# Blood Transfusion a Silent Epidemic: A Case Study in a Semi-Urban Health Care Centre

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## ABSTRACT

*Progress in any scientific discipline is dependent on the availability of techniques and methods that extend the range and sophistication of experiments that may be performed. Blood is a precious resource with an ever limiting supply due to the aging population. The saving of many lives in history has been partly credited to blood transfusions. Use of blood has not been based upon scientific evaluation of benefits, but mostly on anecdotal experience and so a variety of factors are challenging current practice. Risks of transfusions remain a major concern, with advances in blood screening and processing shifting the profile from infectious to non-infectious risks. Therefore, in an evidence-based medical practice the health care providers should regard transfusion with a skewed risk/benefit ratio. The study examined the prevalence of blood transfusion and documents the safety measures for transfusion. A descriptive cross sectional study was used involving all subjects who met up with the requirements. A non probability purposive sampling technique was employed to recruit the total sample size of sixty. After obtaining informed written consent for the study, all subjects who met the inclusion criteria were successfully enrolled in to the study. Data were collected using standardized data collection form based on CDC/WHO criteria. The data were analyzed using SPSS software. The results showed that most subjects were of adult ages with female preponderance. There was a high prevalence rate of transfusion with hemorrhagic conditions being the leading cause .It was also found that transfusion and* HEV, HGV and HTLV-1&11 screening were *not routinely carried out on the donors*. Blood transfusion complication were developed in 5(8.33%) out which two had febrile reaction, there was however no mortality. *The study concluded that the safety of blood product and blood product is*

*a major public health and clinical concern. Therefore, it is recommended that health care personnel should regard transfusion with a skewed risk/benefit ratio and should always include all stake holders in decision making in the clinical evaluation of a patient considered for transfusion as a device for patient safety. Finally, blood transfusion should be considered as an inter-dependent role (nurse-physician and laboratory scientist)*

**Keywords**: Patient, Blood, Epidemic, Hospital, Pathogen

## BACKGROUND

Progress in any scientific discipline is dependent on the availability of techniques and methods that extend the range and sophistication of experiments that may be performed. Over the past 35 years or so this has been demonstrated in a spectacular way by the emergence of paradigm. For centuries, the blood has been seen as the life force and the carrier of mystical qualities (1). Primitive attempts at transferring blood between humans and animals were made and recorded through history with often horrifying outcomes (1). It was not until during the wars of last century that the modern practice of transfusion began to develop (1, 2). Advances such as the understanding of human blood groups, development of anticoagulation to allow blood storage, techniques to separate and process blood into components and testing to detect contaminating infectious agents have all contributed to modern day availability of blood and blood products (1, 2).

Modern transfusion medicine was born out of the necessity to revitalize severely bleeding patients in the context of relatively limited resuscitation options available then, and it undoubtedly saved many lives (2). Given its initial success, transfusion support was considered to be an indispensable tool in the development of many modern therapies such as high dose chemotherapy, transplantation and complex surgeries (2). Focus was on ensuring the safety and quality of the products used, with much less attention directed to addressing the clinical use of the product (2). Much of the use of blood associated with such treatments has not been based upon science, but on tradition and anecdotal experience. A variety of factors are, however, now changing our previous paradigm, as we begin to question the clinical benefits of blood transfusion. Historically, the trigger for red cell transfusion has been a haemoglobin of 100 g/l (10 g/l) or haematocrit of 30% (3). However, this

number was more of a convention and it was not based upon any human or animal oxygen supply-demand research (3). Studies have shown that the haemoglobin level at which compensatory mechanisms are exhausted and metabolism switches from aerobic to anaerobic is much lower at approximately 30–45 g/l (4). This also correlates with the level at which patients experience an increased mortality [5]. Moreover, factors other than haemoglobin levels are also likely to affect this critical threshold, and relying on a single blood parameter may not be accurate enough to distinguish individual patients' oxygenation status [6]. Nonetheless, most transfusions are given preventatively so that such critical levels are not reached.

Published guidelines recommend a transfusion trigger around a haemoglobin level of 60 to 70 g/l [7] for most stable patients. Haemoglobin values > 70 g/l may be appropriate if there is evidence of ischaemia, ongoing blood loss and/or other risk factors [8]. Current guidelines unanimously maintain that transfusion in patients with haemoglobin levels > 100 g/l is almost never indicated. Another common theme in guidelines is the emphasis on inadequacy of making transfusion decisions based on an arbitrary haemoglobin value. Decisions should be guided by patient factors including signs and symptoms of hypoxia, ongoing blood loss and risks of anaemia vs. risks of transfusion for individual patients. In addition, the importance of transfusing a single unit at a time followed by assessment of response and further need is outlined [9]

Using human blood, especially in developing countries where blood-borne pathogens are endemic, poses significant safety concerns (10). WHO recommends that all blood for transfusion in resource-constrained settings be mandatorily screened for HIV, HBV, HCV, syphilis, and malaria (11), with either a combination of HIV antigen–antibody or HIV antibodies, hepatitis B surface antigen (Hbs Ag), a combination of HCV antigen–antibody or HCV antibodies, and specific treponemal antibodies, respectively (11). However, several countries are unable to screen all donated blood for one or more of these markers (11). Paradoxically, blood safety is a matter of grave concern because of poor quality assurance and quality control in resource-limited settings, especially in the sub-Saharan African countries. Screening of blood-transmissible pathogens is a critical phase in blood safety, and it would considerably minimize the risk of TTIs in both emerging and industrialized economies

(10). Over the past four decades, vigilant donor screening has substantially eliminated the vast majority of HBV, HCV, and HIV transfusion-transmitted viral infections (12). Indeed, in western countries, the most reliable screening methods like nucleic acid amplification testing technologies are often used for very early detection of various infectious agents (13). Other confirmatory tests [western blot assays, line immunoassays (LIAs), recombinant immunoblot assays, indirect fluorescent antibody assays, and ELISAs] are often performed. Previous report have noted that these technologies are only accessible in the industrialized nations (14) and they are often not only expensive but also inaccessible for the needy poor people in unindustrialized nations Morbidity and mortality associated with contaminated blood transfusions have been well established in the emerging economies (10). In Japan, the spread of AIDS and hepatitis B and C through blood transfusion has been successfully combated by antibody screening test; subsequently, the nucleic acid amplification technique was also introduced for the blood screening purpose (10). As a result, the safety of the donated blood has increased dramatically. Indeed, blood transfusion service involves several major steps like (1) donor selection, (2) staff training, (3) usage of sterile equipment, (4) employing appropriate potent diagnostic tools/techniques, and (5) exclusion of asymptomatic/infected donors.

## RESEARCH DESIGN

A cross-sectional study was used involving subjects who were admitted at the hospital within the period of study.

### Study Setting

The study setting is a semi-urban secondary healthcare centre in the North-West part of geopolitical zone of Nigeria. It has 187 beds capacity and the hospital has eight (8) wards each of which has a surgical unit. The hospital has fifty four nurses (54) with an average of four hundred and twenty medical patients outflow monthly.

### Sampling Techniques and Sample Size

A non probability purposive sampling method was used to select subjects that were admitted during the study period. A total of sixty subjects were used for the study.

### Ethical Consideration

Ethical consent was obtained from the ethical review board of the hospital and informed consent was obtained from each subject or subjects care giver before being enrolled in to the study.

**Instrument for Data Collection**

The instrument was developed by the researcher (questionnaire) based on the Center for Disease Control and Prevention (CDC/WHO) and a research assistant was trained on the use of the instrument. The questionnaire was used to subject's variables such as demographic characteristics, indication for transfusion, history of transfusion reaction, and laboratory parameters were recorded. The instrument was tested for validity and reliability through pilot study. Also two full-time nurses' assistants were trained on the use of the instrument.

**Data Collection**

The data were collected by the researchers and based on the characteristic of the subjects such as demographic characteristics, indication for transfusion, history of transfusion reaction, and laboratory parameters were recorded..

**Data Analysis**

The data were entered in to the computer using SPSS software version 16 and analyzed according to the objective of the study. In addition descriptive and inferential statistics were performed

**RESULTS**

**Socio Demographic Data**

Frequency distribution of subjects by demographic characteristics

| Variable: N=60 | Frequency | Percent |
|---|---|---|
| **Age (grouped) yrs.** | | |
| < 5 | 5 | 8 |
| 5-10 | 3 | 5 |
| 11-19 | 8 | 13 |
| 20-29 | 19 | 32 |
| ≥30 | 25 | 42 |
| **Total** | **60** | **100.0** |
| **Gender** | | |
| Male | 15 | 25 |
| Female | 45 | 75 |
| **Total** | **60** | **100.0** |
| **Educational Level:** | | |
| Informal Education | 50 | 83 |
| Formal Education | 10 | 17 |
| **Total** | **60** | **100.0** |
| **Patients' Occupation:** | | |
| Civil servant | 8 | 13.3 |

| | | |
|---|---|---|
| Skilled manual | 20 | 33.3 |
| Unskilled manual | 32 | 53.3 |
| **Total** | **60** | **100.0** |
| **Ethnicity** | | |
| Hausa | 48 | 80 |
| Fulani | 12 | 20 |
| Total | **60** | **100** |

The table above revealed that, most subjects had no formal education 50 (83%) and majorities were greater than thirty years. Most subjects were Hausas 45 (75%) and reflected female preponderance.

**Subjects Indication for Transfusion**

| **Variable: N=13** | **Frequency** | **Percent** |
|---|---|---|
| **Indication** | | |
| Postpartum bleeding | 4 | 31 |
| Anemia in pregnancy | 2 | 15 |
| Antepartum bleeding | 1 | 8 |
| Abortion | 1 | 8 |
| Malaria | 3 | 23 |
| Chronic conditions | 2 | 15 |
| **Total** | **13** | **100.0** |

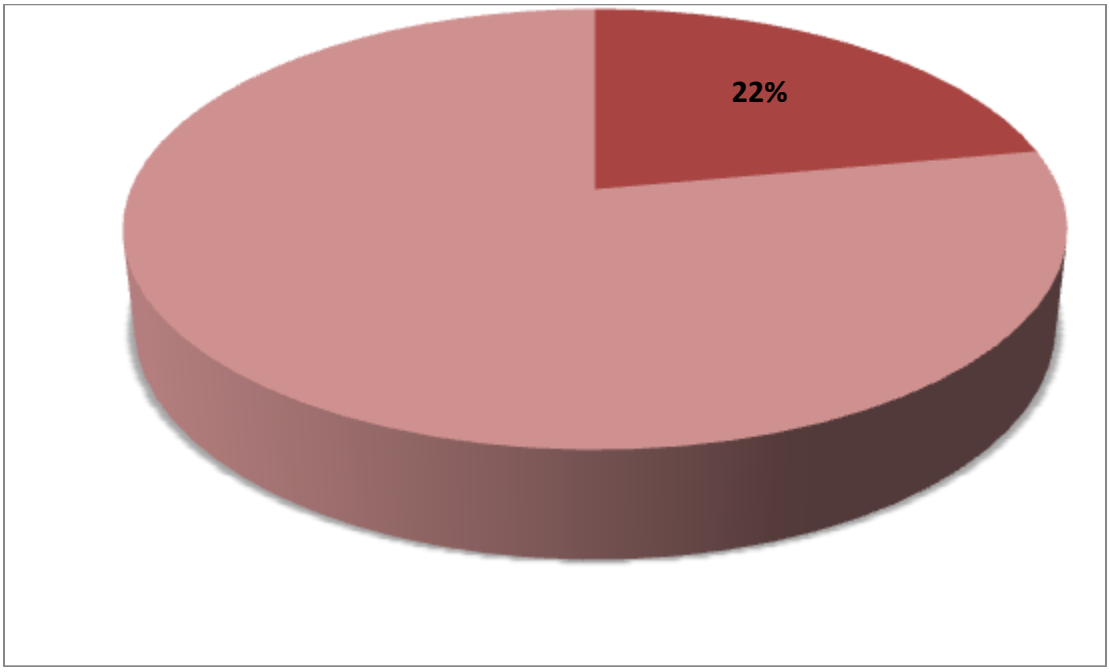
It is clear from the table that postpartum bleeding was the leading cause for transfusion among the subjects. Others were reflected in the table above.

**Subjects Diagnosis with Transfusion Parameters**

| Variables | Packed Cell Volume (%) | Pint of blood received |
|---|---|---|
| Postpartum anemia | 19 | 2 |
| Antetpartum bleeding | 9 | 3 |
| Postpartum bleeding | 13 | 3 |
| Anemia in pregnancy | 22 | 1 |
| Cardiac myopathy | 15 | 2 |
| Chronic renal failure | 15 | 2 |
| Malaria | 5 | 2 |

The table shows that decreased in subjects packed cell volume correspond to the exponential increase in number of blood pint needed by the subjects.

Figure 1: Proportion of transfusion (22%)




**Reported Adverse Outcomes Associated with Transfusion and Population Affected**

| Variables | Adverse outcome | Population affected |
|---|---|---|
| Fever | * | 2 |
| Increased hospital readmission | ------- | --------- |
| Infection | ------ | -------- |
| Septicaemia | --------- | --------- |
| Rashes | * | 2 |
| Postpartum haemolysis | * | 1 |
| Post transfusion lung injury | --------- | ---------- |
| Others | ---------- | ---------- |

It is shown by the table above that, fever and rashes were the common reported adverse reaction of transfusion in an equal proportion.

**Existing Screening and Detecting the Infectious Agents for the Blood Donors**

| S. No. | Disease | Pathogen | Routinely screened | |
|---|---|---|---|---|
| | | | Yes | No |
| 1 | Hepatitis | HBV, HCV | * | |
| 2 | Hepatitis | HEV, HGV | | * |
| 3 | AIDS | HIV-1 and 2 | * | |
| 4 | Malignant lymph proliferative disorders, neuropathy | HTLV-I and II | | * |
| 5 | Malaria | *Plasmodium parasites* | | * |

It is clear from the table that HEV, HGV and HTLV-1 & 11 and *Plasmodium parasites* were not routinely screened for the donors.

## DISCUSSION

The study revealed that most subjects were of adult ages and reflected female preponderance. This could be linked to the disproportion in the processes of subjects' selection across the wards. The study reported high prevalence of transfusion rate across the studied group, the reason for this high increased could be linked to the fact that most subjects condition were hemorrhagic, which physiologically necessitates transfusion to restore haemodynamic level. This finding is in support of a previous study that a haemoglobin values > 70 g/l may be appropriate for transfusion if there is evidence of ischaemia, ongoing blood loss and/or other risk factors (*15).*The study reported that postpartum bleeding was the leading cause of transfusion, this is not counterintuitive, because ongoing bleeding alters haemodynamic level and decreases tissue perfusion which physiologically necessitates transfusion. The study revealed that decrease in packed cell volume corresponds to the geometric increase in number of blood pint required by the subject. This could be link to the clinical evaluation of the subjects is feasible with post- packed cell count which serves as a clinical marker for the clinical benefits of transfusion. The study reported fever and rashes as the common adverse outcomes of transfusion, which is theoretically linked with ABO incompatibility. Limited published information exists with regard to adverse outcomes of transfusion and population affected to worth comparison with the present study. The study found that HEV, HGV and HTLV-1 & 1n 1 were not routinely

investigated for the donors. These findings were in agreement with another study conducted in Japan (1). Similar reports on using human blood, especially in developing countries where blood-borne pathogens are endemic, poses significant safety concerns (10). Paradoxically, blood safety is a matter of grave concern because of poor quality assurance and quality control in resource-limited settings, especially in the sub-Saharan African countries

## CONCLUSION AND RECOMMENDATION

Conclusively, there is high prevalence of transfusion rate, hemorrhagic conditions were the leading cause of transfusion and transfusion-associated infectious diseases and disorders, impose a significant threat among the studied group. Even though, transfusion therapy is a life-sustaining modality in the light of improving the clinical conditions of both immunocompromised and immunocompetent patients. But it is important to note that the safety of blood products is a major public health and clinical concern.

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**Reference** to this paper should be made as follows: Dalhatu, A. & Muhammad S, Mijinyawa (2015), Blood Transfusion a Silent Epidemic: A Case Study in a Semi-Urban Health Care Centre. *J. of Medical and Applied Biosciences,* Vol. 7, No. 2, Pp. 38 – 47.

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