

Survey to Assess Knowledge and Reported Practices Regarding Blood Transfusion Among Cancer Physicians in Uganda

Purpose Optimal decision making regarding blood transfusion for patients with cancer requires appropriate knowledge of transfusion medicine among physicians. We assessed blood transfusion knowledge, attitudes, and reported practices among physicians working at Uganda Cancer Institute (UCI).

Materials and Methods A cross-sectional self-administered survey of UCI physicians on their knowledge, attitudes, and practices regarding blood transfusion was conducted from June to September 2014. In consultation with transfusion medicine experts, 30 questions were developed, including 10 questions for each of the following three domains: knowledge, attitudes, and practices. For the knowledge domain, we created a knowledge score equal to the number of questions correctly answered out of 10.

Results Of 31 physicians approached, 90% participated. The mean knowledge score was 5.3 (median, 5.5), and 32% correctly answered at least seven of 10 questions. Almost all (96%) understood the importance of proper patient identification before transfusion and indicated identification error as the most common cause of fatal transfusion reactions. More than 60% of physicians acknowledged they lacked knowledge and needed training in transfusion medicine. Most physicians reported sometimes changing their mind about whether to provide a patient with a transfusion on the basis of opinion of colleagues and sometimes administering unnecessary transfusions because of influence from others.

Conclusion Although UCI physicians have some basic knowledge in transfusion, most reported gaps in their knowledge, and all expressed a need for additional education in the basics of blood transfusion. Transfusion training and evidence-based guidelines are needed to reduce inappropriate transfusions and improve patient care. Greater understanding of peer influence in transfusion decision making is required.

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INTRODUCTION

Transfusion therapy is indispensable in sub-Saharan Africa, where it is almost always administered as an emergency treatment of severe malarial anemia (in children), hemoglobinopathy, obstetric hemorrhage, and trauma.¹ A study in Uganda to describe the use of blood at a tertiary care hospital found cancer to be the top indication for transfusion (33.5%), followed by pregnancy-related complications (12.4%) and sickle cell disease (6.9%).² However, the high demand for transfusion does not meet the supply; for instance, the median whole-blood donation rate in sub-Saharan Africa is just 2.8 donations

per 1,000 population, as compared with 36.4 donations per 1,000 population in high-income countries. Moreover, even when enough blood is donated, processing it into enough products needed for clinical use may not be possible because of financial and infrastructural inadequacies. In Uganda, for example, it costs approximately US\$45.00 to US\$50.00 to produce a unit of safe blood, and this cost becomes higher for platelets.

The clinical decision making behind whether to transfuse patients with cancer in resource-poor countries is poorly understood. Studies from other populations have shown that physicians'

Henry Ddungu
Elizabeth M. Krantz
Warren Phipps
Sandra Naluzze
Jackson Orem
Noah Kiwanuka
Anna Wald
Isaac Kajja

Author affiliations and support information (if applicable) appear at the end of this article.

Corresponding author:
Henry Ddungu, MD, Uganda Cancer Institute, Upper Mulago Hill Rd, PO Box 3935, Kampala, Uganda; e-mail: hddungu@fredhutch.org.

lack of clinical knowledge and other nonclinical factors may influence their decision to transfuse.^{3,4} As a result, the tendency is inadvertently to transfuse inappropriately, with attendant risks and wastage of this rare resource. For instance, studies in Mwanza, Tanzania, demonstrated that 23% to 56% of blood transfusions were avoidable and that a major reduction in the number of blood transfusions could be achieved, particularly in the pediatric population.^{5,6} Improving patient care requires an understanding of factors that influence the decision to transfuse patients, which may guide the development of evidence-based guidelines and strategies for their implementation, with the latter involving change in physician behavior.⁷ The aim of this study was to assess the knowledge, attitudes, and reported practices of physicians at Uganda Cancer Institute (UCI) with regard to blood and platelet transfusions.

MATERIALS AND METHODS

Participants and Questionnaire

In consultation with transfusion medicine experts, we developed 30 questions, 10 for each of the three domains of knowledge, attitudes, and practices. We included topics considered essential for a clinician who is not a transfusion medicine specialist but whose practice includes regular ordering of blood products. We validated the questions by administering them to four internal medicine residents and two attending physicians, none of whom worked at UCI, to reveal inconsistent or confusing questions and then revised accordingly. We also consulted two transfusion medicine experts, one from the United States and the other from Canada, who had experience with transfusion in sub-Saharan Africa. These experts further reviewed the survey and determined the best or correct response to each question.

We used a convenience sampling method to select physician participants because of the small number of physicians at UCI at the time of the study. Our sample size included all physicians at UCI during the study period. All physicians, including residents, practicing at UCI from June to September 2014 were invited to complete a self-administered questionnaire on knowledge, attitudes, and practices regarding blood transfusion among patients with cancer. There was no specific time allocated in which to complete the

questionnaire (participants were allowed to take it home with them), and the participants were encouraged to keep their responses confidential.

Statistical Analysis

To assess physicians' transfusion knowledge, we tabulated the responses for each of the 10 questions and computed a knowledge score, defined as the total number of questions answered correctly, for each physician. We used a histogram to show the distribution of this score and summarized the score using mean, median, and range. Attitude and reported practices questions were also tabulated. Analysis was performed using STATA software (version 14.1; STATA, College Station, TX). The Makerere University School of Medicine and the Fred Hutchinson Cancer Research Center research ethics committees approved the study.

RESULTS

Questionnaires were given to 31 (91%) of 34 physicians at UCI during the 4-month study period, and of the 31, 28 (90%) returned the completed survey. Of the three who did not take the survey, one was traveling out of the country and two declined to take the survey. We did not collect data on the baseline characteristics of the physician respondents, because their small number at UCI would make it easy for the identification of the individual participants, thus compromising their confidentiality. However, their average level of training was a Master's degree with most having more than 5 years of practice.

Knowledge

Among the 28 physicians, the mean knowledge score was 5.3, with a median score of 5.5 (range, 2 to 8); 32% of participants correctly answered at least seven of 10 questions ([Table 1](#); [Fig 1](#)). Almost all responders (96%) understood the importance of proper patient identification before transfusion, and 64% correctly reported patient identification error as the most common cause of fatal transfusion reactions. Most physicians were knowledgeable about the practical aspects of administering blood transfusions. Eighteen physicians (64%) reported they would commence a transfusion right away after obtaining a blood unit on the ward. When given clinical vignettes describing specific transfusion

scenarios physicians may encounter during their clinical work, 57% to 68% answered appropriately regarding the correct course of action (questions 7 and 9; [Table 1](#)). However, only 10 physicians (36%) knew the appropriate indications for transfusion of fresh frozen plasma. Fewer than half (42%) were knowledgeable about basic aspects of platelet transfusion (question 5; [Table 1](#)), and only 36% correctly identified bacteria as the most common transfusion-transmitted infection in Uganda. Furthermore, only two physicians (7%) had a clear understanding of transfusion-related acute lung injury. Physicians were also asked to rank their knowledge on various aspects of transfusion ([Fig 2](#)). For each item, more than 60% reported they either had little knowledge or needed more education in transfusion.

Attitudes

Almost all participants (96%) strongly agreed that although donated blood was free, there were significant costs associated with blood processing and its administration ([Table 2](#)). Twenty-two participants (78%) agreed that they understood the risks and costs of allogeneic blood transfusion and that because of this they tried to minimize the use of blood components. Moreover, 90% acknowledged that in comparison with red blood cells, platelet transfusions were associated with a higher risk of transmission of diseases, and that they would use platelets with caution. When asked whether the Uganda Blood Transfusion Service should defer blood donations from people who had a clinical history of malaria within the past 3 years because there was no practical screening test for malaria, 27 participants (96%) disagreed.

Regarding the decision of when to transfuse, 61% of physicians reported they would not transfuse a patient on the basis of the patient's symptoms of anorexia, cachexia, or pallor, but 50% would decide to transfuse because of a patient's preference and/or that of his or her family. Attitudes regarding transfusion in specific clinical scenarios are summarized in [Table 2](#) (questions 1, 2, and 9). All participants agreed that formulation and implementation of evidence-based clinical practice guidelines reduced variation in blood use by clinicians and promoted best practices in transfusion medicine. In addition, all respondents strongly agreed that additional training in

blood transfusion science was needed for all clinicians, irrespective of level of qualification or experience.

Transfusion Practices

Regarding their practices around transfusing patients with cancer ([Table 3](#)), all physicians reported routinely measuring hemoglobin before transfusing patients with red blood cells or whole blood, but most reported they would order a blood type (group) and cross match (71%) rather than a type and screen (25%) for patients with cancer admitted with anemia for whom no immediate transfusion was anticipated. Only seven physicians (25%) indicated they obtained signed consent from patients before administering a transfusion.

Physicians were also asked whether certain clinical conditions would lead them to transfuse blood to a patient with cancer. Most (68%) responded that they would not transfuse a terminally ill patient with cancer receiving end-of-life care with a hemoglobin level of 6.5 g/dL or a stable patient with chronic lymphocytic leukemia and a hemoglobin level of 8.8 g/dL (75%). Conversely, all physicians indicated they would transfuse blood to a patient with cancer with acute massive bleeding, and all but one physician agreed that they would transfuse a patient with lymphoma and anemia (hemoglobin, 5.2 g/dL) resulting from chemotherapy. Physicians reported using a range of platelet count thresholds to determine whether to transfuse an adult patient with acute myeloid leukemia without active bleeding to prevent hemorrhage: five (19%) reported a threshold of $5 \times 10^9/L$ to $10 \times 10^9/L$, 14 (52%) reported a threshold of $10 \times 10^9/L$ to $20 \times 10^9/L$, six (22%) reported a threshold of $20 \times 10^9/L$ to $30 \times 10^9/L$, and two (7%) reported a threshold of $30 \times 10^9/L$ to $50 \times 10^9/L$.

The decision to transfuse patients with cancer was commonly influenced by others; physicians reported changing their mind about whether to administer a transfusion on the basis of the input of colleagues sometimes (79%) or often (11%). Twenty physicians (71%) believed that they had sometimes administered unnecessary blood or blood product transfusions because of influence of other physicians; 23 (82%) felt that this was also the case for other physicians. Fifteen physicians (54%) were likely and 10 (36%) very likely to have their transfusion decision making

Table 1. Frequency of Each Response Category for the Knowledge Questions

Knowledge Question	Response	No. (%) of Clinicians
1. Appropriate indications for transfusion of fresh frozen plasma include all of the following except:	(a) Treatment of thrombotic thrombocytopenic purpura	5 (18)
	(b) Emergency reversal of vitamin K antagonists	4 (14)
	(c) Treatment of bleeding due to multiple factor deficiencies	0 (0)
	(d) Prophylaxis before an invasive procedure in a patient with a PT of 15 seconds	10 (36)
	(e) All the above indications are evidence based	8 (29)
	(f) I don't know	1 (4)
2. Which of the following is the most common transfusion-transmitted infection (TTI) in Uganda?	(a) HIV	1 (4)
	(b) Hepatitis C virus	11 (39)
	(c) Bacteria	10 (36)
	(d) HTLV	0 (0)
	(e) Babesiosis	0 (0)
	(f) I don't know	6 (21)
3. In the ward after obtaining a blood bag, how would you handle the blood?	(a) Wrap the unit with a blanket or bed sheet or place it under patient's arm	3 (11)
	(b) Allow blood to wait at room temperature	7 (25)
	(c) Immerse the unit in hot water	0 (0)
	(d) Commence the transfusion immediately	18 (64)
	(e) I don't know	0 (0)
4. Before administering blood, when is it acceptable not to check patient's name and details at the bedside?	(a) Nurse clearly knows patient	1 (4)
	(b) Patient is unconscious	0 (0)
	(c) Never	27 (96)
	(d) Patient is barrier nursed	0 (0)
	(e) I don't know	0 (0)
5. The following are true about platelet transfusion except:*	(a) The number of units transfused should depend on the goal of the transfusion	0 (0)
	(b) Transfusing a patient with 2 units of random donor platelets would increase the post-transfusion platelet count by about 30,000/μL (30×10^9/L)	11 (42)
	(c) The typical dosing for an adult is a pool of four to six whole blood-derived platelets or one apheresis platelet	2 (8)
	(d) Patients who are bleeding or scheduled for invasive procedures often require larger numbers of transfusions, depending on their pretransfusion platelet counts	5 (19)
	(e) I don't know	8 (31)
6. What is the commonest cause of the most fatal transfusion reactions?	(a) Warming blood to more than 37°C	0 (0)
	(b) Error in blood bank testing	6 (21)
	(c) Antibodies in Rh system	4 (14)
	(d) Identification error of patient	18 (64)
	(e) I don't know	0 (0)
7. A 26-year-old patient with acute myeloid leukemia has Hb of 7.5 g/dL. He is to receive 1 unit of red blood cells to run over 3 hours. The blood pack arrived in the ward at 4, 10 minutes after release from the hospital blood bank. The patient does not have clinically significant cold agglutinins and has a peripheral venous line. For this patient:		

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Table 1. Frequency of Each Response Category for the Knowledge Questions (Continued)

Knowledge Question	Response	No. (%) of Clinicians
(a) Routine warming of blood is indicated before administration of blood	(a) True	9 (32)
	(b) False	19 (68)
	(c) I don't know	0 (0)
(b) Transfusing a unit of whole blood over a 2-hour interval could be safely implemented through a perfectly functional 16-gauge IV cannula without warming the blood before the transfusion	(a) True	18 (64)
	(b) False	8 (29)
	(c) I don't know	3 (7)
8. See Figure 2		
9. A blood bag was removed from the blood bank fridge at 6 and kept at room temperature until 7:30 when the nurse could start the transfusion.... The nurse calls you for advice on what should be done with regard to the blood. How would you advise her?	(a) Start the transfusion immediately and complete within 2 hours 30 minutes	16 (57)
	(b) Start the transfusion immediately and complete within 4 hours	5 (18)
	(c) Don't start the transfusion, notify the blood bank, and return the blood	5 (18)
	(d) Start the transfusion and give the unit over 30 minutes	1 (4)
	(e) I don't know	1 (4)
10. Which of the following statements accurately describes transfusion-related acute lung injury (TRALI) as a complication of transfusion? [†]	(a) TRALI has only been associated with products containing large amounts of plasma (eg, platelets, fresh frozen plasma, etc)	2 (7)
	(b) TRALI is most commonly associated with HLA or granulocyte antibodies in the transfusion recipient	6 (22)
	(c) By definition, TRALI occurs within 36 hours of a transfusion	4 (15)
	(d) TRALI has a mortality rate of about 8%	2 (7)
	(e) I don't know	13 (48)

NOTE. Correct responses are given in bold. Percentages may not add to exactly 100% because of rounding.

Abbreviations: Hb, hemoglobin; HTLV, human T-cell leukemia virus; IV, intravenous; PT, prothrombin time.

*Two clinicians did not answer this question.

†One clinician did not answer this question.

influenced by their perception of the availability of blood products, the cost of a transfusion, and their awareness of transfusion practice guidelines. When asked how likely they were to use transfusion practice guidelines if they were made available, all physicians answered they were likely or very likely to use such guidelines.

DISCUSSION

In our survey, we found that UCI physicians have basic knowledge in transfusion, but they acknowledged gaps in their knowledge and expressed the need and desire for additional training. Most were fairly knowledgeable about the practical aspects of administering whole-blood and red cell transfusions but lacked knowledge about basic aspects of platelet transfusion. All physicians felt strongly there was a need for additional training in blood transfusion science.

The physicians also felt that their decision to transfuse patients with cancer was commonly influenced by their colleagues and that such influence sometimes led to unnecessary blood transfusions.

The physicians' knowledge score in this study was 5.3; only 32% of physicians correctly answered at least seven of 10 questions. This score (50.3%) was almost similar to that of a multicenter survey of internal medicine residents, where the mean score of correct responses was 45.7%.⁸ Two studies in Africa also found insufficient knowledge, but scores were higher than our finding, with 42.9% of medical staff in Mali⁹ and 50.8% of prescribers of blood products in Niamey, Niger,¹⁰ having good basic knowledge of transfusion. In Mozambique, another country with a limited supply of blood and one at high risk for transfusion-transmitted infections (TTIs), a survey among 216 health care providers on

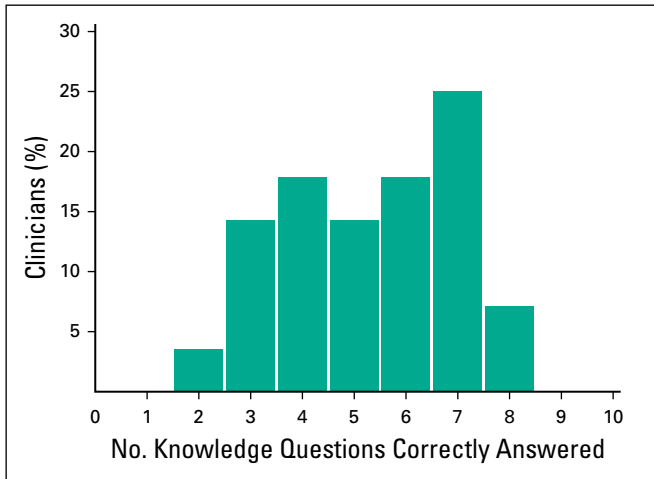


Fig 1. Distribution of number of knowledge questions correctly answered.

their perceptions and knowledge of blood transfusion found that providers were knowledgeable about transfusion but that some patient groups still received avoidable blood transfusions.¹¹

In this study, physicians understood the importance of proper patient identification before transfusion and that patient identification error was a common cause of fatal transfusion reactions. This was also emphasized in the work performed by Maskens et al¹² at Sunnybrook Health Sciences Centre in Canada, who found that errors resulting from inappropriate ordering of blood products and errors in sample labeling posed the greatest potential risk of patient harm.

Physicians were not familiar with TTIs, with only 36% correctly identifying bacteria as the most common TTI and 21% reporting they did not know the right answer. Importantly, transfusion-associated sepsis resulting from bacterial contamination is a frequent cause of mortality, representing 22% of 82 overall deaths related to

transfusion in a French hemovigilance study.¹³ The highest bacterial contamination rate is observed with platelet concentrates (4.02 per 1,000 units), followed by red blood cells (1.71 per 1,000 units) and fresh frozen plasma (0.34 per 1,000 units). Potential interventions to reduce transfusion-associated bacterial sepsis include improvements to donor arm preparation, diversion of the first aliquot of whole blood, and introduction of bacterial testing,¹⁴ practices that are conducted in Uganda.

Malaria parasitemia is thought to be high among blood donors, especially those from highly endemic areas. A study in north-central Nigeria found a high percentage of apparently healthy blood donors harboring the malaria parasite.¹⁵ Although the WHO recommends that blood for transfusion be screened for TTIs, malaria screening is not performed in most malaria-endemic countries in sub-Saharan Africa, because there is currently no screening method that is practical, affordable, or suitably sensitive for use by blood banks in this region. In addition, implementation of any policy that advocates deferral of all such donors might have a significant negative impact on the availability of blood for transfusion.¹⁶ Indeed, in our study, almost all physicians (96%) disagreed with the idea of deferring blood donations from people who had malaria within the past 3 years. Of note, the clinical diagnosis of malaria is sometimes inaccurate, because most febrile illnesses are diagnosed as malaria in some areas, leading potentially to unnecessary discouragement or deferral of otherwise acceptable donors.

Treatment of anemia is important in palliative care, and blood transfusion is generally used for this purpose, although it is not clear if blood

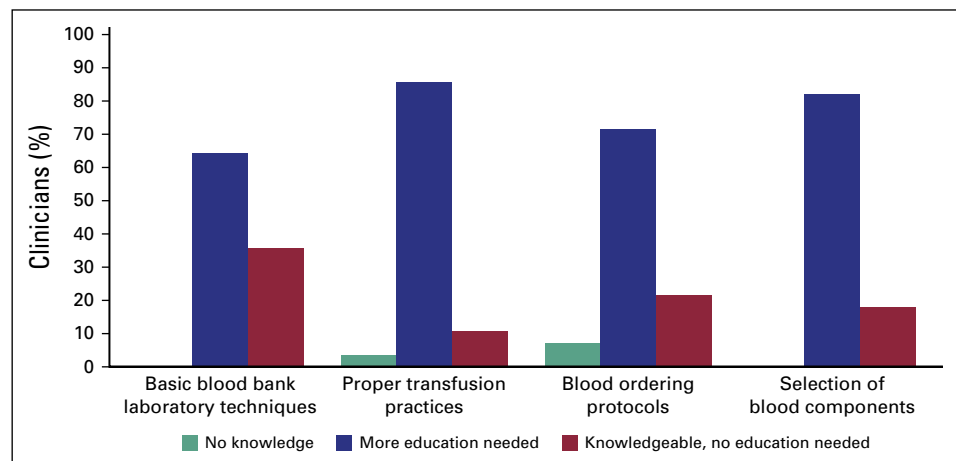


Fig 2. Physicians' ranking of their knowledge on certain aspects of transfusion.

Table 2. Frequency of Each Response Category for the Attitude Questions

Attitude Question	Response	No. (%) of Clinicians
1. How likely are you to transfuse platelets to a CLL patient who is not currently bleeding but with a platelet count of 35,000/ μ L and hemoglobin of 8.3 g/dL?	(a) Highly likely	4 (14)
	(b) Somewhat likely	5 (18)
	(c) Somewhat unlikely	7 (25)
	(d) Highly unlikely	12 (43)
A 65-year-old woman with advanced multiple myeloma is referred to you for evaluation. Since her diagnosis 2 years ago, her clinical course has deteriorated progressively, with increasing bone pain, lethargy, and severe depression. During the last five visits to the cancer center, her hemoglobin has varied between 9 and 10 g/dL. In her consultation with you, she reports a progressive feeling of weakness over the last several months, worse now than ever before, "to the point where I don't feel like getting out of bed anymore." A bone marrow examination performed recently revealed extensive replacement of marrow by abnormal plasma cells. Her current medications include diazepam 5 mg three times daily, insulin 30 U per day, and meloxicam 15 mg per day for arthritis. The day you see her, the hemoglobin is 7.8g/dL, and the red blood cell indices indicate a normochromic normocytic pattern. In addition, she has marked elevation of her alkaline phosphatase, acid phosphatase, and blood glucose levels. How likely are you to transfuse her with red blood cells or whole blood at this time?	(a) Highly likely	7 (25)
	(b) Somewhat likely	14 (50)
	(c) Somewhat unlikely	3 (11)
	(d) Highly unlikely	4 (14)
2. Donated blood is free, but there are significant costs associated with blood processing and administration.	(a) Strongly agree	27 (96)
	(b) Somewhat agree	0 (0)
	(c) Somewhat disagree	1 (4)
	(d) Strongly disagree	0 (0)
3. There is no practical test available to screen donors for malaria; Uganda blood transfusion services should defer blood donations from people who have had malaria within the past 3 years.	(a) Strongly agree	0 (0)
	(b) Somewhat agree	1 (4)
	(c) Somewhat disagree	4 (14)
	(d) Strongly disagree	23 (82)
4. Formulation and implementation of evidence-based clinical practice guidelines reduce variation in blood use by clinicians and promote best practices in transfusion medicine.	(a) Strongly agree	27 (96)
	(b) Somewhat agree	1 (4)
	(c) Somewhat disagree	0 (0)
	(d) Strongly disagree	0 (0)
5. As a clinician, I understand the risks and costs of allogeneic transfusion, and because of this, I try to minimize the use of blood components.	(a) Strongly agree	11 (39)
	(b) Somewhat agree	11 (39)
	(c) Somewhat disagree	4 (14)
	(d) Strongly disagree	2 (7)
6. (a) Presence of anorexia, cachexia, and pallor is a good indication for a blood transfusion.	(a) Strongly agree	1 (4)
	(b) Somewhat agree	10 (36)
	(c) Somewhat disagree	8 (29)
	(d) Strongly disagree	9 (32)
(b) A patient's and/or patient's family's preference to transfuse influences your decision to transfuse him/her with blood products.	(a) Strongly agree	5 (18)
	(b) Somewhat agree	9 (32)
	(c) Somewhat disagree	3 (11)
	(d) Strongly disagree	11 (39)
7. (a) When a patient needs platelets and platelet products are not available, I use fresh red blood cells or whole blood.	(a) Strongly agree	9 (32)
	(b) Somewhat agree	3 (11)
	(c) Somewhat disagree	4 (14)
	(d) Strongly disagree	12 (43)

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Table 2. Frequency of Each Response Category for the Attitude Questions (Continued)

Attitude Question	Response	No. (%) of Clinicians
(b) Compared with red blood cells, platelet transfusions are associated with a lower risk of transmission of diseases; I can use platelets without worries.	(a) Strongly agree	2 (7)
	(b) Somewhat agree	1 (4)
	(c) Somewhat disagree	8 (29)
	(d) Strongly disagree	17 (61)
8. For a patient with cancer with a platelet count of $5 \times 10^9/L$ transfusing with 1 to 2 random donor units is useful to prevent and/or stop bleeding.	(a) Strongly agree	4 (14)
	(b) Somewhat agree	12 (43)
	(c) Somewhat disagree	5 (18)
	(d) Strongly disagree	7 (25)
9. Additional training in blood transfusion science is needed for all clinicians at UCI, irrespective of level of qualification or experience.	(a) Strongly agree	28 (100)
	(b) Somewhat agree	0 (0)
	(c) Somewhat disagree	0 (0)
	(d) Strongly disagree	0 (0)

NOTE. Best responses are given in bold.

Abbreviations: CLL, chronic lymphatic leukemia; UCI, Uganda Cancer Institute.

administered at the end of life is helpful.¹⁷ There are ethical questions about transfusion at the end of life, when decisions often involve seriously ill patients with evolving goals of care. Some argue that use of scarce resources such as blood must be balanced against maintaining adequate resources to treat future patients, thus putting the ethical principles of beneficence and social justice in conflict.^{18,19} Use of blood transfusion at the end of life may have an effect on survival of patients with cancer. A review of red blood cell transfusions in a palliative care unit in Adelaide, Australia, found that among patients, blood transfusions led to subjective improvement in a majority of recipients, although this correlated poorly with objective scale-based measures.²⁰ Another study on the impact of blood transfusion on survival in patients with advanced cancer, in which anemic patients who had transfusion at admission were compared with those who were not transfused, found that patients who had blood transfusion at the end of life lived significantly longer than patients who were not transfused.²¹ In our study, most physicians indicated that they would not transfuse a terminally ill patient with cancer receiving end-of-life care on the basis of only a low hemoglobin level but would instead rely on a combination of other criteria and other prognostic indicators for survival. This is similar to findings in other studies, including a retrospective records review conducted in Italy.²²

The decision to transfuse needs to be considered carefully, because exposure to transfused

blood may be associated with risks, especially in patients with cancer. Avoidance of unnecessary exposure to blood components, particularly plasma and platelets, is preferable because of possible pathogen contamination. Unfortunately, because of limited transfusion knowledge, transfusions may be administered when not indicated, with a potential substantial risk to patients. Physicians in our study were often influenced by their colleagues in deciding when to transfuse, and in so doing, they believed that sometimes they could have administered unnecessary transfusions. A Canadian study to examine factors that guide blood transfusion decision making noted that both individual clinical appreciation and local unit (organizational) culture play a role in physicians' decisions to transfuse patients.²³ This suggests that promulgating appropriate guidelines would affect practice both by directly changing physician behavior and by changing the clinical norms in the medical community.

Our study is limited by small sample size; however, our participants represent the physicians caring for patients with cancer at the only national cancer referral hospital in Uganda. Our study is purely descriptive, and as such, our conclusions may not be as strong. Nonetheless, the findings, some of which corroborate studies from other countries, provide insight into cancer physicians' knowledge and practices regarding transfusion in patients with cancer. Our findings may not be generalizable to other categories of health workers, because our study participants

Table 3. Frequency of Each Response Category for Practice Questions

Clinical Practice Question	Response	No. (%) of Clinicians	
1. How frequently do you perform a hemoglobin determination prior to transfusing patients with red blood cells or whole blood?	(a) Never	0 (0)	
	(b) Occasionally (< 1%-30% of time)	0 (0)	
	(c) Sometimes (30%-85% of time)	0 (0)	
	(d) Routinely (> 85% of time)	28 (100)	
2. If a patient with cancer is admitted with anemia, but no immediate transfusion is anticipated, what do you usually do?	(a) Order a type and cross match	20 (71)	
	(b) Order a type and screen	7 (25)	
	(c) Avoid drawing a specimen in an anemic patient and use uncross-matched group O–negative products if an emergent bleed occurs	1 (4)	
	(d) I don't know	0 (0)	
3. The following clinical conditions would make me decide to transfuse blood to a patient with cancer: (select one option: strongly agree, somewhat agree, somewhat disagree, or strongly disagree)	(i) A terminally ill patient with cancer receiving end-of-life care with hemoglobin of 6.5 g/dL	(a) Strongly agree	3 (11)
		(b) Somewhat agree	6 (21)
		(c) Somewhat disagree	7 (25)
		(d) Strongly disagree	12 (43)
	(ii) A patient with acute massive bleeding	(a) Strongly agree	27 (96)
		(b) Somewhat agree	1 (4)
		(c) Somewhat disagree	0 (0)
		(d) Strongly disagree	0 (0)
	(iii) A hemoglobin level of 8.8 g/dL in a stable patient with chronic lymphocytic leukemia	(a) Strongly agree	2 (7)
		(b) Somewhat agree	5 (18)
		(c) Somewhat disagree	10 (36)
		(d) Strongly disagree	11 (39)
	(iv) Anemia (Hb, 5.2 g/dL) resulting from chemotherapy in a patient with lymphoma	(a) Strongly agree	24 (86)
(b) Somewhat agree		3 (11)	
(c) Somewhat disagree		0 (0)	
(d) Strongly disagree		1 (4)	
4. (a) How frequently do you change your mind about whether to give a patient a blood and/or blood products transfusion based on the input of colleagues?	(a) Never	1 (4)	
	(b) Rarely	2 (7)	
	(c) Sometimes	22 (79)	
	(d) Often	3 (11)	
(b) Do you believe that you have sometimes given unnecessary blood or blood products transfusions because of influence from other physicians?	(a) Yes	20 (71)	
	(b) No	7 (25)	
	(c) I don't know	1 (4)	
(c) Do you think that other physicians may give unnecessary transfusions because of influence from other physicians?	(a) Yes	23 (82)	
	(b) No	2 (7)	
	(c) I don't know	3 (11)	
5. A 50-year-old patient with ALL.... What piece(s) of information would you consider to be most important in deciding whether to order a blood transfusion before starting her on chemotherapy?	(a) Heart disease	0 (0)	
	(b) Hematocrit and current heart disease	21 (78)	
	(c) Hematocrit and history of asthma	0 (0)	
	(d) Hematocrit and history of heart disease	6 (22)	
	(e) I don't know	0 (0)	

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Table 3. Frequency of Each Response Category for Practice Questions (Continued)

Clinical Practice Question	Response	No. (%) of Clinicians
6. In a situation of an adult patient with acute myeloid leukemia without active bleeding, at what threshold platelet count would you wish to transfuse him/her to prevent hemorrhage? [*]	(a) 5,000-10,000	5 (19)
	(b) 10,000-20,000	14 (52)
	(c) 20,000-30,000	6 (22)
	(d) 30,000-50,000	2 (7)
	(e) 50,000-100,000	0 (0)
7. (a) Do you obtain signed consent from patients before administering a blood and/or blood products transfusion?	(a) Yes (go to 7(b))	7 (25)
	(b) No	20 (71)
	(c) I don't know	1 (4)
(b) Approximately what percentage of patients sign consent prior to receiving blood transfusion? (please circle the relevant number) [†]	(a) 0%-24%	0 (0)
	(b) 25%-49%	1 (14)
	(c) 50%-74%	3 (43)
	(d) 75%-100%	3 (43)
	(e) I don't know	0 (0)
8. Which one of the following interventions would minimize the risk of a patient experiencing an acute transfusion reaction? [‡]	(a) Administration of blood that is compatible with that of the recipient	27 (100)
	(b) Starting the transfusion within 20 minutes after collection from blood bank	0 (0)
	(c) Administering a unit of blood to the patient within 4 hours after collection	0 (0)
	(d) Stopping blood if there are signs and symptoms of transfusion reaction	0 (0)
	(e) I don't know	0 (0)
9. In a patient who develops signs and symptoms of an acute transfusion reaction, what do you do as an immediate action?	(a) Stop blood transfusion and notify the blood bank	21 (75)
	(b) Keep vein open with 0.9% normal saline	0 (0)
	(c) Inform nursing supervisor	0 (0)
	(d) Give patient intravenous corticosteroids	7 (25)
	(e) Write an incident report	0 (0)
10. (a) How likely does your perception of the availability of blood products, the cost of a transfusion, and awareness of transfusion practice guidelines influence your transfusion decision making?	(a) Very likely	10 (36)
	(b) Likely	15 (54)
	(c) Unlikely	2 (7)
	(d) Very unlikely	1 (4)
(b) If you have not yet used transfusion practice guidelines, how likely are you to use them if they are made available?	(a) Very likely	21 (75)
	(b) Likely	7 (25)
	(c) Unlikely	0 (0)
	(d) Very unlikely	0 (0)

NOTE. Best responses are given in bold.

Abbreviations: ALL, acute lymphatic leukemia; Hb, hemoglobin.

*Twenty-seven clinicians responded to this question (not 28).

†Percentages are given out of the seven participants who answered yes to question 7(a).

‡Twenty-seven clinicians responded to this question.

were from a fairly specialized group, but they may apply to physicians from other cancer treatment centers in sub-Saharan Africa.

Although some physicians had a good understanding of transfusion medicine, there is an imperative to improve transfusion knowledge, attitudes, and practices among UCI physicians. Indeed, most reported gaps in their knowledge

and expressed a need for additional education in the basics of blood transfusion. Transfusion training and evidence-based guidelines to meet the unique situations faced by physicians in low- and middle-income countries would help to reduce inappropriate transfusions and improve patient care. Greater understanding of peer influence in transfusion decision making is required.

We recommend that medical training institutions in sub-Saharan Africa in general and Uganda in particular include transfusion in their curriculum to ensure physicians have knowledge of transfusion basics. There should also be in-service training for those clinicians already in practice on the basis of an accurate knowledge deficit

assessment using a validated examination.²⁴ To avoid unnecessary transfusions, guidelines need to be developed to help clinicians with the decision of whether to transfuse.

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AUTHOR CONTRIBUTIONS

Conception and design: All authors

Collection and assembly of data: Henry Ddungu, Sandra Naluzze, Anna Wald, Isaac Kajja

Data analysis and interpretation: Henry Ddungu, Elizabeth M. Krantz, Warren Phipps, Jackson Orem, Noah Kiwanuka, Anna Wald, Isaac Kajja

Manuscript writing: All authors

Final approval of manuscript: All authors

Accountable for all aspects of the work: All authors

Elizabeth M. Krantz

No relationship to disclose

Warren Phipps

No relationship to disclose

Sandra Naluzze

No relationship to disclose

Jackson Orem

No relationship to disclose

Noah Kiwanuka

No relationship to disclose

Anna Wald

Consulting or Advisory Role: Aicuris

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Isaac Kajja

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Henry Ddungu

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Affiliations

Henry Ddungu, Sandra Naluzze, and Jackson Orem, Uganda Cancer Institute; **Noah Kiwanuka and Isaac Kajja**, Makerere University, Kampala, Uganda; **Elizabeth M. Krantz, Warren Phipps, and Anna Wald**, Fred Hutchinson Cancer Research Center; and **Warren Phipps and Anna Wald**, University of Washington, Seattle, WA.

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