policy

PREVENTING TRANSFUSION-TRANSMISSIBLE INFECTIONS IN KENYA

Steps to Increase the Supply of Screened Blood

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Blood Screening in Kenya

- The National Blood Transfusion Service collects and screens about 135,000 units of blood per year. Public hospitals collect another 20,000 units but may not screen all of them completely.
- Screening all of the blood collected is an immediate priority, as blood donors at hospitals may have higher levels of transfusion-transmissible infections.
- Based on norms set by the World Health Organization, Kenya may need to collect and screen a total of 410,700 units per year.
- Kenya needs to consider cost-efficient choices for expanding the total supply of screened blood.

Research Questions

1. What would be the costs and benefits of screening the entire *current supply* of blood for transfusions?
2. What would be the most cost-efficient way to *increase the total supply* of screened blood?

Context

Ensuring a screened supply of blood for transfusion is an essential component of preventing HIV as well as other transfusion-transmissible infections (TTIs) such as syphilis, hepatitis B, and hepatitis C. The total volume of screened blood in Kenya is not known precisely, but the National Blood Transfusion Service (NBTS) currently collects and screens about 135,000 units (entirely from voluntary blood donors). Approximately 20,000 additional units per year are collected by public hospitals from family replacement donors. Though practices are improving, screening for TTIs in public hospitals is neither guaranteed nor complete. Practices in private hospitals are not tracked. Collection and screening of blood is an ongoing activity because of the persistent need for transfusions and the expiry of screened blood products after a period of time in storage.

Where the blood comes from makes a difference. The 2007 Kenya AIDS Indicator Survey collected data on TTIs among blood donors and asked whether they were voluntary donors or family replacement donors. Family replacement donors were three times as likely to be infected with HIV as voluntary donors and twice as likely to be infected with herpes simplex virus type 2, a surrogate marker for sexually transmitted infections.[1] Such findings parallel those from other studies in Africa. Over time, voluntary blood donors have become the major source for blood transfusion in Kenya, in contrast to the rest of sub-Saharan Africa.

Kenya faces two steps in expanding the total supply of screened blood: (1) make investments to fully screen the current blood supply, especially the blood collected from family replacement donors, and (2) invest in increasing the total volume of collected and screened blood per year. The World Health Organization suggests collecting and screening 10 units per 1,000 citizens, which implies 410,700 units per year.[2] This is 255,700 units more than what is collected now.

Methodology

Staff of the Health Policy Project consulted stakeholders in NBTS to define research questions. Cost data from a recent study on the NBTS were used.[3] Data on the levels of TTIs among voluntary blood donors were available from NBTS for 2006–11. Comparable recent data for family replacement donors in Kenya were not available for any TTIs except HIV; thus, information from various East African studies was combined to compute factors, which help yield the likely levels among these donors.[1, 4–7] Family replacement donors are 1.4 times more likely to test positive for hepatitis B as voluntary donors, 1.5 times for hepatitis C, and 2.7 times for syphilis. Overall, they were 2 times as likely to test positive for any TTI as voluntary donors. While this is not based on a formal meta-analysis, the results accord with the Kenya AIDS Indicator Survey (2007) findings on herpes simplex type 2 (a proxy for sexually transmitted infections).[1]

Fully Screening the Current Blood Supply

NBTS regional centers screen blood, but the satellite centers only assist with collection. In public hospitals, the current screening rate for HIV, hepatitis B, and hepatitis C is about 60 percent and higher for syphilis. Figure 1 illustrates the reduction in TTIs if hospitals were to increase screening of the blood collected from family replacement donors.

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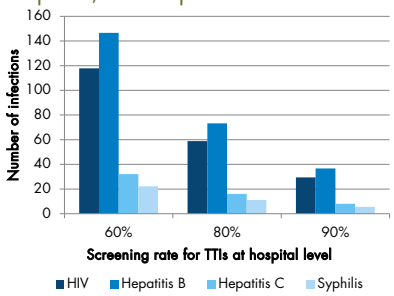
Figure 1: Screening rate of family replacement blood in hospitals, and impact on TTIs



Sources: Authors' analysis. Assumes hospitals collect 20,000 units from family replacement donors, per year. Assumed a transfusion uses an average of 2 units. Transmission probability was assumed at 90%, adjusting for a pre-existing TTI in recipients or prior vaccination (hepatitis).

The HPP team calculated the additional costs for hospitals to achieve 100 percent screening. These costs were then compared to the averted costs of treating TTIs as a result of transfusing units of unscreened blood (see Table 1), based on intent to treat. It was assumed that 60 percent of hepatitis C infections were chronic (of the type needing treatment)[8] and that the infections would be treated with generic versions of peg-interferon and ribavirin.[9] It was also assumed that 33 percent of hepatitis B cases progressed to cirrhosis or hepatocellular carcinoma and were treated with generic lamivudine.[10] Long-term viral suppression was the goal of hepatitis B treatment. Finally, the assumed syphilis cases involved benzathine penicillin and labor costs.

Table 1: Costs and benefits of hospitals screening all blood collected from family replacement donors

Current screening rate	Additional costs to reach 100% screening rate*	Averted TTI treatment costs**	Benefit-cost ratio
60%	$209,350	$637,300	
80%	$104,680	$318,650	3.0
90%	$52,340	159,325	

* Based on 1,800 Kenyan shillings per unit screened (US$22), comprising lab and overhead costs[3] at 100 blood units screened per hospital/month.
** Net present value (NPV, 3% discount rate) of costs over 10 years of 1st and 2nd line antiretroviral treatment. Assumed 1st line treatment: $305 per person, per year (PPY), 2nd line: $820/PPY.[11] Chronic hepatitis C cases were spread across two years since infection, at a cost of $2,500 (per a 48-week treatment course, drugs only).[9] The NPV of a 3TC+adefovir tail course for hepatitis B (60 weeks, drugs only) was $1,580.[12]

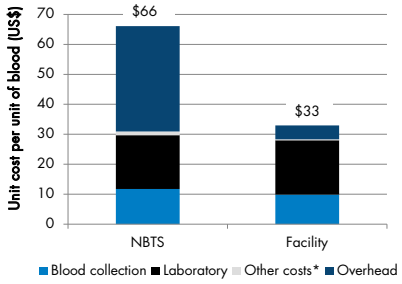
Our results suggest that a complete screening of blood already collected from family replacement donors represents a good investment and will help in further reducing TTIs.

This analysis was limited by a lack of data on the screening rates for TTIs at the hospital level. Detailed unit cost information at the facility level would enable a more robust analysis.

Increasing the Volume of Screened Blood

The gap of 255,700 units could be met by scaling up production through NBTS, through hospital-based collection and screening, or through a mix of both. We compare the options by examining cost per unit of blood (see Figure 2).

Figure 2: Unit cost comparison: NBTS and hospitals



Assumed hospitals would need a new blood bank refrigerator. Assumed hospitals would use the ELISA HIV test (not rapid test). Median overhead per year for district hospitals was 3.8 million Kenyan shillings, with 5% allocated to blood safety activities.
*Includes donor grouping and transfers. Hospitals do not make blood components.

Processing 255,700 extra units via NBTS would cost $17 million per year. Via the hospitals, the cost would be $8.4 million.

To meet the gap, the six NBTS regional centers would need to double the current median monthly collection, and the six satellite centers would need to quadruple it. If NBTS is operating "at capacity" given its staffing and infrastructure, this may limit its ability to scale up collection without new investment. At present, NBTS is mostly funded from external sources. Therefore, additional collection and screening can be explored with a mix of expansion at both NBTS and facility levels.

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