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Syphilis screening practices in blood transfusion facilities in Ghana

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SUMMARY

Objectives: The primary objective of this study was to compare laboratory practices for screening blood donors for syphilis at blood transfusion facilities in Ghana with the recommendations of the World Health Organization and the National Blood Service, Ghana (NBSG). The prevalence of syphilis antibodies in blood donors in Ghana was also estimated.

Methods: Over an 11-month period, from February 2014 to January 2015, a semi-structured questionnaire was administered to 122 laboratory technical heads out of a total of 149 transfusion facilities in Ghana. The response rate was 81.9%.

Results: A total of 58 (48%) transfusion facilities tested donors for syphilis, with an estimated 3.7% seroprevalence (95% confidence interval 3.6–3.8%). A total of 62 782 out of 91 386 (68.7%) donations were tested with assays that are not recommended. The estimated syphilis seroprevalence in voluntary donations was 2.9%, compared to 4.0% in family donations ($p = 0.001$). Only 6.9% of the health facilities were using standard operating procedures (SOPs).

Conclusions: Despite international and national recommendations, more than half of the studied health facilities that provide blood transfusions in Ghana are not screening blood donations for syphilis. These data show a considerable mismatch between recommendations and practice, with serious consequences for blood safety and public health.

1. Introduction

Early reports of the transfusion-related transmission of syphilis led to the World Health Organization (WHO) recommendations for syphilis testing of blood donors.[1] These recommendations have been questioned, since many syphilis antibodies among blood donors are the result of previous infections or even unspecific reactions. Furthermore, *Treponema pallidum* does not withstand cold storage.[2] However, as not all blood components can be assumed to be kept cold for a sufficient amount of time, if at all, and as syphilis may also serve as a potential surrogate marker for high risk behaviour in relation to HIV infection, syphilis screening continues to be a requirement in many countries.

There have been several studies conducted in many African countries indicating a high prevalence of syphilis antibodies in healthy blood donors.[3] The WHO recommends several syphilis screening tests: the enzyme immunoassay (EIA) and *T. pallidum* haemagglutination assay (TPHA) as specific tests, or the Venereal Disease Reference Laboratory (VDRL) and rapid plasma reagin (RPR) as non-specific screening tests.[4] Following a documented case of transfusion-transmitted syphilis in Ghana in 2011,[5] it was recommended that syphilis testing for blood donors be implemented so that recipients of blood transfusions would not be at risk of contracting syphilis.

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In Sub-Saharan Africa, blood donations are collected from two main donor categories: voluntary non-remunerated donors (VNRD) and family (replacement) donors (FD). Family donors – who are individuals prompted to provide blood units to replace blood transfused to their relatives or friends[6] – remain dominant on the African continent as a response to difficulties in recruiting and attracting VNRD.[7] However in Ghana, as elsewhere, there is a higher proportion of syphilis seroreactive donations among FD possibly because they are generally older than VNRD and possibly because they are at higher sexual risk.[8]

Out of the many different categories of hospital in Ghana, a total of 149 health facilities across the country practice blood transfusion under the National Blood Service, Ghana (NBSG). Three of the facilities are teaching hospitals located in the Greater Accra, Ashanti, and Northern regions. Ghana has 10 administrative regions and each of them has a regional hospital with bed occupancy lower than the teaching hospitals. However, the 58 district hospitals are distributed unequally. The distribution of the district hospitals is based on the level of development of the region, so some regions have more transfusion centres than others. Likewise, the other health facilities such as the 36 mission hospitals, eight private hospitals, and seven clinics are distributed unequally.

In Ghana, as in many other African countries, the purchase of blood bank reagents is poorly regulated, with local blood banks purchasing whatever reagents are available and affordable. Additionally, the reagent cost per test for syphilis testing in Ghana depends mainly on the bargaining power of the facility management system in the open market. This decentralized purchasing system may lead to increased costs of reagents, as well as failures in quality and consistency. In addition to decentralized reagent purchasing, the lack of written standard operating procedures (SOPs) and effective transfusion-transmitted infection (TTI) guidelines for donor care may hamper quality and care. To ensure the safety, efficacy, and adequacy of blood and blood products for patients, the Ghana National Blood Policy, which was approved by the cabinet in 2006, states that all blood units collected must be tested prior to transfusion for TTIs including syphilis, using approved, well-controlled techniques and procedures and in accordance with WHO guidelines. Furthermore, the NBSG should be responsible for the purchasing of well-approved test kits before use.

This survey compared current syphilis screening practices in Ghana with the recommendations of the WHO and NBSG regarding the use of assays for screening blood donors and their performance. The prevalence of syphilis antibodies in blood donors was also estimated. Additionally, the survey determined whether written SOPs or guidelines were in place for syphilis screening and whether donors with positive syphilis tests were referred for clinical follow-up.

2. Materials and methods

It was intended to interview the laboratory technical heads of all 149 transfusion facilities in Ghana between January 2014 and February 2015 and to request their 2012 syphilis screening results. The survey was conducted using a semi-structured questionnaire administered by telephone call or e-mail. Contact numbers and e-mail addresses were obtained from the NBSG headquarters in Accra and other laboratory science colleagues in the various transfusion facilities in the country. Seventy-three (60%) of the technical heads responded immediately by telephone, while 24 (20%) of them were interviewed twice before providing all of the information by telephone; 25 (20%) provided information through a semi-structured questionnaire by e-mail. The total number of non-respondents was 27 (18.4%); most of these were in remote areas.

2.1. Statistical analysis

Data from the interviews were collected using Epi Info version 3.5.3 (US Centers for Disease Control and Prevention, Atlanta, GA, USA), transferred into an Excel spreadsheet, and exported into Stata version 12.0 statistical software (StataCorp LP, College Station, TX, USA) for analysis. Prevalence was estimated by calculating proportions and providing their respective confidence intervals (95% CI).

2.2. Ethics statement

Approval for this survey was obtained from the ethics committees of Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana (CHRPE/AP/423/13) and the Liverpool School of Tropical Medicine, Liverpool, UK (18/02/2014). Furthermore, an introductory letter was sent to all of the respondents from the head of the NBSG, with the assurance of their anonymity in the use of their data.

3. Results

3.1. Facilities and testing

Of a total of 149 health facilities known to be undertaking blood transfusion, 122 (81.9%) responded to the inquiry. In 2012, the total number of donations collected and screened for TTIs (HIV, hepatitis B virus (HBV), and hepatitis C virus (HCV)) other than syphilis from the 122 transfusion facilities responding to the survey was 143 787 (Table 1). From the questionnaire administered, it was found that none of the centres was using a second test to re-screen syphilis-reactive donations.

The total number of transfusion facilities not screening for syphilis was 64 (52%). When asked for the reasons, 49 facilities (77%) reported a lack of funds to purchase reagents. Fourteen facilities (21%) reported that although syphilis screening is recommended, the refrigeration of blood units for more than 5 days kills *T. pallidum*. One transfusion facility (2%) reported that screening for syphilis was not mandatory.

The total number of donations at the 58 (48%) transfusion facilities screening for syphilis was 91 386 units, of which 3371 were syphilis antibody seroreactive, resulting in an estimated seroprevalence of 3.7% (95% CI 3.6–3.8%). Of the facilities screening for syphilis, two of the three (67%) teaching hospitals screened for syphilis and contributed the highest percentage (40.4%) of the total donations. Furthermore, eight of the 10 (80%) regional hospitals screened for syphilis, but contributed only 17.7% (16 009/91 386) to the total donations, whilst 12 of the 36 (33%) mission hospitals screened for syphilis and contributed 15.4% (14 064/91 386) to the total donations, as shown in Table 1. Among the seven clinics, only three (43%) screened for syphilis and these contributed the least (1%) donations. However, the teaching hospitals reported the lowest syphilis rate of seroreactivity (3.2%), with the highest coming from the mission facilities (4.4%). Notably, almost half of the district hospitals did not test for syphilis.

3.2. Donor type and syphilis seroreactivity

The total number of donations screened for syphilis was 91 386 (63.6% of 143 787). The total number of voluntary donations screened for syphilis was 26 180 (28.6%, 95% CI 28.4–28.9%), with 757 (2.9%) testing positive. Of the total of 65 206 (71.4%) family/replacement donations, 2614 (4.0%) tested positive for syphilis