

# Time Burden of Blood Transfusion

Winston Ueno, MD,<sup>1</sup> Roy Beveridge, MD,<sup>2</sup> Arthur N. Kales, MD<sup>2</sup>

<sup>1</sup>INOVA Alexandria Hospital, Alexandria, VA; <sup>2</sup>INOVA Fairfax Hospital, Falls Church, VA

## BACKGROUND

- Patients necessarily receive transfusions of whole blood and packed red blood cells (PRBCs) in the course of ameliorating symptoms of anemia from a variety of causes, including chemotherapy-induced anemia, anemia of chronic disease, myelodysplastic syndrome, and chronic renal failure
- Blood product administration is not without adverse effects such as infection, transmission of communicable diseases (HIV), allergic reactions, and a variety of other reactions specific to blood administration
- Administration of blood transfusions requires a significant quantity of time and resources for both the healthcare practitioners involved in the patient's care and the patients and family. Significant financial resources are also expended to provide this therapy and to treat the adverse events resulting from this therapy

## OBJECTIVES

- To quantify the average time for a blood transfusion, the various events that take place during that visit, and the average total time consumed by staff engaged in providing blood transfusions in an outpatient setting
- To present a quantifiable assessment of the time and resources utilized to provide PRBC infusions

## METHODS

- Approved by the institution's IRB
- Conducted in 2 parts from June 2005 to November 2005

### Part I: Retrospective Transfusion Review

- Consisted of retrospective chart review to determine the time for PRBC transfusion and adverse events associated with PRBC transfusion
- Inclusion criteria
  - Adult men/women  $\geq 18$  years of age\*
  - Patients being treated on an outpatient basis
  - Patients receiving transfusion of  $\geq 1$  units of PRBCs for any reason

\*A patient may be entered into the study more than once for multiple unique transfusion events
- Exclusion criteria
  - Patients receiving transfusion as an inpatient
  - Patients receiving other therapies in addition to PRBC transfusion during the same event
- 100 transfusion events were sought

### Part II: Prospective Time and Motion Measurement

- Consisted of a time/motion evaluation of patients receiving PRBC transfusion
- Observations were made and times were recorded for actual transfusion of PRBCs timed to compare with the transfusion times documented in the transfusion record:
  - Document the individual steps in transfusing PRBCs
  - Document the total time for a PRBC transfusion event
- 20 transfusion events were sought

## RESULTS

### RECORD REVIEW

**Table 1. Record Review Visits—Subject Characteristics (N = 100)**

|                                  |             |
|----------------------------------|-------------|
| Age in Years, mean (SD)          | 62.5 (15.6) |
| Gender—Male, N (%)               | 67 (67)     |
| Primary Source of Payment, N (%) |             |
| Medicare                         | 69 (69)     |
| Medicaid                         | 1 (1)       |
| Private                          | 28 (28)     |
| Self-Pay/No Insurance            | 2 (2)       |
| Primary Anemia Cause, N (%)      |             |
| Acute Myeloid Leukemia           | 5 (5)       |
| Chemotherapy Induced             | 19 (19)     |
| Chronic Renal Failure            | 15 (15)     |
| Myelodysplastic Syndrome         | 50 (50)     |
| Other                            | 11 (11)     |

**Table 2. Record Review Visits—Description of Transfused Units (N = 100)**

|                                   |              |
|-----------------------------------|--------------|
| PRBC Filtration, N (%)            |              |
| Pre-filtered in Blood Bank        | 4 (4)        |
| Leukofiltered in Transfusion Unit | 16 (16)      |
| No Filtration                     | 79 (79)      |
| Unknown                           | 1 (1)        |
| No. of Units Transfused, N (%)    |              |
| 1                                 | 19 (19)      |
| 2                                 | 81 (81)      |
| Average per Visit, mean (SD)      | 1.8 (0.4)    |
| Transfusion Time (min), mean (SD) |              |
| First Unit (N=100)                | 103.0 (18.6) |
| Time Between Units (N=81)         | 18.0 (10.0)  |
| Second Unit (N=81)                | 102.0 (18.3) |
| Average per Visit                 | 200.2 (55.0) |

### TIME AND MOTION MEASUREMENTS

**Table 3. Time-Motion Visits—Subject Characteristics (N=20)**

|                                  |             |
|----------------------------------|-------------|
| Age in Years, mean (SD)          | 64.2 (15.5) |
| Gender—Male, N (%)               | 12 (60)     |
| Primary Source of Payment, N (%) |             |
| Medicare                         | 11 (55)     |
| Medicaid                         | 1 (5)       |
| Private                          | 7 (35)      |
| Self-Pay/No Insurance            | 1 (5)       |
| Primary Anemia Cause, N (%)      |             |
| Acute Myeloid Leukemia           | 0 (0)       |
| Chemotherapy Induced             | 11 (55)     |
| Chronic Renal Failure            | 1 (5)       |
| Myelodysplastic Syndrome         | 4 (20)      |
| Other                            | 3 (15)      |
| Unknown                          | 1 (5)       |

**Table 4. Time-Motion Visits—Description of Transfused Units (N = 20)**

|                                   |              |
|-----------------------------------|--------------|
| PRBC Filtration, N (%)            |              |
| Pre-filtered in Blood Bank        | 16 (80)      |
| Leukofiltered in Transfusion Unit | 4 (20)       |
| No Filtration                     | 0 (0)        |
| No. of Units Transfused, N (%)    |              |
| 1                                 | 4 (20)       |
| 2                                 | 16 (80)      |
| Average per Visit, mean (SD)      | 1.8 (0.4)    |
| Transfusion Time (min), mean (SD) |              |
| First Unit (N=20)                 | 98.5 (12.7)  |
| Second Unit (N=16)                | 92.5 (21.2)  |
| Average per Visit                 | 172.5 (42.8) |

**Table 5. Time-Motion Visits—Transfusion Labor Times by Function and by Occupation, in minutes (SD) (N=20)**

| Function            | Pre-transfusion    | During Unit      | Between Units     | Post-transfusion  | Total              |
|---------------------|--------------------|------------------|-------------------|-------------------|--------------------|
| Registration        | 4.7 (7.1)          | 0.0 (0.0)        | 0.3 (1.2)         | 0.0 (0.0)         | 5.1 (4.1)          |
| Clinical Assessment | 21.6 (8.8)         | 3.0 (1.1)        | 3.7 (4.5)         | 4.6 (2.9)         | 32.9 (9.0)         |
| Medical Record      | 0.1 (0.3)          | 0.0 (n/a)        | 0.0 (n/a)         | 7.4 (2.4)         | 7.5 (3.3)          |
| Medication          | 0.0 (0.0)          | 0.0 (n/a)        | 0.0 (n/a)         | 0.1 (0.4)         | 0.1 (0.1)          |
| Manage Supplies     | 2.2 (1.9)          | 0.0 (n/a)        | 0.0 (n/a)         | 2.0 (1.1)         | 4.2 (2.8)          |
| Check Blood         | 2.2 (0.7)          | 0.0 (n/a)        | 2.0 (0.2)         | 0.0 (n/a)         | 4.2 (2.4)          |
| Get Blood           | 6.2 (2.2)          | 0.0 (n/a)        | 6.2 (2.7)         | 0.0 (n/a)         | 12.4 (3.7)         |
| Other               | 0.0 (0.0)          | 0.4 (0.8)        | 0.4 (0.9)         | 0.3 (0.8)         | 1.1 (0.7)          |
| <b>Total</b>        | <b>37.0 (13.6)</b> | <b>3.4 (1.8)</b> | <b>12.6 (4.1)</b> | <b>14.4 (3.2)</b> | <b>67.4 (18.9)</b> |

  

| Occupation         | Pre-transfusion    | During Unit      | Between Units     | Post-transfusion  | Total              |
|--------------------|--------------------|------------------|-------------------|-------------------|--------------------|
| RN                 | 36.3 (13.2)        | 3.4 (1.5)        | 11.8 (7.2)        | 14.4 (3.2)        | 65.9 (18.9)        |
| Secretary          | 0.8 (2.2)          | 0.0 (n/a)        | 0.0 (0.0)         | 0.0 (n/a)         | 0.8 (2.2)          |
| Medical Technician | 0.0 (n/a)          | 0.0 (n/a)        | 0.8 (2.0)         | 0.0 (n/a)         | 0.6 (1.8)          |
| <b>Total</b>       | <b>37.0 (13.6)</b> | <b>3.4 (1.5)</b> | <b>12.6 (7.0)</b> | <b>14.4 (3.2)</b> | <b>67.4 (18.9)</b> |

- Most common diagnoses were myelodysplastic syndrome 45% and 25% chemotherapy-induced anemia
- 81% of patients received 2 units of PRBCs
- Mean time to infuse the first and second units was 103 and 102 minutes, respectively, in the retrospective review and 98.5 and 92.5 minutes, respectively, in the prospective review
- Mean total time per patient from the start of the first unit to the completion of the procedure (1 or 2 units) was 200.2 minutes in the retrospective review and 172.5 minutes in the prospective review
- In the prospective review, the average transfusion visit required an additional 51.4 minutes of labor pre- and post-transfusion, of which 50.7 minutes was RN time
- Adverse reactions occurred either during the infusion of the first unit or between units 1 and 2, but never during the second unit
- The data do not include the time required for blood draw, type, and cross; patient identification; insurance verification (all of which are substantial time commitments)

## CONCLUSIONS

- PRBC transfusions consumed substantial time for both the staff and patient
- Adverse reactions requiring intervention occurred in approximately 1 in 13 patients
- Retrospective chart review does not identify all labor/time elements involved with transfusion. The pre-, during, and post-transfusion time is not identifiable in a chart review
- Prospective time-motion study identified a 26% increase in time required for transfusion that was not identified in the retrospective review (98.6% of this increase was RN time)
- Total time from patient arrival until departure was an average of 255 minutes (4.25 hours)

**DISCLOSURE:** The authors of this presentation have the following to disclose concerning possible financial or personal relationships with commercial entities: Winston Ueno has no relationships to disclose. Roy Beveridge has no relationships to disclose. Arthur N. Kales has no relationships to disclose.

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