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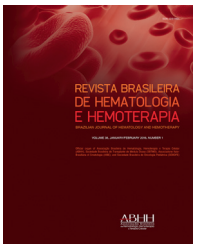

Original article

Seroprevalence, cost per donation and reduction in blood supply due to positive and indeterminate results for infectious markers in a blood bank in Lima, Peru

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ABSTRACT

Introduction: Safety in Transfusion Medicine is subject to regulations and government legislation within a total quality framework. The aim of this study was to evaluate the impact of seroprevalence and indeterminate results on lost units and cost per donation.

Methods: A prospective cross-sectional study was performed in the Blood Bank and Transfusion Therapy Department of the Hospital Central de la Policia Nacional del Perú in Lima, Peru. All completed donations (replacement/voluntary) without complications were included in this study. Every donation met the institutional requirements and quality criteria of Programa Nacional de Hemoterapia y Bancos de Sangre (PRONAHEBAS). Data analysis was achieved using the Statistical Package for the Social Sciences.

Results: A total of 7723 donations were evaluated during 2014 and 2015 with 493 being seropositive (overall prevalence 5.25%) and 502 having indeterminate results (overall prevalence 5.35%). Thus total loss was 995 units, 437.8 L of blood and 49,750 US dollars. The most common seropositive infectious markers were the core antibody of hepatitis B virus (2.82%) and syphilis (1.02%), and the most common indeterminate results were Chagas disease (1.27%) and the core antibody of hepatitis B virus (1.26%). There was no significant change in the prevalence of seropositivity (p-value = 0.243) or indeterminate results (p-value = 0.227) over the two-year period of the study. A statistical correlation was found between the cost per lost donation and the most prevalent markers (rho = 0.848; p-value = <0.001).

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Conclusion: Seroprevalence was lower than the regional mean, but the prevalence of indeterminate results was elevated causing a great impact on blood supply and economic losses to this institution.

Introduction

Safety in Transfusion Medicine is subject to regulations and government legislation within a total quality framework. Safety in transfusion therapy and during donation is an ethical issue in blood banks that must have protective mechanisms that detect noxae and diminish risk, making the transfusion practice efficient, safe and individualized for each patient with donations being free of adverse-reaction events. Nevertheless, new difficulties affect blood supply safety, such as the strict donor selection questions, an affordable blood supply, seroconversion periods and emergent agents, among others.[1,2]

The relative risk from donations is considerable and changing, the reason for which its estimation and its extrapolation to other communities are frequently hindered. In undeveloped countries, the relative risk from donations is heterogeneous due to geographic diversity, the habitat and population groups, as well as to the socioeconomic and educational conditions, and access to healthcare resources.[3] Donations in Peru require screening for at least five infectious markers: surface antigen (HBsAg) and the core antibody of hepatitis B virus (HBcAb), antibodies against human immunodeficiency virus (HIV) type 1 and 2 (anti-HIV 1 and/or anti-HIV 2), antibodies against hepatitis C virus (HCV) and anti-*Treponema pallidum* (syphilis).[4] Additionally, antibodies against human lymphotropic viruses (anti-HTLV-1/2) and markers for Chagas–Mazza disease are performed in endemic zones.[5,6] The number of tests is not the same in each country because of different socio-sanitary conditions and based on sero-epidemiological data. Additional tests are included for Chagas disease in South America, Canada, Mexico, and some Western Pacific countries, anti-human T-lymphotropic virus (HTLV)-1/2 in Portugal, France, Taiwan, Japan and Greece, but not in Turkey, Creutzfeldt–Jacob disease variant (vCJD) in the United Kingdom, Germany, Chile, Portugal and Austria, West Nile Virus (WNV) in United States, Canada, Australia and India and Anti-plasmodium in Benin.[7–13]

The effect usually associated to seropositive units is the loss of blood units (biological and economical costs). During the last fifteen years, the reduced blood supply to the Blood Banking Service and the great economic impact of discarded blood components was 457.2 L of blood and 61,893 US dollars, with limitations in the donation chain. This is also affected by the high-risk of transfusion-transmitted infections in non-healthy populations.[6] The prevalences of infectious markers were 0.23%, 4.19%, 0.56%, 1.19% and 0.5% for HIV, hepatitis B virus (HBV), HCV, syphilis and Chagas disease, respectively in units of blood screened in Peru; the overall prevalence was higher than for other countries in the region.[6,14–16]

Thus, behavioral risk factors, donor quality and geographical endemism generate variable factors that complicate the functioning of blood banks where screening for infectious markers constitutes an invaluable measure to eliminate unsafe blood and avoid adverse transfusion reactions.[17]

The aim of this study was to evaluate the impact of seroprevalence and the cost per donation in the Blood Bank and Transfusion Service of the Hospital Central de la Policia Nacional del Perú in Lima, Peru during 2014 and 2015.

Methods

An analytical-correlational cross-sectional prospective study was performed in the Blood Bank and Transfusion Service of the Hospital Central de la Policia Nacional del Perú in Lima. The group of blood donors included in this study was chosen based on all donations with positive and indeterminate results for one or more of the seven infectious markers: HBsAg, HBcAb, HIV 1–2, HCV, Chagas disease, syphilis and HTLV-1/2. The overall prevalences of these infectious markers in Peru were 0.23% for HIV, 0.38% for HBsAg, 0.56% for HCV, 1.19% for syphilis, 0.5% Chagas disease, 0.88% for HTLV-1/2 and 4.19% for HBcAb.[16] The cutoff point was derived from the average of three negative calibrators plus a fixed value; indeterminate results were defined as results within the gray zone established by this institution.

All serological tests were performed in duplicate during separate routines. Only samples that had two positive results in two different runs were classified as positive. These results were notified to the Instituto Nacional de Salud of Peru for confirmation using molecular methods, as defined in the epidemiological evaluation programs for disease and patient follow-up.[18]

Donated blood units considered in this study were selected respecting the donation criteria established by the Programa Nacional de Hemoterapia y Banco de Sangre (PRONAHEBAS) and standard operational process.[6,18,19] The ages of all donors were between 18 and 55 years old, donations that were incomplete due to technical issues, those that were associated to complications or were evidently contaminated, were excluded. All the blood donations (replacement/voluntary) were collected in Terumo quadruple blood bags (Shibuya-ku, Tokyo, Japan). As this project was performed at a hospital for police officers, most donors were officers and their families and thus a population group with important and similar risk

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