization, staffing, training, and technology
  – If severe financial pressures lead to focus on short-term economic survival – patient safety will be left behind
  – In blood transfusion – we need to transition from focus on the blood centre to focus on the transfusion process at the hospital
Essential ingredients

• Migrate from reactive to proactive management of errors

Patient dies $\rightarrow$ Root cause $\rightarrow$ Systems change

Near miss $\rightarrow$ Potential Safety issue $\rightarrow$ Systems change

Event data
Essential ingredients

• Solve common irritating problems
  – control the chaos

Table 4:
Errors in sample collection

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  identifiers                                   |
| 08 Sample collected unnecessarily             | 2    | 16   | 14   | 15   | 8    | 18   | 73    | 3.9|
| 09 Requisition arrives without sample        | 21   | 17   | 17   | 48   | 35   | 7    | 145   | 7.8|
| 10 Armband incorrect/not available           | 1    | 1    | 0    | 0    | 0    | 1    | 3     | 0.2|
| 11 Sample contaminated                        | 0    | 1    | 0    | 0    | 0    | 0    | 1     | 0.1|
| 99 Other                                      | 5    | 7    | 3    | 2    | 4    | 36   | 57    | 3.1|
| Total                                        | 205  | 185  | 151  | 363  | 531  | 414  | 1849  | 100.0|
Where & why?

Table 5:
Errors in sample collection

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<td>1</td>
<td>6</td>
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<td>04 Collected in wrong tube</td>
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<td><strong>810</strong></td>
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</table>
These errors cost a lot of money

- Recollection of samples $24.79 per re-collection
- N=3802 samples rejected
- $95,250 just for the blood bank samples
The cost of lost products

Table 15:
The cost of wasted products

<table>
<thead>
<tr>
<th>Table 15:</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
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<th>Cost ($)</th>
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<tr>
<td><strong>Total</strong></td>
<td><strong>58</strong></td>
<td><strong>61</strong></td>
<td><strong>82</strong></td>
<td><strong>114</strong></td>
<td><strong>76</strong></td>
<td><strong>70</strong></td>
<td><strong>461</strong></td>
<td><strong>$521,531.82</strong></td>
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</tbody>
</table>

RBC: red blood cell, IVIG Intravenous Immune Globulin, Rh IG: Anti- D Immune Globulin and PCC: prothrombin complex concentrate
The location of lost products

Table 16:
Ranking of clinical services according to cost (ranked highest to lowest)

<table>
<thead>
<tr>
<th>Clinical Service</th>
<th>Total Cost of Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Operating Room</td>
<td>$175,292.38</td>
</tr>
<tr>
<td>2. Medical/Surgical</td>
<td>$127,202.73</td>
</tr>
<tr>
<td>3. Intensive Care Unit</td>
<td>$98,367.17</td>
</tr>
<tr>
<td>4. Emergency Department</td>
<td>$77,269.92</td>
</tr>
<tr>
<td>5. Other (e.g. Obstetrics, Outpatient Clinics)</td>
<td>$43,399.62</td>
</tr>
</tbody>
</table>
To trigger giant leaps forward in the safety, quality and affordability of health care by:

- Supporting informed healthcare decisions by those who use and pay for health care; and,
- Promoting high-value health care through incentives and rewards.
Outline

• Case
• Learning from other industries
  – Aviation
  – Anesthesiology
• Essential ingredients of transfusion error reporting
  – With examples from the Sunnybrook transfusion experience
“Error-reporting should not be our final goal, but only a means of learning from our shortcomings to help improve the future care of our patients”

Charles H. Andrus
Dept. Surgery, San Joaquin General Hospital, California