International Transfusion Medicine
3 cups of Blood: Establishment of National blood supplies in the STAN’s: Afghanistan, Kazakhstan and Kyrgyzstan

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Objectives

• Discuss international transfusion medicine challenges
• Discuss PEPFAR program using Tanzania and Rwanda as examples of progress
• Discuss consultative role to expanding national blood programs in Afghanistan, Kazakhstan, and Kyrgyzstan
Disclosures

• Relevant Financial Relationships
  – Consultant to the CDC/USAID/PEPFAR program
  – Grant / Research support from CDC/USAID/PEPFAR program
International Challenges

• Blood economics
• Blood availability
• Blood distribution
• Infectious disease risks
• Blood collection infrastructure
• Quality issues
US may have almost twice the expenditure/citizen on health care but we certainly do NOT have the best outcomes for our $$!
Blood Economics

- Average cost of RBC in US >$200, testing costs alone ~$50
- Cost for bags, equipment in emerging world is higher due to low volumes & transport
- Simplified testing (prescreen with rapid EIA may reduce costs to ~$15-40/unit)
- Average annual governmental health care spending in subsaharan Africa (SSA)/per capita is $2-5!
### Number of whole blood units collected per 1,000 population

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<th>Country</th>
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Blood distribution

• One risk of centralization is that in many emerging economies, such as subsaharan African nations, maintaining temperature (“cold chain”) during transport of blood is logistically very difficult

• Some argue that nationalization efforts should complement local collection, not replace it
Infectious disease risks: Africa

- Higher rates of endemic transfusion transmitted diseases especially HIV, Hepatitis B, syphilis, and some HCV
- Testing generally rapid or centralized EIA only (except South Africa where individual donor nucleic acid screening is available)
- Unique issue is malaria that usually isn’t screened for
PEPFAR Blood Safety Overview

PEPFAR-Blood Safety-AABB

Ground Floor (2004-2008)

- 5 year Commitment, Approximately $12.5 Million
- Technical Assistance Provider to 5 Countries (Kenya, Mozambique, Rwanda, Tanzania & South Africa)

“Providing Technical Assistance Support for the Rapid Strengthening of Blood Transfusion Services in Selected Countries in Africa and the Caribbean…”

Followed from 1st Al Qaeda attack against US embassies in Kenya, Tanzania
No safe blood was available to treat injured staff.
PEPFAR Blood Safety Overview

AABB Assigned Countries:

- Kenya
- Rwanda
- Tanzania
- Mozambique
- South Africa
<table>
<thead>
<tr>
<th>Country</th>
<th>Population</th>
<th>People Living w/AIDS</th>
<th>Infant Mortality</th>
<th>Life Expectancy</th>
<th>Literacy</th>
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<td>Kenya</td>
<td>37 mil</td>
<td>1.2 mil</td>
<td>57/1,000</td>
<td>55</td>
<td>85%</td>
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<td>Mozambique</td>
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<td>109/1,000</td>
<td>41</td>
<td>48%</td>
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<tr>
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<td>10 mil</td>
<td>.25 mil</td>
<td>85/1,000</td>
<td>49</td>
<td>70%</td>
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<tr>
<td>S. Africa</td>
<td>44 mil</td>
<td>5.3 mil</td>
<td>59/1,000</td>
<td>42</td>
<td>86%</td>
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<tr>
<td>Tanzania</td>
<td>39 mil</td>
<td>1.6 mil</td>
<td>72/1,000</td>
<td>51</td>
<td>69%</td>
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<tr>
<td>U.S.</td>
<td>301 mil</td>
<td>1 mil</td>
<td>6/1,000</td>
<td>78</td>
<td>99%</td>
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<tr>
<td>World</td>
<td>6,602 mil</td>
<td>?</td>
<td>43/1,000</td>
<td>66</td>
<td>82%</td>
</tr>
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</table>
Notable Accomplishments:

- Volunteer Donors Increased from 20 to 80%
- HIV 5.5 to 3.9%
- Repeat Donors Increased from 5 to 20%
- Total Collections 120,000 Annually
- 6 New Zonal Centers Opened
Overall Technical Assistance Provided

- Standards Adopted in Each Country
- Extensive Facility and Equipment Maintenance Programs
- Introduced New Technologies for Infectious Disease Testing
- Introduced New Technologies for Immunohematology Testing
- Implemented Quality Management Systems
Rwanda Blood Transfusion

Centre National de Transfusion Sanguine (CNTS) collects 38,000 volunteer units fully tested for HIV, Hepatitis B & C
Rwanda National Transfusion Service (CNTS = Centre National de Transfusion Sanguine) hosted a conference to rewrite national transfusion guidelines. Previous guidelines were written when only whole blood was available (as opposed to component therapy with red cells, platelets and plasma). In addition, there was no attempt to get input of clinicians that used blood so there was little acceptance of the written criteria.
Status of blood banking and the blood supply in Afghanistan

Ayyoubi MT, Konstenius T, McCullough JC, et al University of Minnesota, Minneapolis,

BACKGROUND:
• As a result of more than 20 years of war, its blood supply system has been damaged.

STUDY DESIGN AND METHODS:
• An assessment tool was developed, daily activities in Afghanistan were observed, and key personnel were interviewed.

RESULTS:
• Because there was no donor recruitment organization, most blood was obtained by the family replacement system. There was an inadequate supply of stored blood, which led to use of blood before screening test results for transfusion-transmitted disease were complete. Blood was tested intermittently for HIV, HBV and HCV and syphilis.

CONCLUSIONS:
• A dedicated staff is in place but to strengthen the blood supply system in Afghanistan, it will be important to address infrastructure and facilities, organization, standard operating methods, supplies and equipment, training, quality assurance, and transfusion medicine education.

The University of MN (Drs J. McCullough, William Riley) received grants to provide technical assistance to develop the national blood system. Overall, EFS (France) and CDC funded training sessions targeted (1) blood center (2) hospital laboratory and (3) hospital medical staff
Training for 2 sessions of ~20 staff

The staff of the blood center has also received training in nearby Iran and Pakistan which assisted in implementation of tube and current plans for implementing centralized EIA testing.
Infectious disease screening

Screening occurs by drawing a sample and using rapid assays for HIV, HCV, HBV. Rates documented for 2010-2011 show HIV =~ 0%, HCV 1-2% but HBsAg averaging about 5%. Samples and units used to be drawn through a window which has since been removed.
Issues raised by rapid testing include diminished sensitivity and lack of confidentiality. Documentation of quality control generally substandard in regions using rapid testing (external controls, proficiency testing etc)
Blood donor recruitment: Afghanistan

- No separate department dedicated to recruitment
- Organizing drives largely responsibility of director
- Refreshment areas not well utilized as incentive
- Blood donor bus used for unscheduled drives
- Collections at foreign embassies very successful source of units, but not sustainable long term donor strategy
Blood drive capacity limited to one bus and 2 mobile trucks

Well intentioned western donors tend to reproduce collection strategy successful locally. A donated collection bus is used in downtown Kabul but lack of paved roads precludes use in more remote locations.
Malalai maternity hospital

- Malalai hospital had exactly one O negative unit and only 3 O+ units on the shelf. They have over 120 deliveries daily!
Maternity hospital transfusion

ABO/Rh typing but no Antibody screen

Whole blood is collected from family Replacement donors
Blood transfusion safety

- No antibody screens performed
- No mechanism for hospitals to report transfusion reaction or disease transmission events back to central blood center
- Varying standards for blood administration across hospitals
- No temperature control in transport. Family members may provide transport of blood from blood center to hospital.
The US military provided extensive technical training and the military hospital provided a striking contrast with written procedures and organized and maintained equipment.
Afghanistan lessons

• Considerable progress has been made in training of military hospital personnel
• Military staff have started to act as trainers for other blood center laboratory staff
• Considerable redundancy of services (multiple maternity hospitals, each collecting their own units within a mile of each other) makes improving quality at each center a challenge
Kazakhstan is almost as large as US but has 18 million people
  – GDP/capita ~12K
• Kyrgyzstan has ~6 million people
  – GDP/capita ~1K
• US has ~350 million people and GDP/capita ~58K
Kazakhstan: Attitude to blood donation Survey of 471 citizens

- Majority ~80% of younger responders had never donated blood
  - In contrast to >60% of older respondents who had donated
  - Reasons given for not donating included “don’t think about it” fear of infection, lack of knowledge

Conclusions:

- Lack of involvement and health problems contribute to low donation rate
- Results of survey to be used in efforts to improve donation rates of regular voluntary donors.
Market opportunities: Kazakhstan

- National blood program has access to
  - NAT testing
  - Pathogen inactivation
  - Blood irradiation
  - Automated collections
Scientific-production center of transfusiology

- 100% leukofiltration of red blood cell components
- In 31% of cases - viral inactivation of fresh frozen plasma is conducted
- In 60% - viral inactivation of platelet concentrate
- 32% of the issued fresh frozen plasma has been quarantined
- The technology of producing fibrin glue of plasma has been implemented
A Voluntary nonremunerated blood donor program in the Kyrgyz republic

- # of active blood donors (mostly family replacement) in Kyrgyzstan has declined almost 6 fold since Soviet times: current rate ~5/1,000 pop.
- Program aims to increase VNRD from 23 to 50% by 2018 and reduce TTI discards from 18% to 10%.

2013 results: 34 K donations, = 75% FRD, 23% VNRD, 2% paid (Increase to ~6/1,000)
AIHA Goal: Work with local Kyrgyz Staff to update Prikaz
This is the main order that sets all rules and requirements for blood transfusion
Dr. Chursin, director of Anesthesia at the largest hospital in Almaty had done similar work in Kazakhstan
Infrastructure challenges: Supplies

Donor testing tubes - no vacutainers available in country, so diversion pouches were not used
EIA testing
Emerging markets

• Want adequate supplies
  – Help in collecting enough blood
  – Access to economical quality blood collection equipment
  – Access to quality systems
    • Software supportable by local staff and able to run on simple IT systems

• Want safe blood
  – Western model of >$1 million/QUALY not sustainable
  – But: Is pathogen inactivation cheaper than broad scale screening?
    – Pre-donation rapid tests can add a layer of safety but not adequate alone
Motivation for staff
Acknowledgements

• CDC: Jonathan Pitman, Christie Reed
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• ANBSTS: Ahmad Masoud-Rahmani
• AIHA: Jean Stanley, Inna Jurkevich
• Kazakhstan: Dr. Chursin
• Kyrgyzstan: Dr. Karabaev
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Thank you.

Q&A