



## Knowledge, Attitude and Practice of Blood Conservation Strategies amongst Physicians' in Tertiary Hospitals

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### Authors' contributions

Author AS designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Author AA managed the analyses of the study. Author OM and Author DAO managed the literature searches. All authors read and approved the final manuscript.

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### ABSTRACT

**Aim:** To assess the extent of available knowledge, as well as the attitudes and the utilization of blood conservation strategies amongst medical doctors, who are the implementers of blood transfusion and conservation in clinical practice.

**Study Design:** A cross-sectional study.

**Place and Duration of Study:** Clinical Departments in both Lagos State University Teaching Hospital, Lagos State and Babcock University Teaching Hospital, Ogun State between August 2013 and November 2013.

**Methodology:** We included clinicians from various medical specialties in the study (78 from public hospital and 26 from private hospital). A pre-tested, self-administered questionnaire was devised to collect data. Data was entered and analyzed descriptively and qualitatively.

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**Result:** A total of 104 doctors participated in the study consisting of 57 males (54.80%) and 47 females (45.29%). Almost all participants had transfused blood in their practice and all participants were aware that blood transfusions have complications. Majority 80 (76.9%) had heard about blood conservation techniques, about 51 (49%) had used any of the strategies.

If available, 93 (89.4%) would use any of the strategies, only 1 (1%) would not.

**Conclusion:** There is a need for hospital transfusion committees to educate and increase the drive for utilization of blood conservation methods amongst doctors, so as to increase its practice.

*Keywords: Blood conservation; blood transfusion; blood substitutes; blood safety.*

## 1. INTRODUCTION

Blood transfusions save life. Indeed, donating blood is often referred to as giving "the gift of life". One unit may benefit different patients in different places and at different times [1]. Despite the common use of blood, the practice of transfusion medicine continues to be dogged by controversies. First and foremost, blood transfusion is a double-edged sword that "still kills" some [2] and is believed to exert adverse effects (e.g. lengthen hospital stay and impair recovery) in many more [3].

Increasing concerns over the widespread use of blood has prompted interest in blood conservation strategies including various pharmacologic agents, as well as numerous devices and techniques. Pharmacologic agents, which include antifibrinolytic agents, desmopressin, erythropoiesis stimulating agents, parenteral iron, vitamin K and recombinant activated factor VII, can either reduce or stop bleeding, or reduce the likelihood of transfusion by raising the haemoglobin [4].

Other strategies, which have mostly been used to reduce transfusion requirements in surgical or trauma cases, include surgical haemostasis, acute normovolaemic haemodilution, cell salvage, reduction of blood loss during diagnostic testing, and potentially red cell substitutes [4].

Blood transfusion is a universally practiced, remarkably safe, routine clinical procedure. However, the need for sophisticated blood processing, storage and cross-matching, coupled with increasing public concerns about the safety of blood products, have fuelled the need for blood conservation strategies to minimize transfusion in addition to the search for safe and efficacious blood substitutes [5,6].

Transfusion is an expensive technology because it is necessary to guarantee safety in order to reduce the risks of transfusion-transmitted diseases [7,8]. Screening is only one very small part of the total cost of blood transfusion for the past decade, developed countries have invested virtually unlimited resources to screen for and identify the responsible infectious agents early enough and, as such, improve the safety of blood supply. While these efforts have been highly effective in achieving their goal (albeit with a hefty price tag that might undermine the cost-effectiveness), [9] emergence of infectious agents such as human immunodeficiency virus [10] and variant Creutzfeldt–Jakob disease [11] has challenged the possibility of creating a blood supply that is absolutely free of risk of transmitting infectious agents [12,13,14].

Blood safety, however, remains a challenge to many countries in sub-Saharan Africa due to unstable economies, civil strife, natural and manmade disasters, and failure to translate government commitment to practical interventions that would lead to further improvement. [15,16].

Studies carried out in widely different patient populations have linked RBC transfusions with many negative outcomes [17,18,19,20] the observation that allogeneic blood transfusions are associated with worse patient outcomes (e.g. higher mortality and morbidity rates) is a common finding in studies comparing cohorts of transfused patients with non-transfused (or less-transfused) patients across various patient populations [17-35]. These credible risks and dubious efficacy do not make a promising combination and fail to justify the widespread utilization of allogeneic blood transfusions in practice.

While oxygen delivery is not the sole function of blood, it is among the most critical of all, as demonstrated by the grave consequences of severe acute anaemia (particularly at Hb levels below 5g/dl [36]. Anaemia resulting in tissue ischaemia remains a dreaded condition and thousands of patients receive blood transfusions every day to avoid (or in hope of avoiding) this negative consequence [37-39]. Like many other medical interventions, transfusion, a common treatment of anaemia, is not free of risks. Its routine and widespread use in clinical practice ignores the fact that blood transfusion can be viewed as an organ transplant with known complexities and risks, albeit lacking the rigorous indications of solid transplants.

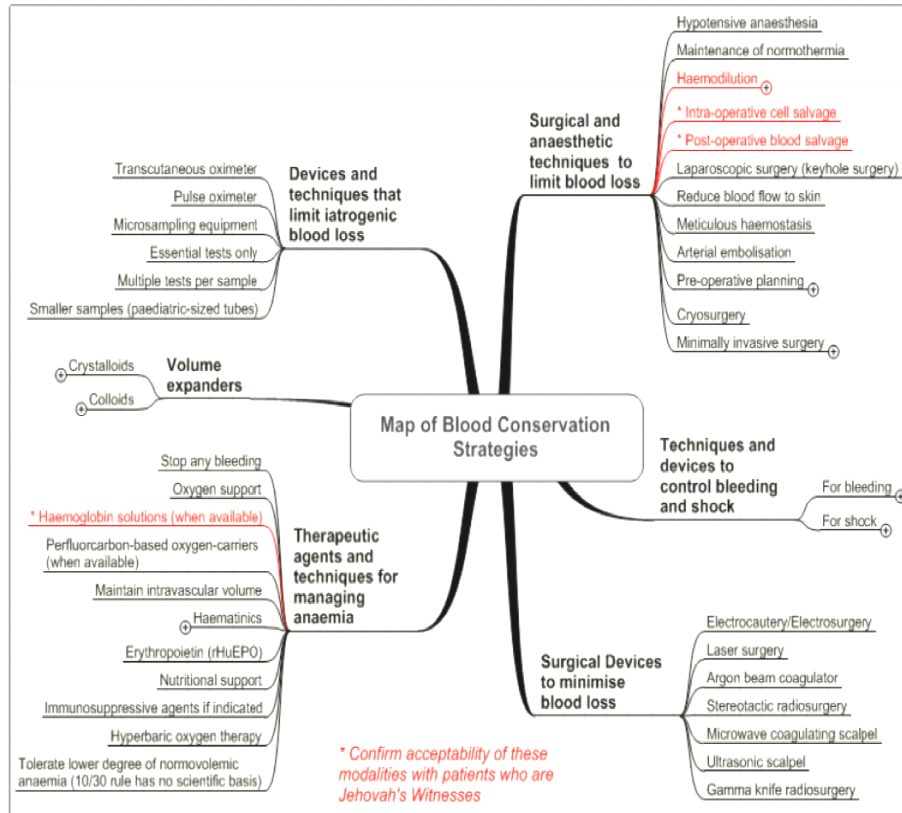
For many patients, the undetermined benefits of transfusions make this clinical decision difficult and it should not be taken lightly [40,41]. Just as a timely organ transplant can be life saving so can appropriate blood transfusion. The issue at hand is the balance between the risks of transfusion and the risks of anaemia, a challenge many clinicians face with inadequate education, information or both.

Many strategies to improve outcome while reducing allogeneic blood transfusions are available Fig. 1. These strategies rely on approaches to optimize haematopoiesis, minimize blood loss, and use and manipulate physiological responses to anaemia while treating this condition with minimal or no use of allogeneic blood transfusion. The concept encompassing this intervention is collectively known as patient blood management [42-44].

Emerging evidence supports the efficacy of these strategies in managing various patients, including those known to be exposed to a high risk of blood loss, anaemia and transfusion [45-48]. Using these strategies, it is possible to detect and treat anaemia in a timely manner and mitigate the risk of allogeneic blood transfusions and their associated negative outcomes.

Based on this fact, this study aimed at finding out the knowledge, attitude and practice of blood conservation strategies amongst doctors in the Lagos State.

# Principles of Blood Conservation



<http://transfusionguidelines.org.uk>

**Fig. 1. Principles of blood conservation**

## 2. MATERIALS AND METHODS

A cross-sectional study was conducted among doctors from both public and private tertiary hospitals during the period of August - November 2013. A total study population of 104 doctors was selected by convenience sampling method.

A pre-designed, pre-tested, self-administered questionnaire in English was devised to collect data. The questions appearing in the questionnaire were designed based on American Association of Blood Banks (AABB) guidelines [49]. The questions were designed to address physicians' basic knowledge in blood transfusion, clinical use of blood and blood conservation strategies. The questionnaire contained 36 questions of which 15 referred to basic knowledge and 10 pertained to clinical use of blood and blood conservation strategies.

Physicians' attitude and practice was addressed with open ended questions based on their current blood conservation practice and whether their practice pattern will differ with more information on these strategies. The participation to study was on voluntary basis. All participants were given a briefing about objective of the study and were assured of confidentiality in collection of personal data. Institutional ethical committee approval was obtained for the study. Data was entered and analyzed by using Statistical Package of Social Sciences (SPSS) version-16.0.

### 3. RESULTS

A total of 104 doctors participated in the study consisting of 57 males (54.80%) and 47 females (45.29%). Doctors in public hospitals constituted 78 (75%) while 26 (25%) were from private institutions. Majority of the respondents 51 of 104 (49%) were between 30-40 years followed by 27 (26%) between 40-50 years, 18 (17.3%) were less than 30 years, only 8 of 104 (7.7%) were older than 50 years. Almost all medical specialties were represented including, family medicine, surgery, internal medicine, haematology, paediatrics, ophthalmology and community medicine.

Most of the participants had practiced between 5-10 years, 35 of 104 (35.6%) followed by 34 (32.7%) who had practiced between 1-5 years, while 23(22.1%) practiced between 10-15 years and only 10(9.6%) had practiced for more than 20 years Table 1.

**Table 1. Sociodemographic parameters of respondents'**

Parameter	N= 104	Percentage%
<b>Gender</b>		
Male	57	54.8
Females	47	45.2
<b>Institution</b>		
Public	78	75
Private	26	25
<b>Duration of Practice (in years)</b>		
1-5	34	32.7
5-10	37	35.6
10-20	23	22.1
≥20	10	9.6

Almost all participants 102 of 104 (98%) had transfused blood in their practice and all participants were aware that blood transfusion have complications. About half of the participants 51 of 104 (49%) would transfuse blood only in symptomatic anaemia, while 27 (26%) would transfuse blood in asymptomatic anaemia if Hb<10g/dl. About 12 (11.5%) each, would transfuse pre-operative or post operatively if Hb<10g/dl. Only 2 (1.9%) did not respond to the question.

Majority 80 (76.9%) had heard about blood conservation techniques, while 18 (17.3%) had not heard about the technique, 6 (5.8%) did not respond to the question.

Only 20 (19.2%) had heard about pulse oximeter, 35 (33.7%) had not, 49 (47.1%) did not respond. While 45 (43.3%) had heard about the use of microsampling equipment, 15 (14.4%) had not and 44 (42.3%) did not know.

About 46 (44.2%) had heard about haemodilution, 23 (22.1%) had not while 35 (33.7%) did not respond. Almost 72 (69.2%) had heard about intraoperative salvage, 6 (5.8%) had not, while 26 (25%) did not respond. Only 33 (31.7%) had heard about post-operative salvage, 18 (17.3%) have not heard about it while 53 (51%) did not respond.

Concerning cryosurgery, 62 (59.6%) had heard about it, 7 (6.7%) had not, while 35 (33.7%) did not respond. A total of 61 (58.7%) had heard about pre-operative donation, 9 (8.7%) had not heard and 34 (32.7%) did not respond. About half of the participants 49 (47.1%) were aware of use of ultrasonic scalpel surgery, 10 (9.6%) were not aware and 45 (43.3%) did not respond. More than half 68 (65.4%) were aware haematinics could be used, 5 (4.8%) were not aware and 31 (29.8%) did not respond. Majority 79 (76%) were aware that conservation strategies were effective in reducing transfusion requirements, only 2 (1.95%) noted it to be ineffective, 11 (10.6%) did not know, while 12 (11.5%) did not respond Table 2.

About 51 (49%) had used any of the strategies, 34 (32.7%) had not used any, while 19 (18.3%) did not respond. If available, 93 (89.4%) would use any of the strategies, 1 (1%) would not while 10 (9.6%) did not respond.

**Table 2. Knowledge regarding blood conservation strategies**

Question	Yes (%)	No (%)	No response (%)
<b>The following are/is blood conservation strategy/ies:</b>			
1. use of pulse oximeter	20(19.2)	35(33.7)	49(47.1)
2. use of microsampling equipment	45(43.3)	15(14.4)	44(42.3)
3. haemodilution	46(44.2)	23(22.1)	35(33.7)
4. inraop cell salvage	72(69.2)	6(5.8)	26(25)
5. postop cell salvage	33(31.7)	18(17.3)	53(51)
6. cryosurgery	62(59.6)	7(6.9)	35(33.7)
7. pre blood donation	61(58.7)	9(8.7)	34(32.7)
8. use of ultrasonic scalpel for surgery	49(47.1)	10(9.6)	45(43.3)
9. use of haematinics, EPO, perfluorocarbons	68(65.4)	5(4.8)	31(29.8)
10. performing essential tests	45(43.3)	22(21.2)	37(35.6)

#### 4. DISCUSSION

Blood transfusion remains a crucial and requisite procedure for saving many lives. However, the associated risks and costs (elucidated above) can be burdensome, especially in low-income settings like Nigeria. Though the values and benefits of blood transfusion are enormous, the associated complications, financial implications and religious limitations threatening its continued use beg for an increased utilization of alternatives to blood transfusion [50,51]. There are serious concerns about the costs and safety of currently available blood substitutes, especially regarding their oxygen-carrying capacity, ability to maintain adequate vascular volume, microvascular blood flow and acid–base balance in the recipient [52]. Thus, the conservation of blood to minimize the requirement for transfusion appears to be the safest practice. Our study was conducted with the aim of assessing the extent of available knowledge, as well as the attitudes and the utilization of blood conservation techniques amongst medical doctors, who are the chief implementers and facilitators of blood transfusion and conservation in clinical practice. Our study included

doctors across all specialties. Our results thus provide a holistic picture of blood conservation irrespective of field of practice.

Majority of doctors in our study had transfused blood and expectedly, were aware of the associated complications. There were varied triggers for transfusion amongst doctors in our study, probably based on differing clinical scenarios, hospital transfusion policies and the doctors' tolerance level for anaemia, even in critical care situations, as was similarly reported in different studies [53-56]. It is generally accepted that each patient has his/ her own optimal haemoglobin concentration based on weight, workload and co-morbidities. It is not, therefore, possible to make a single haemoglobin value a "transfusion trigger" and base decisions accordingly [57]. The Society for the Advancement of Blood Management advocates the implementation of risk-based transfusion guidelines and the reduction of transfusion threshold in chronic anemia patients to 7 g/dl. However, majority of doctors in this study still set transfusion threshold at 10g/dl.

Although there was generally a high level of awareness about blood conservation amongst doctors in our study, the level of awareness of the specific blood conservation methods was low, save for intraoperative salvage and cryosurgery, which ironically are largely unavailable in our environment. [53] It must however be noted that a significant proportion (25-51%) of respondents did not respond to these questions. Thus, it may be difficult to make assertive deductions about the level of awareness of the different blood conservation methods amongst doctors in our environment based on the results of our study. This may suggest that those who did not respond were not sure and preferred to avoid giving responses.

About half of respondents had utilized any of the blood conservation strategies, while a greater majority indicated a readiness to utilize the various blood conservation methods, subject to availability. There is a varied utilization of blood conservation strategies as recorded in many studies, with costs and availability of required equipment appearing as recurring limitations to the utilization of such strategies [53,58-60]. Pre-operative autologous donation and intra-operative cell salvage are conservation techniques widely used in practice, but the associated increase in cost and patient inconvenience associated with autologous donation have limited their use, especially in low income settings like Nigeria [53,58-60]. Conversely, the use of pharmacologic agents such as recombinant human erythropoietin has been very low, even in developed countries [61].

Acute normovolemic haemodilution is a low-cost and effective blood conservation technique without the inconvenience and need for preoperative preparation required for preoperative autologous donation. It bears great potential for surgical blood conservation in low income settings, but remains underused [53,62,63].

The lack of adequate knowledge about transfusion practices amongst physicians has been identified as a major hindrance to effective transfusion practice [54,56,64]. Aside from promoting the safe and effective use of blood and blood components; the hospital transfusion committee also has the key responsibility of training and educating targeted hospital personnel.

## **5. CONCLUSION**

This study has revealed the need for an effective transfusion committee in our hospitals that will actively educate and increase the drive for utilization of blood conservation methods amongst doctors, so as to increase its practice. More studies will also be required to assess

the effectiveness of blood conservation strategies in our environment, with the aim of developing more effective and efficient ways of blood conservation.

## CONSENT

Not applicable.

## ETHICAL APPROVAL

Institutional ethical committee approval was obtained for the study.

## COMPETING INTERESTS

The authors declare that there is no conflict of interests regarding the publication of this article.

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