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RESEARCH ARTICLE

Transfusion-related Adverse Reactions: An update from a District Hospital in Ghana

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Abstract

Background: Transfusion therapy is indispensable for effective emergency medicine practice. However, in resource-poor settings transfusion therapy is suspected to be practiced in a manner that may be contributory to morbidity and mortality among blood recipients. Yet, there exists a wide information gap, with respect to incidence of transfusion-related adverse reactions secondary to inappropriate blood prescription.

Objective: This study assessed incidence of transfusion-related adverse reactions in a district hospital in Ghana.

Materials and Methods: A hospital-based cross-sectional study was conducted from December 2020 to January 2021. Patients attending a district hospital in Kumasi, Ghana who were prescribed blood transfusion were recruited into the study after oral/written consent. Patients' demographic data, blood components and units of blood requested as well as the ward of patients were recorded. Records of patient's full blood count (FBC), body temperature, blood pressure and transfusion-related adverse reactions were extracted from their medical folders.

Results: Out of 200 patients, 169 were transfused with whole blood while 31 patients received packed red cells. Majority (48%) of the patients were transfused with ≤1 unit whereas 10% received 3 units of blood. Anaemia (Hb = 6.13 g/dl) and leukocytosis (WBC = 13.83 x 103/µL) were observed in the haematological parameters in which the MCV and lymphocyte count differed significantly in males compared to females. The overall incidence of transfusion-related adverse reactions was 47.5%. Of the 169 patients who received whole blood, more than half (53.8%) experienced more than one of the transfusion-related adverse reactions that were monitored. Finally, patients within the ages of 19-29 years had the highest incidence of transfusion reaction (30.5%) and overall, the number of units administered was significantly associated with the incidence of transfusion reaction ($p<0.011$).

Conclusion: Transfusion-related adverse reaction was common at the study setting. This could be attributed to inappropriate administration of blood and blood products. Strict adherence to World Health Organization recommendations on transfusion therapy needs to be encouraged and supervised in the study setting.

Keywords: Blood Transfusion, Blood Donors, Packed red cell, Transfusion reaction, Whole blood.

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Introduction

Transfusion of blood and its products remains a major life-saving response in the treatment of most disease conditions involving reduced blood volume. Blood and its components play vital physiological roles including, oxygen and nutrient transport, thermoregulation, transport of waste products of metabolism to various excretory organs as well as forms integral component of the body's immune system (Cheesbrough, 2005). In view of the crucial functions of blood and its components, severe blood loss or deficiency in any of its components in a person as a result of any cause may present serious clinical consequences including organ failure and death. To address the issue of reduced whole blood or blood component, and blood-related complications, blood transfusion is normally recommended (Padmakumar & Bellamy, 2011).

Increased demand for blood is a global phenomenon. In the United States, roughly 4.5 million patients receive nearly 21 million blood components through blood transfusion technique (Carman, Uhlenbrock, & McClintock, 2018). In Canada the incremental rate was 4.2% for red cell units supplied to hospitals (Ejaz et al., 2015). In Ghana, demand for blood and blood products by patients outweighs what hospitals and the national blood bank can even supply. Ghana's average collection rate is 5 - 9.9/1000, which is 0.5 to 0.99 % lower than the World Health Organization's (WHOs) minimum required (Laperche et al., 2009). Despite the life-saving benefits of blood transfusion, it may present life-threatening transfusion-related adverse reactions, when carried out inappropriately (Kumar, Thapliyal, Coshic, & Chatterjee, 2013).

Adverse transfusion reaction encompasses all forms of adverse reactions related to administration of whole blood or blood components. Adverse reactions that occur within 24 hours of post-transfusion are termed as either acute immune mediated blood transfusion reactions or acute non-immune mediated blood transfusion reactions and these may include, acute hemolysis, febrile non-hemolysis and sepsis. Delayed transfusion reactions, unlike acute transfusion related adverse reactions may occur many days or weeks post-transfusion, examples of which may include delayed hemolysis, post-transfusion purpura and transfusion-associated graft versus host disease (Sahu & Verma, 2014). A consideration which constitute the heart of the Clinical Practice Guidelines on the use of blood components emphasize that blood component therapy should only be given when the expected benefits to the patient are likely to outweigh the potential harm (Song et al., 2013). Component thresholds form an important aspect of clinical decision making to prescribe red blood cells and other blood components in transfusion therapy. A finding supported by the WHO states that thresholds should not be used as the primary basis for clinical decision making. For example, although prescribing RBCs may be of benefit when hemoglobin (HB) levels fall between 70 - 100g/L, caution should be exercised and comprehensive clinical assessment of patients' presentations should be conducted (Napolitano et al., 2009).

According to Gray and colleagues (Gray, Hart, Dalrymple, & Davies, 2008) and the Northern Ireland Regional Transfusion Committee (Northern Ireland Regional Transfusion Committee, 2006), 47 - 50% of RBCs are inappropriately transfused. Inappropriate blood component transfusion (IBCT) is known globally to cause post-transfusion morbidity and mortality, which may arise from several factors including, patient misidentification, sample labelling errors, blood group typing errors and inappropriate prescription of whole blood and specific blood components (Sawadogo et al., 2018). The incidence of IBCT has been reported to be 0.3 cases per 1000 units of blood in Burkina Faso (Sawadogo et al., 2018) and 0.24 per 1000 units in Tunisia. The inappropriate prescription of blood products exposes patients unnecessarily to the risk of transfusion-related adverse effects with significant cost implications (Boateng, Schonewille, Sackey, Owusu-Ofori, & Afriyie, 2014). Educating medical practitioners with regards to potential adverse outcomes of transfusion is reported to have reduced inappropriate transfusion by 40% (Knowles, 2011). Importantly, development of an appropriate transfusion method coupled with enhanced supervision and education of the major players (patients, nurses, doctors, medical laboratory scientist and policy makers) will ensure improved transfusion services and patient safety. However, in resource-poor settings, accurate data on incidence of inappropriate blood transfusion and its attendant transfusion-related adverse reactions is scant. The present study assessed transfusion-related adverse reactions secondary to inappropriate blood transfusion in a district hospital in Kumasi, Ashanti region of Ghana.

Materials and Methods

Study Site and participants: Asokwa municipality is one of the 43 districts in the Ashanti region of Ghana. It is located at the central part of the region with Asokwa as its capital. It has a total land area of about 25.31-kilometer square and a population of about 125, 642(Ghana, 2010). The district hospital is located specifically at Chirapatre a suburb in the Asokwa municipality. The study site is the second largest hospital in the southern part of Ashanti region. The geographical location of the hospital and its surrounding road network makes the hospital one of the busiest in Ashanti region as well as many referral points for all other clinics and for most road traffic accidents and industrial accidents. The catchment area includes the whole of Asokwa, Ahensan, Atonsu, Esreso, Gyenyase, and Kaase.

All patients (in-and-out patients) who attended the district hospital from December 2020 to January 2021, who were prescribed blood transfusion as evidenced by possession of a request form and consented to partake in the study by means of an oral or a written agreement were purposefully recruited into the study.

Study Design and procedures: This was a hospital-based cross-sectional study conducted from December 2020 to January 2021. Transfusion request information of each participating patient was extracted unto a data collection sheet. The information collected included patient name, age, sex, the indication for the request and the blood component requested (either red blood cells, platelets, plasma, packed red cells or whole blood etc.), number of blood units requested and the ward of the patient. The full blood counts (FBCs) of patients were checked if it was done before the blood was transfused. Records of patients' temperature and blood pressure were obtained from patients records. Transfusion reactions were monitored with the help of nurses and doctors during or after transfusion. Inappropriate blood transfusion was assessed by benchmarking transfusion request information of each participating patients with the National Guidelines for Clinical Use of Blood and Blood Products in Ghana.

For the purposes of this study, inappropriate blood transfusion was defined as:

(a) Prescribing blood based on low threshold of a particular blood component.

(b) Transfusing whole blood without acute blood loss with hypovolemia.

(c) Prescribing packed red cells for patients with acute blood loss.

Ethics approval and consent to participate: The study was approved by the University of Cape Coast Institutional Review Board (UCCIRB/CHAS/2020/42) and the management of the hospital. Also, patients' consent was sought for by means of verbal or written agreement after the aim of the study was clearly explained to study participants. All information extracted from medical folders was strictly kept confidential.

Data Analysis: Data was presented in percentages, averages and figures where appropriate. Statistical analysis was carried out by using Statistical Package for Social Sciences (SPSS) version 25 (IBM Corp., Armonk, NY). Comparison of categorical data was done using Student's T-test. $P \leq 0.05$ was considered statistically significant in all analyses.

Results

Demographic and Request Information: Over the 2 months study period, 200 patients received 200 units of transfused blood consisting of whole blood (167) and packed red blood cells (33). Majority (31%) of the recipients were 19-29 years old, among whom 38.7% were males and 61.3% were females. Patients in the General wards received the highest (53%) number of blood transfusions with the least being patients in the lying -in and recovery ward (6%) transfusion cases. Among the recipients, 84.5% received whole blood and 15.5% received packed red cells. On the basis of units of blood transfused, 48% of patients received ≤1 unit of blood, 42% received 2 units of blood and only 10% received 3 units of blood **(Table 1)**.

Average Body Temperature, Blood Pressure and Hematological Profile Presented by Patients: The average body temperature among the study participants was 36.79 ± 0.64°C and that of the systolic and diastolic blood pressures were 109.20 ± 10.93mmHg and 74.57 ± 11.42mmHg respectively **(Table 2)**.

Medical Conditions of Patients Receiving Blood Transfusion and the Type of Blood Requested: The common medical conditions reported were anemia, malaria, sickle cell anemia, abortion, and abortion. Among 27 anemic patients, 17/27 received whole blood while 10/27 received packed red cells. For those diagnosed with malaria (22), majority of them (20/22) received whole blood while 2/22 received packed red cells. Patients who presented conditions such as abortion, abdominal injury, gastroenteritis, chronic kidney diseases (CKD) and renal tubular acidosis (RTA) were all administered whole blood only **(Table 3)**.

Requisition of Blood Transfusion Based on HB, WBC AND PLT: Request for blood or blood components for a patient was based on the levels of hemoglobin, white blood cells and platelets count. The first category of patients was denoted as C1, which represented patients with low level of hemoglobin but normal levels of White blood cells and platelets. The C1 category consisted of 14% patients, out of which 85.7% of them received whole blood and 14.3% received packed red cells. The second category was denoted as C2, these were patients with low hemoglobin level, normal white blood cells level and increased platelets count. Only one person reported of bronchopneumonia who received a whole blood in this category. The third category denoted as C3 were patients with low hemoglobin level but high levels of both white

Table 1: Demographic and request information of patients receiving blood transfusion

Variable	Total (n = 200)	Male (n = 87)	Female (n = 113)	P-value
Age (years)	27.60 ± 16.55	28.29 ± 19.83	27.06 ± 13.55	0.605
Age group n (%)				0.008
≤ 5	21 (10.5)	13 (61.9)	8 (38.1)	
6-18	36 (18.0)	16 (44.4)	20 (55.6)	
19-29	62 (31.0)	24 (38.7)	38 (61.3)	
30-39	34 (17.0)	10 (29.4)	24 (70.6)	
40-49	37 (13.5)	9 (33.3)	18 (66.7)	
50-59	10 (5.0)	6 (60.0)	4 (40.0)	
≥ 60	10 (5.0)	9 (90.0)	1 (10.0)	
Ward				<0.001
Emergency	39 (19.5)	24 (61.5)	15 (38.5)	
General	106 (53.0)	63 (59.4)	43 (40.6)	
Labour	31 (15.5)	0 (0.0)	31 (100)	
Lying in	12 (6.0)	0 (0.0)	12 (100)	
Recovery	12 (6.0)	0 (0.0)	12 (100)	
Blood requested				0.839
Whole blood	169 (84.5)	73 (43.2)	96 (56.8)	
Packed red cells	31 (15.5)	14 (45.2)	17 (54.8)	
Units of blood transfused				0.762
≤ 1	96 (48.0)	44 (45.8)	52 (54.2)	
2	84 (42.0)	34 (40.5)	50 (59.5)	
3	20 (10.0)	9 (45.0)	11 (55.0)	
Values are presented as frequency (percentage)				

Table 2: Average body temperature, blood pressure and complete blood count of patients receiving blood transfusion

Variable	Total	Male	Female	P-value
Temperature (units)	36.79 ± 0.64	36.78 ± 0.63	36.79 ± 0.65	0.963
Blood pressure				
SBP mmHg	109.03 ± 10.93	108.89 ± 11.0	109.14 ± 10.92	0.87
DBP mmHg	74.57 ± 11.42	74.47 ± 12.01	74.64 ± 10.99	0.919
HB (g/dl)	6.13 ± 1.46	6.18 ± 1.57	6.09 ± 1.37	0.666
WBC (x 103/µL)	13.82 ± 8.44	14.78 ± 7.35	13.08 ± 9.16	0.159
RBC (x 106/µL)	3.82 ± 1.45	3.83 ± 1.41	3.82 ± 1.49	0.955
MCV (fl)	72.51 ± 8.77	74.25 ± 9.73	71.18 ± 7.73	0.014
MCH (pg)	23.66 ± 5.65	23.80 ± 6.11	23.55 ± 5.30	0.754
MCHC (g/dl)	29.59 ± 5.13	29.74 ± 6.28	29.48 ± 4.05	0.722
PLT (x 103/µL)	212.72 ± 143.49	202.28 ± 134.10	220.75 ± 150.41	0.368
GRAN (x 103/µL)	5.71 ± 3.78	5.87 ± 3.01	5.58 ± 4.30	0.58
LYM (x 103/µL)	6.29 ± 4.07	7.11 ± 4.19	5.65 ± 4.19	0.011
MID (x 103/µL)	1.95 ± 1.78	2.02 ± 1.51	1.90 ± 0.19	0.64

Values are presented as mean ± standard deviation. SBP = Systolic blood pressure; DBP = Diastolic blood pressure; HB = Hemoglobin count; WBC = White blood cells count; RBC = Red blood cells count; MCV = Mean corpuscular volume; MCH = Mean corpuscular hemoglobin; MCHC = Mean corpuscular hemoglobin concentration; PLT = Platelet count; GRAN = Granulocyte; LYM = Lymphocytes;

Table 3: Some medical conditions of patient's receiving blood transfusion and the type of blood requested

Conditions	Type of Blood Requested		Total (n = 200)
	Whole Blood (n = 169)	Packed red cells (n = 31)	
Anaemia	17 (63.0)	10 (37.0)	27 (13.5)
Malaria	20 (90.9)	2 (9.1)	22 (11.0)
Malaria + Anaemia	13 (92.9)	1 (7.1)	14 (7.0)
Sickle cell disease	4 (25.0)	12 (75.0)	16 (8.0)
Abortion	8 (100)	-	8 (4.0)
Chronic kidney disease	5 (100)	-	5 (2.5)
Renal tubular acidosis	12 (100)	-	12 (6.0)
Cardiovascular accident	3 (100)	-	3 (1.5)
Abdominal injury	2 (100)	-	2 (1.0)
Abdominal tuberculosis	2 (100)	-	2 (1.0)
Bronchopneumonia	2 (100)	-	2 (1.0)
Gastroenteritis	2 (100)	-	2 (1.0)
Respiratory viral infection	6 (42.9)	8 (57.1)	14 (6.0)
Burns	8 (100)	-	8 (4.0)
Antepartum haemorrhage	5 (83.3)	1 (16.7)	6 (3.0)
Pulmonary hypertension	6 (100)	-	6 (3.0)
Premature rupture of membranes	11 (100)	-	11 (5.5)
Trauma	3 (100)	-	3 (1.5)
Road traffic accident	9 (100)	-	9 (4.5)
Gastrointestinal bleeding	3 (100)	-	3 (1.5)
Ectopic Pregnancy	7 (100)	-	7 (3.5)
Sepsis	5 (100)	-	5 (2.5)
Urinary tract infections	4 (100)	-	4 (2.0)
Uterine Rapture and Myomas	6 (100)	-	6 (3.0)

- = not administered to patients

blood cells and platelets. Out of the 7.5% patients in this category, 66.7% received whole blood and 33.3% received packed red cells **(Table 4)**.

Units of Blood Received: Patients with different levels of hemoglobin, white blood cells and platelets count received different type of blood. Those deemed to be anemic (Hb <7g/dL), were made up of 67.5% of those who received whole blood and 54.8% of those who received packed red cells. Patients with WBC count >10, were made up of 63.9% of those who received whole blood and 74.2% of those who received packed red cells. Of those with WBC levels between 4 - 10, 34.4% of them received whole blood and 25.8% of them received packed red cells (Table 6). Of patients with platelets count between 150 - 450, 45% of them received whole blood and 51.6% received packed red cells **(Table 5)**.

Association of Blood Transfusion Reactions in Relation to Age and Units of Blood Transfused: There was a significant association between the units of blood transfused and transfusion reactions (p = 0.011). There was no significant association between transfusion-related adverse reactions and age distribution **(Table 6)**.

Out of the 200 patients issued blood over the two months period, 95 (47.5) experienced adverse transfusion reactions

(Table 1, Figure 1). From the observed 95 transfusion-related adverse reactions, whole blood accounted for 95.79 % while packed red blood cells accounted for 4.21%. The highest (30.5%) number of transfusion-related adverse reaction was observed among people aged 19-29 age groups. There was however no statistically significant difference between age and occurrence of transfusion reaction. Of 96 patients who received ≤1 units of blood, 58.1% experienced some form of transfusion-related adverse reactions **(Figure 2)**.

Table 4: Requisition of blood for transfusion based on HB, WBC and PLT levels

Categories	Total	Type of Blood Requested	
		Whole Blood	Packed red cells
C1	28 (14.0)	24 (85.7))	4 (14.3)
C2	1 (0.5)	1 (100)	0 (0.0)
C3	15 (7.5)	10 (66.7)	5 (33.3)
C1 = Low HB, Normal WBC and Normal PLT; C2 = Low HB, Normal WBC and Increased PLT; C3 = Low HB, Increased WBC and Increased PLT. HB = Hemoglobin count; WBC = White blood cells count; PLT = Platelet count			

Table 5: HB, WBC, RBC and Platelet levels with the Type of blood requested

Parameter	Type of Blood Requested		P-value
	Whole Blood (n = 169)	Packed red cells (n = 31)	
HB (g/dL)			0.288
< 7	114 (67.5)	17 (54.8)	
7-10.	53 (31.4)	14 (45.2)	
> 10	2 (1.2)	0 (0.0)	
WBC (103/µL)			0.461
< 4.0	3 (1.8)	0 (0.0)	
4.0-10	58 (34.3)	8 (25.8)	
> 10	108 (63.9)	23 (74.2)	
RBC (106/µL)			0.012
< 4.4	123 (72.8)	17 (54.8)	
4.4-5.5	35 (20.7)	7 (22.6)	
> 5.5	11 (6.5)	7 (22.6)	
PLT (103/µL)			0.161
< 150	80 (47.3)	10 (32.3)	
150-450	76 (45.0)	16 (51.6)	
> 450	13 (7.7)	5 (16.1)	
Values are presented as frequencies (percentage). HB = Hemoglobin count; WBC = White blood cells count; RBC = Red blood cells count; PLT = Platelet count			

Discussion

This study was conducted over a period of two months at a district hospital in Kumasi, Ghana. The study assessed the incidence of transfusion-related adverse reactions among patients attending a district hospital in Ghana. Transfusion-related adverse reactions were observed to be quite common at the district hospital. Of the 200 units of blood issued, 95 transfusion reactions were reported among patients during the study period. From this study, the incidence of transfusion-related adverse reaction was found to be 47.5% which is approximately twice the incidence (21.3%) reported earlier at a teaching hospital in Ghana (Owusu-Ofori, Owusu-Ofori, & Bates, 2017).

Table 6: Association of blood transfusion reactions in relation to age distribution and units of blood transfused

Characteristics	Transfusion Reaction		P-value
	No reaction	Reaction	
Age group n (%)			0.354
≤ 5	5 (5.3)	16 (15.2)	
6-18.	19 (20.0)	17 (16.2)	
19-29	30 (31.6)	32 (30.5)	
30-39	15 (15.8)	19 (18.1)	
40-49	15 (15.8)	12 (11.4)	
50-59	5 (5.3)	5 (4.8)	
≥ 60	6 (6.3)	4 (3.8)	
Units of blood transfused			0.011
≤ 1	35 (36.8)	61 (58.1)	
2	48 (50.5)	36 (34.3)	
3	12 (12.6)	8 (7.6)	

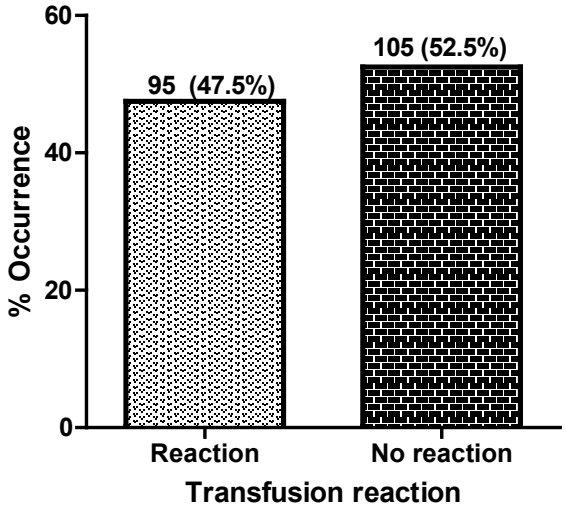

Figure 1: Percentage occurrence of transfusion reaction in patients receiving blood transfusion

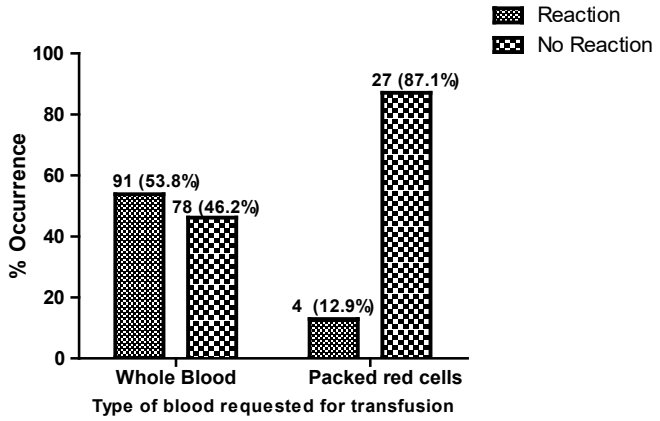

Figure 2: Occurrence of blood transfusion reaction based on the type of blood transfused

The main difference between the two findings could be attributed to the low number of participants and the short duration (two months) of this study in comparison to the later which recruited 432 in a twelve-month study. Adherence to proper protocols on the part of clinicians and

laboratory scientists could also be a major factor as the former was conducted at a teaching hospital.

Nevertheless, these results indicate high incidence of transfusion-related adverse reactions at the study setting, which could be due to inappropriate blood product prescription, hemovigilance system, blood safety operations and poor resourced laboratories (Owusu-Ofori et al., 2017). The incidence in this study was higher than those reported in other studies within other Sub-Saharan African countries. For instance, 87 per 1000 blood components resulted in transfusion-related adverse events in a tertiary Hospital in Nigeria (Arewa, Akinola, & Salawu, 2009) and more than 50 adverse reactions per 1000 blood components was also reported in a principal teaching hospital in Cameroon. However, the incidences were very low in some countries outside the Sub-Saharan region, as 0.046% was reported in a study carried out in Zimbabwe (Mafirakureva et al., 2014) and 0.049% incidence at the South African National Blood Service (SANBS) (Gounden, 2019). The Quebec Hemovigilance system in 2004 also reported an adverse transfusion incidence rate of 3.5 per 1000 blood components transfused (Robillard, Nawej, & Jochem, 2004) and 4.2 incidents per 1000 blood components was reported by a General University Hospital in Switzerland (Michlig et al., 2003). Kumar also reported an incidence of 0.5 incidents per 1000 blood components transfused in India (Kumar et al., 2013).

The need for quality and safe blood transfusion process as stipulated by WHO involves quality assurance in all operation stages: donor recruitment and selection, infection screening, blood grouping and blood storage, appropriate administration to the patients and clinical monitoring for adverse reactions (Allain, Owusu-Ofori, & Bates, 2004). In this study, whole blood transfusion accounted for the highest number of transfusion reactions (53.8%) compared to packed red blood cells making up for only 4.21%. This results was consistent with that earlier reported as 66.6% of the adverse reactions from whole blood transfusion while packed red blood cells accounted for only 20.1% of the transfusion reactions (Mafirakureva et al., 2014)These indicate a high incidence of transfusion reactions in patients receiving whole blood compared to those receiving packed red cells.

It was found that 85.7% of individuals with acute blood loss anemia, having low hemoglobin level but normal white blood cells and platelets counts were given whole blood even though only packed red blood cells were required. Moreover, for individuals with low hemoglobin level but having high white blood cells and platelets levels, 66.7% of them received whole blood and only 33.3% received packed red blood cells. These results coincide with the results obtained in another study where almost 60% of its blood requests was whole blood and for a 45% packed red blood cells requested for patients, 80% of most of these cases were given whole blood transfusion in place of packed red blood cells (Boateng et al., 2014). Similarly, (Rebibo, Hauser, Slimani, Hervé, & Andreu, 2004) reported that inappropriate blood components transfusion accounted for 137/2911 transfusion reactions. Of this number, 12/137 were cases of ABO cross matching errors. Inappropriate prescription of whole blood for acute blood loss anemia could be a major contributing factor for the high adverse transfusion reactions recorded among patients who received whole blood in this study. In addition, these adverse transfusion reactions could have been triggered by undue increment in total blood volume in circulation together with elevated levels of white blood cells and platelets since their levels were already high or normal prior to the transfusion.

In western and industrialized countries, the common transfusion practice is blood component therapy since the latter half of twentieth century (Acker, Marks, & Sheffield, 2016). Following the enactment of Safe Blood Transfusion Act 2002 by WHO, a lot of measures have been put in place over the past decades to ensure that proper screening is done to improve the quality and safety of blood samples before they are administered to recipients. For instance screening blood for infectious agents to establish blood safety has been at the forefront of transfusion medicine since the HIV/AIDS epidemics started over the past 30 years (Opare-Sem et al., 2014). Nonetheless, there is little improvement on giving the right blood components like, fresh-frozen plasma, packed red blood cells, platelet concentrates and white blood cells to address different needs of patients especially in developing countries (Dipta & Rahman, 2009). Giving whole blood to a patient who requires just a specific component is a form of inappropriate blood transfusion commonly practiced in Ghana and some Sub-Saharan African countries. This may be attributed to poor resourced laboratories and inadequate knowledge on whole blood separation techniques (Boateng et al., 2014). Blood can be used efficiently if component therapy is practiced, since one unit of whole blood can be separated into components and could be used to treat more than one patient. Conversely, administration of superfluous blood components in whole blood to a recipient who requires only a specific blood component is likely to result in complications like circulatory overload, physiological derangement, allergic reactions, acute hemolytic reaction and febrile non-hemolytic reaction (Boateng et al., 2014; Kleinman, Chan, & Robillard, 2003).

Circulatory overload normally results when too much fluid is transfused or the transfusion is too rapid for the patient, thus the fluid overload could cause pulmonary and systemic venous engorgement which is normally followed by cardiogenic pulmonary edema and acute respiratory failure (Napier, 1995). Massive transfusion especially of whole blood in anemic patients is known to trigger a number of complications, including hypothermia, hyperkalaemia, dilutional coagulopathy and citrate toxicity (Elmer, Wilcox, & Raja, 2013). In addition, high and rapid transfusion of whole blood or its components in patients with liver damage or failure often leads to hypocalcemia and hypomagnesia (Carson, Triulzi, & Ness, 2017). It is also worth noting that patients receiving whole blood transfusion have an increased risk of acquiring blood borne pathogens like malaria, syphilis, hepatitis, bacteria infections and HIV/AIDS compared to those receiving specific blood components (Adjei et al., 2006; Allain et al., 2004).

Conclusion

This study has shown that incidence of adverse transfusion reactions in Ghana, especially at resource poor facilities is still common despite advancement in transfusion practice. It is important that the Ghana Health Services and National Blood Service, and relevant bodies train clinicians in the practice of blood transfusion in Ghana. Transfusion safety can be achieved through appropriate prescription of whole blood, promoting blood component therapy, improved adverse reaction monitoring and blood product manufacturing. Also, it is advisable to strengthen our hemovigilance system and also make room for assessing the specific need of a patient before giving the appropriate blood component. Finally, Clinicians are expected to prescribe appropriate blood products or whole blood by strictly adhering to guidelines by WHO and other recognized bodies for the safety of patients.

Declarations

Source of Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Conflict of Interests: The authors declare that they have no competing interests.

List of Abbreviations: HB: Hemoglobin, IBCT: Inappropriate Blood Component Transfusion, KSH: Kumasi South Hospital, PLT: Platelets, RBC: Red Blood cells, SANBS: South African National Blood Service, SPSS: Statistical Package for Social Sciences, WB: Whole Blood, WBC: White Blood Cells, WHO: World Health Organization

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