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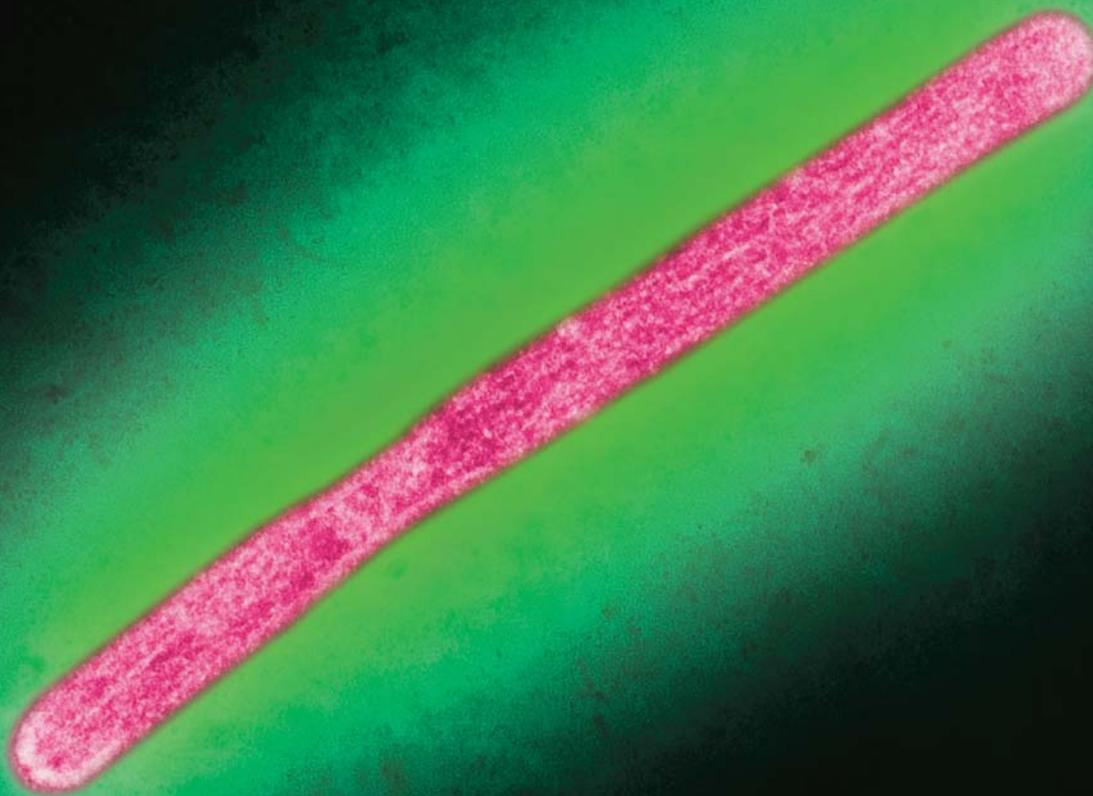
AN EDUCATIONAL RESOURCE PUBLISHED BY AMERICAN RED CROSS BLOOD SERVICES | WINTER 2009

## THE POTENTIAL IMPACT OF PANDEMIC INFLUENZA ON **BLOOD** SAFETY AND AVAILABILITY

Many scientists believe it is only a matter of time until the next influenza pandemic occurs. However, the timing and the severity of the next pandemic cannot be predicted. Modeling studies suggested that its effect in the United States could be severe. In the absence of any control measures (vaccination or drugs), a medium-level pandemic could cause 89,000 to 207,000 deaths, between 314,000 and 734,000 hospitalizations, 18 to 42 million outpatient visits, and another 20 to 47 million people being sick. Between 15% and 35% of the U.S. population could be affected. The numbers of health care workers (HCWs) and first responders available to work can be expected to be reduced; they will be at high risk of illness through exposure in the community and in the health care settings, and some may have to miss work to care for ill family members. What will be the likely impact on the blood supply, both in safety and availability, should an influenza pandemic occur?

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## THE POTENTIAL IMPACT OF PANDEMIC INFLUENZA ON BLOOD SAFETY AND AVAILABILITY, CONT.



Avian flu virus

Viremia can occur during influenza infection, including avian influenza infection, although the chance is low, especially in asymptomatic infections, which are relevant to the blood supply. Further study is needed to assess the transmissibility of influenza virus in blood transfused into a susceptible recipient.

The potential impact of the next pandemic on blood donors and blood center staff could be significant. A proportion will be infected. Another proportion could be unable or unwilling to show up for donation or duty, although no data are available on the probable sizes of the proportions.

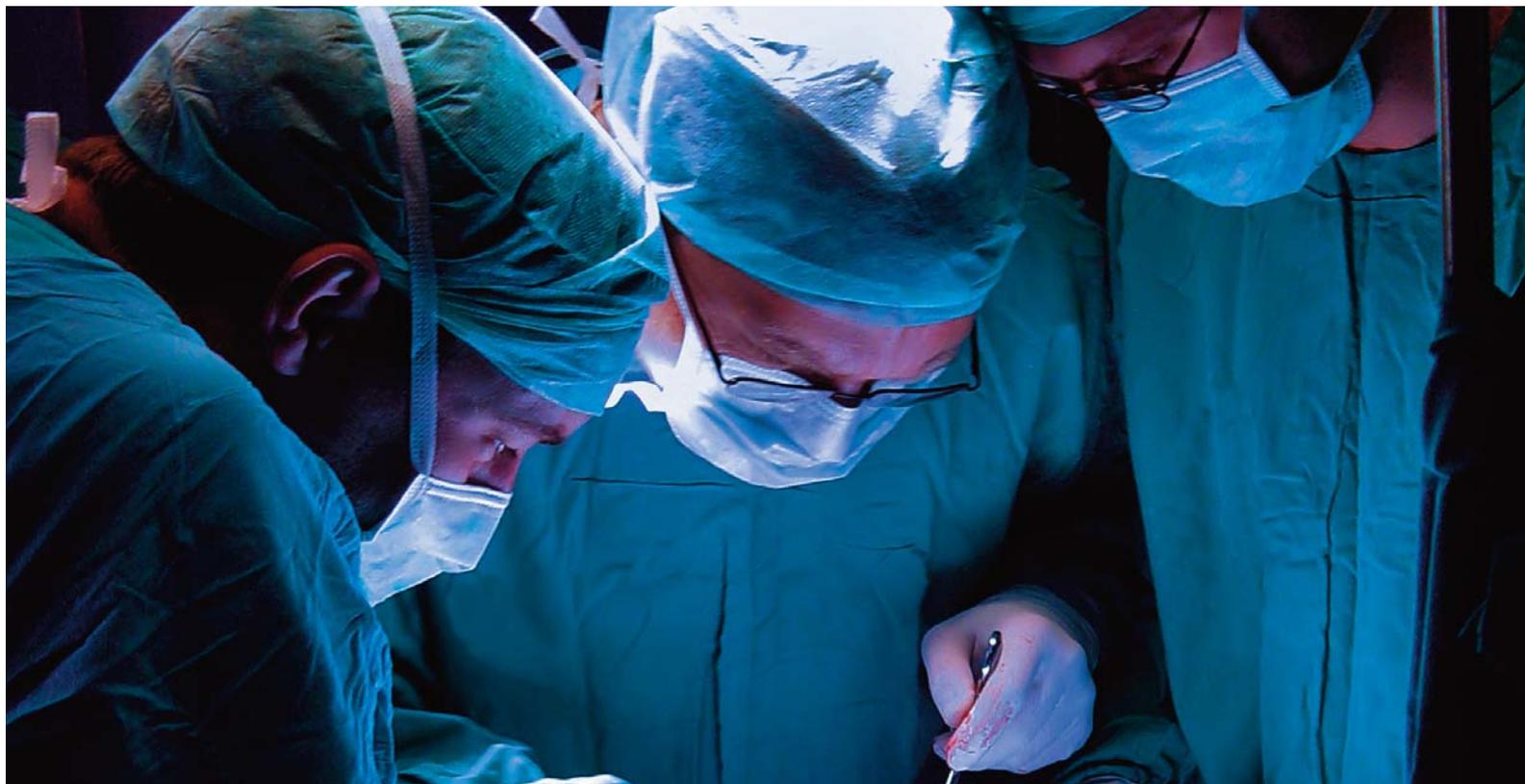
During a pandemic, there could be reduced admissions to hospitals and therefore a reduced number of patients who may need transfusion. Furthermore, there could be a reduction in transfusion even for existing patients because of reduced hospital staff capacity or simply for contingency purposes. It will be important to know whether reduced demand in hospitals will outperform or underperform reduced collection and delivery of blood

products. Another important aspect of the potential impact of a pandemic on blood demand is the likely difference in needs for different products, such as whole blood vs. platelets. Although the need for whole blood or plasma may decrease because of cancelled operations, the need for platelets may be unaffected or affected to a lesser extent.

Further studies are needed to quantify the impact of a pandemic on blood availability and on the transfusion needs of recipients during a pandemic. In addition, various intervention measures may have an impact on the blood supply from blood centers and on the blood demand from hospitals. The likely impact of such measures on blood availability as well as on blood safety ought to be evaluated. Results from such studies will be able to help contingency planning and necessary actions.■

*This article is an abridged version of Zou S. Potential Impact of Pandemic Influenza on Blood Safety and Availability. *Trans Med Rev* 2006 20:181-9. Reprinted with permission.*

## STUDY IDENTIFIES CHARACTERISTICS OF HOSPITALS WITH LOW RATES OF SURGICAL SITE INFECTIONS



Research published in the December issue of the *Journal of the American College of Surgeons (JACS)* suggests that surgical procedures that are shorter in duration and the use of fewer blood transfusions characterize hospitals that have a lower incidence of surgical site infections (SSI). Furthermore, the study concludes that strategies to reduce the length of operations and the number of blood transfusions should complement basic aseptic techniques in the operating room.

SSIs are a persistent problem that contribute to patient discomfort, longer hospital stays, and higher health care costs. Previously, evidence-based prevention measures implemented by the Surgical Infections Prevention Project (SIPP) resulted in a 27 percent reduction in the incidence of SSIs in 44 participating hospitals over the course of one year. This study, part of the first American College of Surgeons-National Surgical Quality Improvement Program (ACS-NSQIP) Best Practices Initiative, aimed to identify "best practices" that have not yet achieved the evidence requirement and therefore were not included in the SIPP.

Researchers compared 20 low-SSI incidence and 13 high-SSI incidence hospitals with regard to patient characteristics, operative variables, structural variables, and processes of care. Results of the analysis showed that hospitals with high SSI rates performed operations that took significantly longer on average compared with hospitals with low SSI rates (128 +/- 104.3 minutes versus 102.7 +/- 89.9 minutes, respectively;  $p < 0.001$ ).

In addition, hospitals with low SSI rates were less likely to administer transfusions than hospitals with high SSI rates (5.1 percent versus 9.7 percent, respectively;  $p = 0.03$ ).

"Most hospitals have been employing basic SSI prevention techniques for decades. In order to make a real impact on reducing the incidence of these infections, the standard procedures need to be complemented by strategies that reduce the length of operations and the frequency of blood transfusion," said lead study author Darrell A. Campbell Jr., MD, FACS, professor of surgery at the University of Michigan, Ann Arbor. Data showed that hospitals that were substantially more involved with training young surgeons had operations with longer durations. In the article in the December issue of *JACS*, researchers called for further studies to explore the link between higher transfusion rates in higher SSI incidence hospitals and commented that the practice of reducing operating room traffic also deserves more research. Overall, the results of the study showed that hospitals with low SSI incidence rates were smaller, more efficient in the delivery of care, and experienced little operative staff turnover. ■

Campbell D, Henderson W, Englesbe M, Hall B, O'Reilly M, Bratzler D, Dellinger E, Neumayer L, Bass B, Hutter M. Surgical Site Infection Prevention: The Importance of Operative Duration and Blood Transfusion—Results of the First American College of Surgeons—National Surgical Quality Improvement Program Best Practices Initiative. *Jour Amer Coll Surg*. 2008. 207:810–820.

## RED CROSS EXAMINES BLOOD DONOR DEFERRALS



Donor deferrals impact blood availability

A large number of blood donors are deferred each year, and many of the temporarily deferred donors do not return to donate blood. A recent study analyzed actual deferral and return donation data from the American Red Cross to further assess the impact of donor deferral on blood availability.

Blood safety is ensured through selection of appropriate donor populations, screening of presenting donors, testing of donated blood units, postdonation procedures, and donor deferral registry, as well as blood transfusion practice. Safe donors are encouraged to donate their blood while at-risk donors are encouraged to self-defer from blood donation. At blood collection sites, presenting donors are informed of known or newly identified risks of blood-borne infections to help their decision making regarding donation. Presenting donors are further screened through a mini-physical examination and a health history questionnaire. The examination and questions are related to either donor safety or recipient safety issues such as potential exposure to infectious agents, human immunodeficiency virus (HIV), hepatitis B virus, hepatitis C virus (HCV), and human T-lymphotropic viruses. For infectious agents

where no test is available, donor screening and deferral is regarded as an important safeguard for the blood supply.

The expanding list of health history questions related to potential exposure to blood-borne infections has had a significant impact on the blood collection process. Not only have such questions resulted in a large number of blood donors being deferred each year by blood centers in the United States but many of the temporarily deferred donors also do not return to donate blood.

A mean of 12.8 percent of a total of 47,814,370 donor presentations between 2001 and 2006 resulted in a deferral. While the majority of the deferrals were related to donor safety reasons, deferrals for recipient safety reasons accounted for 22.6 percent of deferrals or 2.9 percent of total presentations. Temporary and indefinite deferrals for recipient safety-related reasons collectively caused an estimated loss of 647,828 donors during the 6 years. An additional 1,042,743 donors were lost due to deferrals for donor safety-related reasons during the same period.

The follow-up of deferred donors through the donation and deferral records maintained by the ARC Blood Services showed that a mean of more than 12 percent of total donor presentations was deferred in 2001 through 2006. Significant increases in deferral were observed for low Hb levels and for travel-related to malarial risk. Applying the results to the entire United States, more than 3.7 million donors were likely lost during the 6 years after deferral, including more than 1.4 million donors lost after deferral due to recipient safety reasons with questionable benefits to actual recipient safety.

The results regarding donor loss after deferral call attention to the impact of donor deferrals on blood availability and the need to monitor and assess the necessity and effectiveness of such deferrals. ■

Zou S, Musavi F, Notari E.P, Rios J.A, Trouern-Trend J, Fang CT. Donor deferral and resulting donor loss at the American Red Cross Blood Services, 2001 through 2006. *Transfusion*. 2008. 48:2531-2539.

# ANAPLASMA PHAGOCYTOPHILUM TRANSMITTED THROUGH BLOOD TRANSFUSION

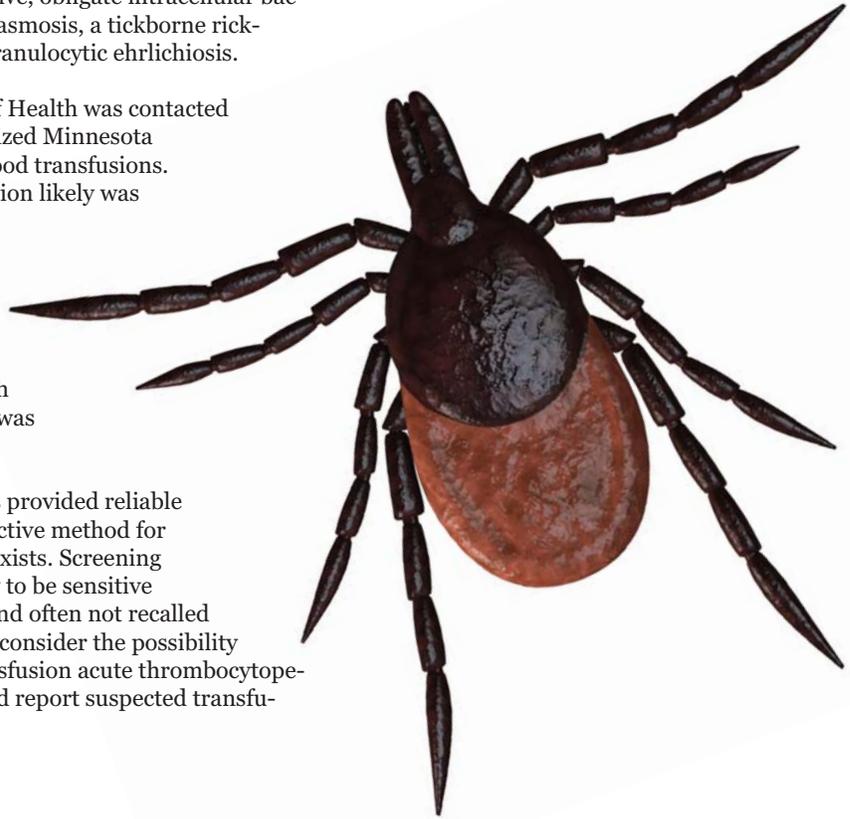
**A** *Anaplasma phagocytophilum*, a gram-negative, obligate intracellular bacterium of neutrophils, causes human anaplasmosis, a tickborne rickettsial disease formerly known as human granulocytic ehrlichiosis.

In November 2007, the Minnesota Department of Health was contacted about *A. phagocytophilum* infection in a hospitalized Minnesota resident who had recently undergone multiple blood transfusions. Subsequent investigation indicated that the infection likely was acquired through a transfusion of red blood cells.

This report describes the patient's clinical history and the epidemiologic and laboratory investigations. Although a previous case of transfusion-transmitted anaplasmosis was reported, this is the first published report in which transfusion transmission of *A. phagocytophilum* was confirmed by testing of the recipient and a donor.

Although polymerase chain reaction (PCR) assays provided reliable evidence of transmission in this case, no cost-effective method for screening blood donors for *A. phagocytophilum* exists. Screening donors for a recent history of tick bite is not likely to be sensitive or specific because such exposures are common and often not recalled by persons with anaplasmosis. Physicians should consider the possibility of anaplasmosis in patients who develop posttransfusion acute thrombocytopenia, especially if accompanied by fever, and should report suspected transfusion-associated cases to health authorities. ■

MMWR. 2008;57:1145-1148.



## IMMUNOLOGICAL COMPLICATIONS OF BLOOD TRANSFUSION REVIEWED

**I**n the developed world, most of the reported complications of transfusion have an immunological basis. Although the media and the public are worried about the infectious risks of transfusion, hemovigilance reports show that antigen-antibody reactions are responsible for the vast majority of acute and delayed transfusion reactions.

Among the immediate complications of transfusion, the most common and serious are intravascular hemolytic transfusion reactions because of ABO incompatibility caused by giving the wrong blood to a patient (e.g. group A blood to a group O recipient). Fortunately, the vast majority of ABO-incompatible transfusions do not lead to major morbidity or mortality.

Another important cause of severe immediate transfusion reactions is transfusion-related acute lung injury (TRALI), caused by white cell antibodies in donor plasma. The most common, although not severe, acute transfusion reactions are urticaria and febrile, nonhemolytic, mostly preventable by leukodepletion and leukoreduction.

Delayed transfusion reactions are:

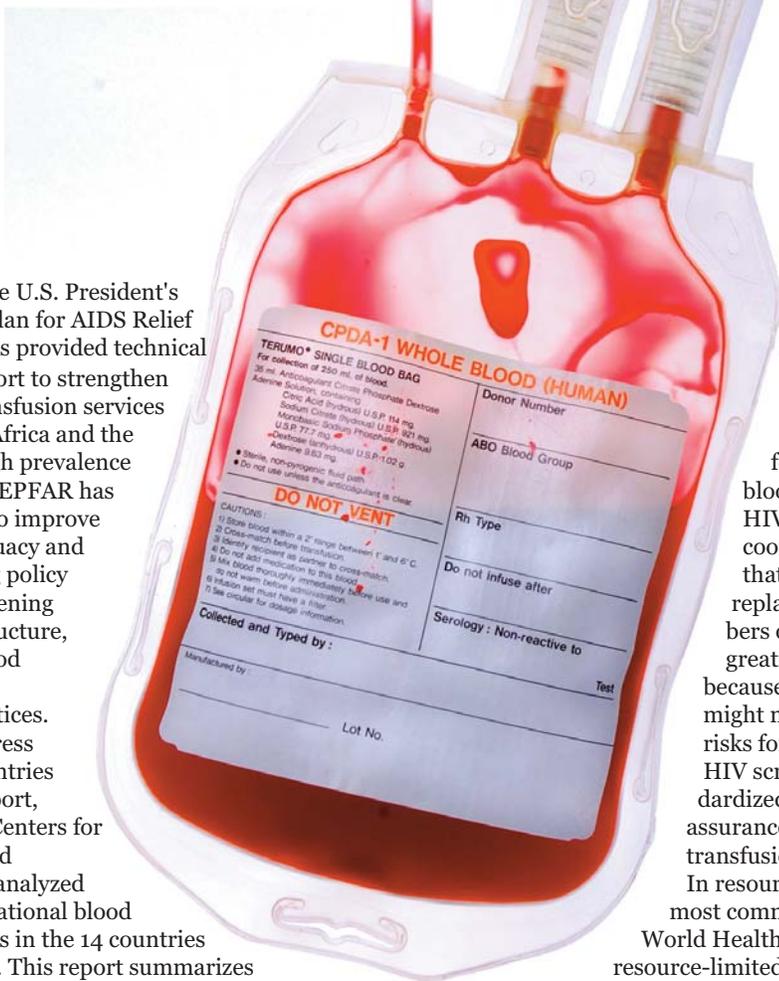
**hemolytic**, caused by anamnestic responses to red cell antigens, causing hemolysis days after the transfusion; post-transfusion purpura, caused by an anamnestic response to platelet antigens.

**graft-versus-host disease**, caused by engrafted donor lymphocyte reacting against the recipient; and immunological refractoriness to platelet transfusions, caused mostly by human leukocyte antigen antibodies destroying transfused platelets.

The diagnosis of most of these complications can now be made by immunohematologists, with the aid of specialist reference laboratories, thus enabling prompt therapy as required. ■

Taylor C, Navarrete C, Contreras M. Immunological complication of blood transfusion. *Alter Trans Med*. 2008. 10:112-126.

# PROGRESS IS MADE TOWARD STRENGTHENING BLOOD TRANSF



Since 2004, the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) has provided technical and financial support to strengthen national blood transfusion services in 14 countries in Africa and the Caribbean with high prevalence of HIV infection. PEPFAR has supported efforts to improve blood supply adequacy and safety by providing policy guidance, strengthening laboratory infrastructure, and enhancing blood donor recruitment and retention practices. To assess the progress made by these countries with PEPFAR support, the United States Centers for Disease Control and Prevention (CDC) analyzed data collected by national blood transfusion services in the 14 countries during 2003–2007. This report summarizes the results of that analysis, which found that:

- 1) national policies had been established in 12 of the 14 countries;
- 2) the number of whole blood units collected had increased in all 14 countries;
- 3) the percentage of collections from voluntary, non-remunerated donors had increased; and
- 4) the percentage of collected blood units reactive for HIV had decreased in 13 of the 14 countries. Since the start of the PEPFAR initiative, progress toward improving safe and adequate supplies of blood has been made in the 14 countries with high prevalence of HIV infection.

## Global Blood Safety

Globally, approximately 80 million units of blood are donated each year. Of this total, 2 million units are donated in sub-Saharan Africa, where the need for blood transfusions is great because of maternal morbidity, malnutrition, and a heavy burden of infectious diseases such as malaria. In 2004, blood

collections in most of the 14 PEPFAR-supported countries did not satisfy clinical demand. Inadequacy of the blood supply in many African countries was compounded by inconsistent laboratory screening for HIV infection and collection of blood from donors at greater risk for HIV infection. Collections often were coordinated by hospital-based services that frequently relied on paid donors or replacement donors (e.g., family members of patients) who typically were at greater risk for HIV infection and, because of external pressures to donate, might not have revealed their behavioral risks for HIV during donor selection. HIV screening of donor blood in nonstandardized laboratories without quality assurance further increased the risk for transfusion-associated HIV transmission. In resource-limited settings, blood is collected most commonly in whole blood units. The World Health Organization (WHO) estimates that resource-limited countries should begin to fulfill baseline clinical demand if 10–20 whole blood units per 1,000 population are collected each year. To improve blood supply adequacy and transfusion safety, WHO has recommended that resource-limited countries adopt comprehensive national policies for national blood transfusion services.

## PEPFAR Indicators

In 2006, a team of international blood safety experts developed a set of indicators to support routine monitoring and evaluation of PEPFAR projects. Indicator data related to blood supply adequacy and safety are compiled by staff members at regional centers where blood is collected, screened, and distributed. Collectively, these regional centers make up each national blood transfusion service. On a regular basis, data are transferred to national blood transfusion service headquarters; these data are aggregated quarterly and shared with CDC, which uses them for ongoing programmatic evaluation.

In 2008, national blood services in the 14 countries transferred data for the period 2003–2007 to CDC, where the data were analyzed by country and by year. The four indicators analyzed for this report address key elements in the WHO recommendations:

# USION SERVICES IN 14 DEVELOPING COUNTRIES

- 1) status of national policies and legislative frameworks for national blood transfusion services;
- 2) percentage of blood collections from voluntary, non-remunerated donors;
- 3) number of whole blood units collected and number collected per 1,000 population; and
- 4) percentage of blood collections reactive for HIV.

**TABLE 1. Status of national blood transfusion policies and legislative frameworks, <sup>a</sup> number of whole blood units collected, and number collected per 1,000 population — U.S. President's Emergency Plan for AIDS Relief, 14 countries, 2003–2007**

Country	Established national policy		Enacted legislative framework		No. of whole blood units collected					No. of whole blood units collected per 1,000 population <sup>b</sup>				
	2003	2007	2003	2007	2003	2004	2005	2006	2007	2003	2004	2005	2006	2007
Botswana	Yes	Yes	No	No	11,583	13,210	20,643	21,061	22,230	6.4	7.3	11.2	11.2	11.6
Côte d'Ivoire	Yes	Yes	Yes	Yes	67,780	77,972	86,321	86,082	92,000	3.8	4.3	4.6	4.5	4.8
Ethiopia <sup>†</sup>	No	Yes	No	No	17,208	17,941	19,203	21,019	22,220	0.2	0.2	0.2	0.3	0.3
Guyana	Yes	Yes	No	In development	4,008	4,896	4,531	5,192	5,475	5.4	6.6	6.1	7.1	7.5
Haiti	No	Yes	No	In development	8,711	9,513	10,823	13,622	17,094	1.0	1.0	1.2	1.4	1.8
Kenya	Yes	Yes	Yes	Yes	40,857	47,661	80,762	113,080	123,787	1.2	1.4	2.3	3.1	3.3
Mozambique	No	In development	No	In development	67,105	66,648	76,667	72,170	79,925	3.4	3.5	3.8	3.5	3.8
Namibia	No	Yes	No	In development	17,860	19,154	19,133	19,422	18,309	9.1	9.6	9.5	9.0	8.9
Nigeria <sup>‡</sup>	No	Yes	No	Yes	—	—	1,266	5,519	16,987	—	—	<0.1	<0.1	0.1
Rwanda	No	Yes	No	Yes	30,796	28,777	37,893	39,539	32,543	3.5	3.2	4.1	4.1	3.3
South Africa <sup>**</sup>	Yes	Yes	Yes	Yes	809,322	813,230	805,923	822,950	821,258	17.3	17.2	16.9	17.2	17.0
Tanzania <sup>§</sup>	No	Yes	No	In development	—	—	12,597	63,411	109,471	—	—	0.3	1.6	2.7
Uganda	Yes	Yes	Yes	Yes	102,703	106,996	115,988	122,442	133,585	3.8	3.8	4.0	4.1	4.3
Zambia	No	In development	No	In development	40,616	38,477	61,982	64,308	68,066	3.7	3.4	5.4	4.6	5.7

<sup>a</sup> As described in: World Health Organization. Aide-memoire for national blood programmes. Geneva, Switzerland: World Health Organization; 2002. Available at [http://www.who.int/bloodsafety/transfusion\\_services/en/Blood\\_Safety\\_Eng.pdf](http://www.who.int/bloodsafety/transfusion_services/en/Blood_Safety_Eng.pdf).  
<sup>b</sup> Based on United Nations Population Division census estimates for 2003–2007.  
<sup>†</sup> Ethiopia Red Cross Society is the designated national blood transfusion service.  
<sup>‡</sup> Nigeria and Tanzania established their national blood transfusion services in 2004. The first year with 12 complete months of data available was 2005.  
<sup>§</sup> Includes data from South Africa National Blood Service and Western Province Blood Service.

In 2003, national policies to ensure the adequacy and safety of the blood supply were in place in six of the 14 countries, and national blood transfusion services were operating under a legislative framework in four of the 14 countries. By 2007, national policies had been established in six more countries and were in development in the two remaining countries; legislative frameworks to support the national policies had been enacted in one additional country and were in development in six other countries (Table 1).

**TABLE 2: Estimated percentage of persons aged 15–49 years with human immunodeficiency virus (HIV) infection, percentage of blood collections reactive for HIV, and percentage of collections from voluntary, non-remunerated donors — U.S. President's Emergency Plan for AIDS Relief, 14 countries, 2003–2007**

Country	% of persons with HIV infection <sup>a</sup>		% of blood collections reactive for HIV					% of blood collections received from voluntary, non-remunerated donors				
	2001	2007	2003	2004	2005	2006	2007	2003	2004	2005	2006	2007
Botswana	26.5	23.9	7.5	5.7	4.0	2.7	2.1	100	100	100	100	100
Côte d'Ivoire	6.0	3.9	1.6	1.4	1.5	1.4	1.2	100	100	100	100	100
Ethiopia <sup>†</sup>	2.4	2.1	—	3.6	3.4	2.5	3.0	38.8	27.5	23.2	28.1	28.4
Guyana	2.5	2.5	0.8	0.6	1.0	0.6	0.3	21.7	18.9	26.1	21.4	61.1
Haiti	2.2	2.2	1.7	1.8	1.6	1.9	1.4	5.2	5.4	14.9	37.4	51.9
Kenya	8.1	7.8 <sup>‡</sup>	1.5	1.7	1.9	2.5	1.2	99.0	95.3	97.6	98.9	99.5
Mozambique	10.3	12.5	8.6	6.9	6.4	8.3	7.2	58.0	58.3	59.6	52.0	72.3
Namibia	14.6	15.3	0.7	0.6	0.6	0.5	0.6	100	100	100	100	100
Nigeria <sup>‡</sup>	3.2	3.1	—	—	3.8	3.5	2.5	—	—	100	100	92.3
Rwanda	4.3	2.8	1.1	0.1	1.2	0.9	0.5	100	100	100	100	100
South Africa <sup>**</sup>	16.9	18.1	<0.1	<0.1	<0.1	<0.1	0.1	100	100	100	100	100
Tanzania <sup>§</sup>	7.0	6.2	—	—	4.8	3.2	2.8	—	—	66.5	80.0	89.2
Uganda	7.9	5.4	2.0	1.9	1.6	1.5	1.3	95.5	96.3	99.0	99.9	100
Zambia	15.4	15.2	6.9	6.4	9.0	6.4	3.8	72.7	71.2	90.6	97.9	99.6

<sup>a</sup> Estimates from the Joint United Nations Programme on HIV/AIDS (UNAIDS), available at [http://data.unaids.org/pub/globalreport/2008/jc1510\\_2008\\_global\\_report\\_pp211\\_234\\_en.pdf](http://data.unaids.org/pub/globalreport/2008/jc1510_2008_global_report_pp211_234_en.pdf). Because UNAIDS methodology used to estimate 2003 prevalence was different from the methodology used for 2007, data are presented for 2001, the most recent pre-program year for which the same methodology was used as for 2007.  
<sup>†</sup> Ethiopia Red Cross Society is the designated national blood transfusion service.  
<sup>‡</sup> Preliminary estimate.  
<sup>§</sup> Nigeria and Tanzania established their national blood transfusion services in 2004. The first year with 12 complete months of data available was 2005.  
<sup>\*\*</sup> Includes data from South Africa National Blood Service and Western Province Blood Service. Autologous donations and collections from designated donors are reported as donations from voluntary, non-remunerated donors.

During 2003-2007, national blood transfusion services in all 14 countries had increased total collections of whole blood units and, in 11 countries, had increased collection rates per 1,000 population. In 2003, collections in South Africa were already within the WHO-recommended range of 10-20 whole blood units per 1,000 population. By 2007, the collection rate in Botswana also was within that range.

In 2003, in five of the 14 countries, 100% of blood collections by national blood transfusion services were from voluntary, non-remunerated donors. By 2007, the number of countries meeting this criterion had increased to six. In addition, by 2007, the percentage of collections from such donors had increased in six other countries (Table 2). In 13 of the 14 countries, the percentage of collected blood units that were HIV reactive in 2007 had decreased from the first year of reporting. ■

Reported by: J Pitman, MPH, L Marum, MD, Global AIDS Program; S Basavaraju, MD, A McIntyre, PhD, EIS officers, CDC.--*MMWR*, 28 November 2008, 57 (47):1273-1277.



## AVAILABLE BROCHURES



*What If I Need Blood?*, a brochure that answers commonly asked questions and explains the transfusion options for patients, is available through your American Red Cross representative.

The brochure is available in both English and Spanish.



The second edition of *Practice Guidelines for Blood Transfusion: A Compilation of Peer-Reviewed Literature* is available through your American Red Cross Blood Services representative.

This pocket guide is a concise transfusion medicine resource, providing guidelines for some of the more commonly encountered clinical situations.

*A Guide to American Red Cross Reference Laboratory Services*  
A new guide describing the many services offered by the American Red Cross Immunohematology Reference Laboratories is now available.



## REMEMBER THESE WEB SITES

*Immunohematology Journal*  
[www.redcross.org/en/immunohematology](http://www.redcross.org/en/immunohematology)

Reimbursement  
[www.redcross.org/hospitals/reimbursement](http://www.redcross.org/hospitals/reimbursement)

PLUS  
Winter 2009, Volume Three, Issue One

## HEA-BIOARRAY BEADCHIP GENOTYPE AVAILABLE FOR PREDICTION OF BLOOD GROUP ANTIGENS

With the completion of feasibility testing and with the automation of DNA extraction, molecular testing with the HEA-beadchip is now available through the American Red Cross Molecular Testing Laboratory.

**HEA (Human Erythrocyte Antigen) genotyping** includes the following systems:

**Rh:** C/c, E/e, VVS **MN, Ss** (including U-/U<sup>Var</sup>)  
**LW:** a/b **Kell:** K/k, Kpa/b, Jsa/b **Lutheran:** Lua/b  
**Colton:** Coa/b **Duffy:** Fya/b (including Fyx and erythroid silenced Fyb) **Diego:** Dia/b **Kidd:** Jka/b  
**Dombrock:** Doa/b, Jo(a), Hy **Scianna:** Sc1/2

### Potential uses:

- To predict the extended phenotype of multiply transfused patients and patients with warm autoantibodies.
- High-throughput screening for antigen negative donor units. Negative results require RBC serologic confirmation when reagents are available.

### Reports:

- Reports will indicate a *predicted* phenotype based on the genotype. This testing cannot detect all mutations that silence gene expression, and false positive results are possible.
- Reports will include the following disclaimer statement: The molecular test methods were developed, and their performance characteristics determined by the molecular red cell and platelet testing laboratory at the American Red Cross. The FDA has not reviewed or approved the reagents used. These results are not intended as the sole means for clinical diagnosis or patient management decisions.

**Limitations:** The genotype may not always reflect the red cell phenotype. New mutations that inactivate gene expression or new variant alleles may not be identified in these assays.

**Sample requirements:** EDTA sample, non-leukoreduced donor segments, or buccal swap.

**Turn-around:** Approximately 48-72 hours M-F. Requests for critical patient needs can be expedited by contacting the laboratory.

For more information, please call the American Red Cross Molecular Blood Group and Platelet Antigen Testing Laboratory at 215.451.4917.



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