Types of Blood Donors and Blood Safety in Developing Countries

DORA MBANYA
FMBS – UYI/CHU
YAOUNDE - CAMEROON
Developing countries - hmmmm
Presentation Outline

- Introduction
- History & evolution of transfusion in Sub-Saharan Africa (SSA)
- Types of blood donors in SSA & impact
- Any hope?
- Conclusions
Introduction

Blood safety continues to represent a big challenge in developing countries, especially of SSA.

According to a review by Tayou et al (2008) it is multifactorial:

Related issues include the *absence of policies and legislation* that organize and coordinate transfusion practice, and their implementation.
Introduction

Blood donors and donor programmes are nonexistent.

High prevalence Transfusion Transmissible Infections (TTI) & inappropriate screening.

Cold chain disruptions and storage problems.

Distribution and rational use issues.
Blood donation remains a key element in blood safety.

In these settings, blood donors tend to be mainly family or replacement donors.

However, according to WHO (1997), these are very risky donors.
## History

First Reports of Blood Transfusion (service or systematic treatment) in sub-Saharan Africa, 1924-1955

<table>
<thead>
<tr>
<th>Year</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1924</td>
<td>Belgian Congo (Zaire)</td>
</tr>
<tr>
<td>1943</td>
<td>Senegal</td>
</tr>
<tr>
<td>1948</td>
<td>Kenya, Uganda, Tanganyika</td>
</tr>
<tr>
<td>1950</td>
<td>Angola, <strong>Cameroon</strong>, Dahomey (Benin), Ivory Coast, Guinea, Mali, Mozambique, Niger, Northern Rhodesia, Togo, Upper Volta (Burkina Faso)</td>
</tr>
<tr>
<td>1951</td>
<td>Southern Rhodesia (1926 for Europeans only)</td>
</tr>
<tr>
<td>1953</td>
<td>Nigeria, Gold Coast (Ghana)</td>
</tr>
<tr>
<td>1955</td>
<td>Tchad, French Congo, Gabon</td>
</tr>
</tbody>
</table>

Courtesy Dr. William Schneider
Who gave blood?

Blood banks

- "voluntary" donors
  - Schools
  - Soldiers
  - Gov’t private offices
  - Prisoners

Donation in Uganda

- Mengo Hosp 1949
- Schoolboys 1951
- Rural Uganda 1953

Blood donation, Hôpital Principal Dakar, 1950s

Courtesy Dr. William Schneider
History

Press coverage of blood transfusion near the time of independence in Kenya

**PATIENTS MUST SUPPLY OWN BLOOD DONORS**

Patients admitted to Mombasa hospitals for major operations are being told to bring their own blood donors.

This move follows a desperate shortage of Blood Bank supplies at the Coast where stocks have fallen to a few pints.

By NATION Reporter.

Coast Province Medical Officer, Dr. T. G. Mathews, said yesterday that blood supplies were coming in very slowly. He said the Coast General Hospital could use 40 pints a week. The current bank was only a few pints and the little blood available was being kept for really urgent cases.

Although there was a blood shortage, Dr. Mathews said some registered blood donors were "reluctant" to part with their blood. But there had been fair success in blood campaigns among schools, the police and visiting sailors.

Daily Nation (Kenya), 1962

Courtesy Dr. William Schneider
WHO Intervention in blood safety

During the 28th WHO WHA of May 1975, Resolution WHA 28.72 called on member states to:
- Promote the creation of National Blood Transfusion Services (NBTS) based on voluntary non-remunerated blood donors (VNRBD)
- Promote the promulgation of laws that govern transfusion practice
History of blood transfusion in sub-Saharan Africa: 1975 to present

Example of Burundi assistance from Swiss Red Cross
- Donor Recruitment and mobile unit

Courtesy Dr. William Schneider
Types of donors

3 categories of donors can be identified:

Volunteer non-remunerated blood donor (VNBD): “person gives blood of his/her own free will and receives no payment for it, either in the form of cash, or in kind which could be considered a substitute for money”
Types of donors

- **Family/Replacement donor (F/R donor)**
  
  “Individuals who are generally relatives or friends of patients who require blood transfusion”

- **Paid donors:**

  “Persons who receive monetary payment from the family of a patient to substitute for unavailable ‘replacement’ donors within the family circle”
| Donor's Photograph, collected data & their codes |
Characteristics of Blood donations in SSA

Variation in transfusion services:

- Hospital-based systems
- Centralized BTS
- Hybrid of both systems; is predominant (Bates et al., 2007), where a few centralized functions (transfusion guidelines; collection from voluntary donors) are incorporated into the hospital-based blood banking
Characteristics of Blood donors in SSA

- Mainly Family/Replacement in 70 – 100% cases
- R/F donors are readily available and cheaper to obtain than VNRBD (Hensher & Jefferys, 2000; Allain et al., 2004; Lara et al., 2007).
- Mainly first-time donors
- About >75% aged <30 yrs (Rajab, Nigeria; Nebie, Burkina; Tayou et al. (Multicentric study))
Type and age distribution of blood donors in Kumasi, Ghana

Characteristics of Blood donors in SSA

Contrast with Europe:

*Ex.* Lefrere & Rouger, 2006 reported:

- <50% aged under 35 years in some European countries

Male predominance in most African reports ranging 60-90% (Agbovi et al, Togo; Nebie et al, Burkina F; Allain et al, Ghana; Tayou et al (Multicentric study))
Characteristics of Blood donors in SSA

- **High TTI prevalence** (HBV, HIV, HCV, Syphilis, Malaria, Filaria...)

- According to WHO at least 5% TTI transmitted through blood transfusion in Africa
# TTI in 1<sup>st</sup> time donors Cameroon compared to some African countries (Mbanya et al, Transfusion Medicine 2003; 13(5): 267 – 73)

<table>
<thead>
<tr>
<th>Type of infection</th>
<th>Number cases detected (n=252)</th>
<th>Percentage (Cameroon, 2003)</th>
<th>Other African Prevalences among donors (%)</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBV</td>
<td>27</td>
<td>10.7</td>
<td>11 (Tanzania) 20.3 (Mauritania)</td>
<td>Matee et al, 1999 Lo et al, 1999</td>
</tr>
<tr>
<td>HIV</td>
<td>20</td>
<td>7.9</td>
<td>3.0 (Kenya) 8.7 (Tanzania)</td>
<td>Mwangi, 1999 Matee et al, 1999</td>
</tr>
<tr>
<td>HCV</td>
<td>12</td>
<td>4.8</td>
<td>8.0 (Tanzania)</td>
<td>Matee et al, 1999</td>
</tr>
<tr>
<td>HTLV-1</td>
<td>4</td>
<td>1.6</td>
<td>0.0: (Tanzania) 0.7 (Ghana) 7.1 (Cameroon)</td>
<td>Matee et al. 1999 Ampofo et al, 2002 Mbanya et al, 2002</td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>26.2</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
### Serological findings among blood donors

*FTD = First time donors; RD= Regular donors; FD=Family donors; BD=Benevolent donors*

<table>
<thead>
<tr>
<th></th>
<th>No. Positive</th>
<th>%</th>
<th>No. FTD Positive(%)</th>
<th>No. RD positive (%)</th>
<th>No. FD (%)</th>
<th>No. BD (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HBsAg</strong></td>
<td>21</td>
<td>10.3</td>
<td>18 (85.7)</td>
<td>3 (14.3)</td>
<td>20 (95.2)</td>
<td>1 (4.8)</td>
</tr>
<tr>
<td><strong>HIV</strong></td>
<td>6</td>
<td>2.9</td>
<td>5 (83.3)</td>
<td>1 (16.7)</td>
<td>6 (100)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td><strong>HCV</strong></td>
<td>8</td>
<td>3.9</td>
<td>7 (87.5)</td>
<td>1 (12.5)</td>
<td>7 (87.5)</td>
<td>1 (12.5)</td>
</tr>
</tbody>
</table>

Mbanya et al, Transfusion Medicine, 2005, 15, 395–399
Viral markers in the donors in Nigeria (Ahmed et al, 2007)

<table>
<thead>
<tr>
<th>Marker</th>
<th>VNRBD (%)</th>
<th>F/R donors (%)</th>
<th>Paid donors (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV</td>
<td>4.1</td>
<td>4.6</td>
<td>8.1*</td>
</tr>
<tr>
<td>HBsAg</td>
<td>13.5</td>
<td>14.1</td>
<td>20.5*</td>
</tr>
<tr>
<td>HCV</td>
<td>1.4</td>
<td>1.8</td>
<td>2.8*</td>
</tr>
</tbody>
</table>

* Statistically significantly higher difference for all markers in paid donors
Comparison of viral infection markers between SSA first-time VNRBD & Replacement donors

<table>
<thead>
<tr>
<th>Country</th>
<th>Viral marker</th>
<th>1st-time VNRD (%)</th>
<th>1st time F/R donors (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ghana</td>
<td>Anti-HIV</td>
<td>69/6640 (1.0)</td>
<td>50/4360 (1.1)</td>
<td>0.87</td>
</tr>
<tr>
<td></td>
<td>HBsAg</td>
<td>919/6640 (13.8)</td>
<td>649/4360 (14.9)</td>
<td>0.13</td>
</tr>
<tr>
<td>Guinea</td>
<td>Anti-HIV</td>
<td>26/1784 (1.5)</td>
<td>42/8956 (0.5)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>HBsAg</td>
<td>259/1784 (14.5)</td>
<td>1142/8956 (12.8)</td>
<td>0.047</td>
</tr>
<tr>
<td>Cameroon</td>
<td>Anti-HIV</td>
<td>11/272 (4.0)</td>
<td>114/3053 (3.7)</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td>HBsAg</td>
<td>49/272 (18.00)</td>
<td>233/3053 (7.6)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Courtesy Prof. JP Allain
Impact on blood supply

Analysis of blood donation patterns (WHO, 2004):

- A significant difference in blood donations between low, medium and high HDI countries:
  - 61% of the global blood supply was donated in developed (high HDI) countries.
  - 39% was donated in developing (low and medium HDI)

Thus, there is acute shortage of blood in this region
Donation per 1000 population in the African Region

Courtesy BLS/AFRO
Total units collected 1999-2008

Courtesy BLS/AFRO
Main objectives

- To assist the countries to set up an effective **system of recruitment** of low-risk blood donors;
- To **improve the safety** of blood and blood products
- To promote the **appropriate use** of blood and blood products by clinicians;

Targets for 2012

- Situation analysis done by all countries
- National Policy implemented in at least 75% of countries
- At least 80% of blood collected from VNRBD
- 100% of blood screened for all major TTIs

Courtesy BLS/AFRO
Percentage of VNRBD in countries of the African Region 2006

Courtesy BLS/AFRO
Voluntary donation on AFRO targets

AFRO TARGET - 80% voluntary donation by 2012

Courtesy BLS/AFRO
Any hope?

Nearly four decades after the 28th WHO WHA of May 1975, Resolution WHA 28.72 called on member states to promote the creation of national BTS based on VNRBD, and the promulgation of laws that govern transfusion practice:

- BLOOD DONATION, SUPPLY & SAFETY on the whole, in SSA is still very challenging.
Any hope?

It is 2011:

- 70-80% donations continue to be F/R
- Most are first-time donors
- Hence donor retention remains a major issue.

Hope? : Yes, May 2005 WHA Resolution 57.13:

- Established the WBDD to be celebrated on 14th of June
World Blood Donor Day 2010: Cameroon
Club 25

- Initiated in Zimbabwe (1989)
  - Pledge by youths to donate at least 25 times
- Spread to many other countries of Africa & the developing world
- Significant role in blood supply where it works
Blood transfusion safety in sub-Saharan Africa (SSA) is still plagued amongst other issues by:

- High prevalence of infectious agents,
- Donor selection issues and chronic blood shortage
- Compounded by the lack of resources etc. etc.

This implies that international norms in transfusion safety are not implemented/implementable in most of SSA.
Conclusions

Hence the dilemma remains:

What would work best for these resource-limited developing countries?:

- Supply???
- Safety???
What would strike the balance between blood supply and safety?

Blood supply

25-50% of deaths due to lack of blood

Blood safety

High prevalence of transfusion-transmitted infections in Africa

Conclusions

Courtesy Dr. Imelda Bates
Conclusions

So, what would work?

- A centralized system (100% VNRBD)

  OR

- A local system (tolerance of F/R donors)
Conclusions

Cost/unit of blood
Centralised and local systems

Centralised (excl. capital costs)

- Donor recruitment
- Blood distribution
- Quality processes

Local

- Patients bear donor costs
- No distribution costs
- Quality?

$60
$16

Conclusions

- **Solution**: Strategies to increase repeat donations
- Both types of 1st-time donors (VNRBD & F/R) are equally acceptable
- Improved blood safety relies on repeat donations
- Hence that should be a target in our settings
"Winning isn't everything, but wanting to win is"

Following a train wreck in October 1957
Acknowledgement

For kindly authorizing me to use their slides, I wish to thank:

- Prof. JP Allain
- Dr. W. Schneider
- Dr. I. Bates
- Dr. JB Tapko
THANK YOU FOR YOUR ATTENTION...