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Reasons for blood donation deferral in sub-Saharan Africa: experience in Ivory Coast

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Abstract

INTRODUCTION—Blood donor selection is important to ensure the safety of both donors and recipients. There is a paucity of data on reasons for blood donor deferral in Ivory Coast. The aim of this study was to identify the reasons for predonation deferral at a blood collection site at General Hospital, Yopougon Attié in Abidjan.

MATERIALS AND METHODS—The investigators conducted a retrospective audit of data pertaining to donor deferral for blood donors that presented to the general hospital of Yopugon Attié from January 1, 2006 to December 31, 2008.

RESULTS—A total of 10,694 prospective blood donors, presented over the study period, and 24,363 attempts to donate were registered. The majority were repeat blood donors (77.4%). A total of 2618 (10.8%) donors were deferred. The most frequent reason for deferral was a low hemoglobin level (42.5%), with females constituting the majority of those deferred. The second most frequent reason for deferral was a reported change of or new sexual partner (34.3%); male donors were predominant in this group. Additional reasons for deferral included short interdonation interval (4.6%) and reactivity for a screened biomarker (2.3%).

CONCLUSION—Although the rates for permanent and temporary deferral rates are similar between the Ivory Coast and high-middle income countries, the causes and demographics differ. The reasons for exclusion are preventable through awareness and education of prospective blood donors.

INTRODUCTION

In sub-Saharan Africa, the need for blood transfusions is great, owing to a high prevalence of obstetric hemorrhage, malnutrition, and a heavy burden of infectious diseases such as malaria.[1] The World Health Organization recommends a collection rate of 10–20 whole blood units per 1000 population to address transfusion needs; in contrast, Ivory Coast reported a rate of 4.8 per 1000 in 2007. To increase the number of donors—and consequently the number of donations—the National Blood Transfusion Service of Ivory Coast, supported by the President's Emergency Plan for Acquired Immunodeficiency

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CONFLICT OF INTEREST
None.

Syndrome (AIDS) Relief funding, decided to establish new collection sites across a broader geography so as to address shortfall in collection. The collection site located in the general hospital of Yopougon Attié—a town with a population of approximately 1.1 million—was established in 2005 in this context.

Only a subset of those attempting to donate blood is eligible to be blood donors. Stringent donor selection criteria are in place to ensure the safety of both donors and recipients alike.[2–4] Blood donor selection is pivotal in interdicting infectious risk. The criteria are therefore informed by known sociobehavioral risk factors that impute risk of transfusion-transmissible infections. While well described in high-middle income countries, knowledge of deferral is frequently lacking in resource-constrained settings. The objectives of this study were to identify the causes underpinning donor deferral in Ivory Coast, with the overarching goal of applying this knowledge to improve donor selection.

MATERIALS AND METHODS

A retrospective audit was conducted of all blood donors that presented to donate allogeneic whole blood at the collection site located at General Hospital, Yopougon Attié over a 36-month period (January 1, 2006–December 31, 2008). The subjects were voluntary and nonremunerated blood donors.

Donation process

To be eligible to donate blood in Ivory Coast, subjects need to be between 18 and 60 years, have a weight ≥50 kg, a systolic blood pressure between 110 and 160 mm Hg, a diastolic blood pressure between 60 and 90 mm Hg, a hemoglobin level between 11 and 17.9 g/dL (same for both men and women), and an interdonation interval of 3 months for women and 2.5 months for men. Each prospective blood donor is routinely provided with two documents: a fact sheet on risk behavior for human immunodeficiency virus (HIV)/AIDS and an identification form with a preestablished questionnaire to be completed by the prospective donor. A unique donation number is assigned for identification purposes. The donor's weight, blood pressure, and hemoglobin level (Hemocue 201+, Hemocue, Inc., Mission Viejo, CA or HemoControl, EKF-Diagnostic GmbH, Barleben, Germany) are subsequently recorded, and the donor's arms are inspected for needle marks that might suggest injection drug use. This is followed by an interview conducted by trained medical personnel with the use of guidelines developed in Ivory Coast. The donor's responses to the questionnaire are entered into a blood data management system (Progesa, Mak-System Services, Tremblay, France), which is used for all donors in the country. Table 1 shows the criteria for donor deferral. On completion of the interview and review of donor responses, the prospective donor is either declared fit to donate blood or alternatively deemed ineligible and deferred from blood donation. Any deferral is recorded as either temporary (short or long term) or permanent. Short-term deferral is 1 week to 3 months and long-term deferral is 3 months to 1 year. In cases of temporary deferral, the number of deferral days has been established specific to the reason for deferral. This is recorded in the blood data management system, precluding subsequent donation during the assigned deferral period.

Study methods

The study data were obtained from the computerized records (blood data management system). The reasons for deferral were stratified for sex and type of donation.

Donation status was categorized as follows: donors who attempted to donate blood for the first time in their lifetime were classified as first-time donors and those who donated more than once were considered repeat donors. Statistical analyses were performed with the use of

Epi-info 6.04d (CDC, Atlanta, GA), French version. Proportions were compared with the use of the chi-squared test, and a p value < 0.05 was considered as significant.

RESULTS

During the study period, there were a total of 10,694 candidates (prospective blood donors), from which 24,363 attempts to donate were registered. About 19,158 (78.6%) were deemed eligible and subsequently donated. About 2587 (10.6%) of the donation attempts were subjected to a confirmatory sample for an abnormal laboratory result. About 2618 (10.74%) were ultimately deferred.

Most deferred donors were male (75.2%). Among the 2618 deferred donors, 591 (22.6%) were first-time donors and 2027 (77.4%) were repeat donors. A total of 584 (22.3%) donors received short-term deferral, 1658 (63.3%) received long-term deferral, and 134 (5.1%) were permanently deferred; 242 (9.3%) were not classified.

Globally, the four most common reasons for deferral were low hemoglobin (29.4%), followed by change of sexual partner (29.1%), short interdonation interval (4.5%), and positive serology (3.3%). The complete list of types and frequencies of deferrals stratified by sex and type of donors (first time vs. repeat) is provided in Table 2.

The foremost reasons for short-term deferral according to sex were interdonation interval in males (5.4%) and low weight in females (4.5%). According to the type of donor, the main causes of short-term deferral were short interdonation interval in repeat donors (5.9%). For the first-time donors, ingestion of medication (4.2%) and low weight (4.1%) were the main causes.

Sex-specific analysis showed that the most common reason for long-term deferral was low hemoglobin level in women (42.5%) and new sexual partner in males (34.1%). When stratified by donation status, the two most common causes for long-term deferral in repeat donors were low hemoglobin (35.2%), followed by new sexual partner (24.1%), while in first-time donors new sexual partner (46.5%) and low hemoglobin (9.8%) were most common.

The most frequent reason for permanent deferral was positive serology in males (4.3%), while heart disease (0.8%) and testing reason (0.6%) were the most common permanent deferral in females. For first-time donors, the main causes of permanent deferral were tuberculosis (1%) and test seeking (0.6%), but for repeat donors, positive serology was the more common (4.2%).

DISCUSSION

Donor selection is critical to blood transfusion safety. Given a shortage of safe blood donors in sub-Saharan Africa, it is important to understand the reasons for deferral. Improved understanding of reasons for deferral informs intervention. There have been few publications describing the reasons for deferral in Africa, specifically in Ivory Coast. Our study evaluated reasons for deferral in a population of voluntary and nonremunerated donors. In our study, we found that the overall deferral rate of donors in our center over a 3-year period was 10.74%, which approximates those reported by Newman (10%) and Custer et al. (13.6%) in the United States, Lawson-Ayayi and Salmi (10.8%) in France, and Arslan (14.6%) in Turkey.[5–8] The comparison of our deferral frequency with those reported in studies carried out in other African countries is difficult because of differences in practices.[9]

Exclusion during medical examination particularly affected men and repeat donors with rates in Ivory Coast being higher than those reported in other studies.[5,6,8,9] The high number of male and repeat-donor deferrals reflects the high proportion of these donors in our donor pool.

Our short-term and permanent deferral rates were lower than those reported in other studies. Custer et al. reported that 68.5% and 10.5% of deferrals in the United Sates were short term and permanent, respectively.[6] A Turkish study found that temporary short-term deferral accounted for 66% and permanent deferrals accounted for 10%.[8] The difference could be explained by the classification of low hemoglobin levels among the reason for short-term deferral of blood donors in the United States and the high-middle income countries,[6,8] whereas we have classified it among long-term deferral causes of view of the epidemiological context (high-potential anemia diseases such as malaria, poor iron nutrition, etc.). However, this difference could also be due to the local donor profile. In our country, the blood donors are much younger and therefore potentially less likely to have chronic diseases (e.g., diabetes, cancer, cardiovascular disease, etc.).

Although we have a higher percentage of male donors compared with other studies, the rate of temporary deferrals (short term and long term) did not vary by sex and type of donor ($p > 0.05$). Deferral rates—stratified by donor sex—differed only for permanent deferral ($p < 0.05$). Other published studies differ from our study, with Custer et al.[6] having concluded that the rates of deferral do vary by sex and Lawson-Ayayi and Salmi[7] having reported that permanent deferral was not sex related.

In our study, the leading causes of temporary deferrals (short term or long term) of men were new sexual partner, low hemoglobin, and short interdonation interval. We noted a low frequency of high blood pressure, while the number of deferrals for short interdonation interval was increased among men.[10]

In our study, low hemoglobin in women was the major cause for temporary deferral. This is not unique to Ivory Coast and can be explained by female donors being prone to anemia and iron depletion as reflected by low hemoglobin values.[11] Reasons for this anemia include menstrual blood loss, poor nutrition, and tropical disease.[9] This should motivate for provision of dietary advice and iron supplementation to female donors. Blood donation has been reported to be a significant contributing cause of iron deficiency among blood donors that disproportionately affects female donors.[12] In Europe, the current institutional guideline for donor deferral is a hemoglobin less than 13.5 g/dL in males and hemoglobin less than 12.5 g/dL in females.[3,13] Even with hemoglobin of 11 g/dL required for eligibility in Ivory Coast, we have a high number of blood donor deferrals. This raises concern as to whether donor deferral criteria should be aligned with high-middle income countries, e.g., in Europe, so as to protect donors from anemia. However, given current shortfalls in the blood supply, Ivory Coast is unlikely to tolerate more stringent guidelines. The data show that regular blood donors are at risk for low hemoglobin and consequently deferral from donation.

Earlier studies showed that regular blood donors are at risk for developing depletion of iron stores.[14] One unit of blood donation results in depletion of 236 mg of iron.[12] The results of our study support considered review of the donor deferral criteria pertaining to low hemoglobin to balance donor risk against the needs of patients. Public health intervention with promotion of awareness surrounding anemia and the importance of diet and regular medical checkups may assist in minimizing downstream deferral. Regular donors should be encouraged to maintain iron intake to prevent depletion of iron stores.[15]

Positive serology was the reason most frequently reported for permanent deferrals; this predominantly affected male blood donors, which is different from that reported in the

United States.[6] We believe that a high seropositivity rate for HIV and hepatitis B and C in our country is the major contributing factor. In females, test seeking is a cause of permanent deferral. We could explain it by the fact that they did not want to go to the center of voluntary testing of HIV close to their home.

In conclusion, donor deferrals are common in the collection site at the General Hospital of Yopugon Attié and are similar to rates reported in high-middle income countries. Although the rates for permanent and temporary deferral are similar between the Ivory Coast and high-middle income countries, the causes and demographics differ. Improved understanding of the reasons for deferral among blood donors can inform donor recruitment, thereby improving selection. Finally, this study highlighted the dilemma of donor protection versus shortfall of provision of critically needed blood. Considered review of the current hemoglobin criteria for donor deferral is warranted in this context.

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TABLE 1

Criteria for donor deferral in Ivory Coast

Temporary deferral	
Short term (1 week–3 months)	Tooth extraction, toothache: 1 week
	Medicines: antibiotics, aspirin: 1 week
	Vaccination: yellow fever and oral polio: 1 month; hepatitis B vaccine = 1 week
	Dizziness, headache, convalescence, malaria, influenza, conjunctivitis, joint pain, colds, coughs, sore throats: 1 week after healing, diarrhea, abdominal pain
Long term (3–12 months)	Low hemoglobin level
	General surgery
	Transfusion
	Piercing, tattoo, acupuncture
	Abortion, pregnancy, childbirth, miscarriage or curettage, breastfeeding
	New partner, casual
	Typhoid fever
	Dermatitis: skin infection, shingles, chickenpox, any major illness
	Gastric ulcer
Permanent deferral	Unexplained weight loss
	Malignancy
	Abnormal bleeding tendency
	Heart, lung, or liver diseases
	Endocrine disorders
	Epilepsy, mental illness
	Infection with HBV, HCV, HIV, syphilis
	High-risk group: multiple sex partners, homosexuals, bisexuals, prostitutes, exposure to prostitutes, sexual relationship with HIV, HCV, and HBV infected person, intravenous drug users
	Phenotype K+
	Nonvoluntary donation

HBV = hepatitis B virus; HCV = hepatitis C virus; HIV = human immunodeficiency virus.

TABLE 2

Deferral reasons by sex and type of donation

	Sex		Type of donors		
	Female (n = 650) (%)	**Male (n = 1968) (%)**	**Repeat (n = 2027) (%)**	**First time (n = 591) (%)**	**Total (n = 2618) (%)**
Short term					
Malaria	3 (0.5)	15 (0.8)	11 (0.5)	7 (1.2)	18 (0.7)
Short interval duration	14 (2.2)	106 (5.4) *	120 (5.9)		120 (4.5)
Low blood pressure	2 (0.3)	4 (0.2)	6 (0.3)		6 (0.2)
Ingestion of medication	18 (2.8)	45 (2.3)	38 (1.9)	25 (4.2)	63 (2.4)
High blood pressure	11 (1.7)	50 (2.5)	48 (2.4)	13 (2.2)	61 (2.3)
Influenza	8 (1.2)	47 (2.4)	45 (2.2)	10 (1.7)	55 (2.1)
Convalescence	16 (2.5)	37 (1.9)	43 (2.1)	10 (1.7)	53 (2.0)
Vaccine	6 (0.9)	47 (2.4)	47 (2.3)	6 (1.0)	53 (2.0)
Weight < 50 kg	29 (4.5) *	22 (1.1)	27 (1.3)	24 (4.1) *	51 (1.9)
Venous problem	18 (2.8)	12 (0.6)	24 (1.2)	6 (1.0)	30 (1.1)
Other medical illnesses	6 (0.9)	12 (0.6)	10 (0.5)	8 (1.4)	18 (0.7)
Left without donation	3 (0.5)	12 (0.6)	15 (0.7)		15 (0.6)
Colds and/or sore throats	5 (0.8)	7 (0.4)	8 (0.4)	4 (0.7)	12 (0.5)
Tooth extraction	2 (0.3)	26 (1.3)	25 (1.2)	3 (0.5)	28 (1.1)
Age < 18 years		1 (0.1)		1 (0.2)	1 (0.0)
Subtotal	*141 (21.7)*	*443 (22.5)†*	*467 (23.0)*	*117 (19.8)†*	*584 (22.3)*
Long term					
Curettage layer breastfeeding	30 (4.6)		13 (0.6)	17 (2.9)	30 (1.1)
New sexual partner	92 (14.2)	671 (34.1) *	488 (24.1)	275 (46.5) *	763 (29.1)
Low hemoglobin level	276 (42.5) *	495 (25.2)	713 (35.2) *	58 (9.8)	771 (29.4)
Digestive disease	4 (0.6)	16 (0.8)	16 (0.8)	4 (0.7)	20 (0.8)
Asthma	3 (0.5)	1 (0.1)	3 (0.1)	1 (0.2)	4 (0.2)
Typhoid fever	7 (1.1)	15 (0.8)	16 (0.8)	6 (1.0)	22 (0.8)
Tattoos	2 (0.3)	11 (0.6)	7 (0.3)	6 (1.0)	13 (0.5)
Dermatitis	5 (0.8)	14 (0.8)	13 (0.7)	6 (1.0)	19 (0.8)
Colds and/or sore throats	5 (0.8)	7 (0.4)	8 (0.4)	4 (0.7)	12 (0.5)

	Sex		Type of donors		
	Female (n = 650) (%)	**Male (n = 1968) (%)**	**Repeat (n = 2027) (%)**	**First time (n = 591) (%)**	**Total (n = 2618) (%)**
General surgery	3 (0.5)	6 (0.3)	5 (0.2)	4 (0.7)	9 (0.3)
Urogenital disease	2 (0.3)	2 (0.1)	4 (0.2)		4 (0.2)
Endoscopic examinations		3 (0.2)	3 (0.1)		3 (0.1)
Subtotal	*424 (65.2)*	*1234 (62.7)*†	*1281 (63.2)*	*377 (63.8)*†	*1658 (63.3)*
Permanent					
Tuberculosis	1 (0.2)	8 (0.4)	3 (0.1)	6 (1.0)	9 (0.3)
Positive serology	2 (0.3)	84 (4.3)	85 (4.2)	1 (0.2)	86 (3.3)
Heart disease	5 (0.8)	4 (0.2)	6 (0.3)	3 (0.5)	9 (0.3)
Sickle-cell disease	0	6 (0.3)	3 (0.1)	3 (0.5)	6 (0.2)
HIV-positive partner	2 (0.3)	5 (0.3)	6 (0.3)	1 (0.2)	7 (0.3)
Test seeking	4 (0.6)	1 (0.1)	1 (0.0)	4 (0.7)	5 (0.2)
Multiple sexual partner		5 (0.3)	3 (0.1)	2 (0.3)	5 (0.2)
Phenotype K+		3 (0.2)	3 (0.1)		3 (0.1)
Epilepsy		2 (0.1)	1 (0.0)	1 (0.2)	2 (0.1)
Polycythemia		2 (0.1)	2 (0.1)		2 (0.1)
Subtotal	*14 (2.2)*	*120 (6.1)**	*113 (5.6)**	*21 (3.5)*	*134 (5.1)*
Not specified	71 (10.9)	171 (8.7)	166 (8.2)	76 (12.9)	242 (9.3)

* $p < 0.05$.

† Nonsignificant.

HIV = human immunodeficiency virus.