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Self-Reported Blood Transfusion Practices and Attitudes of Kenyan Medical Doctors

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Abstract

Background: Blood transfusion (BT) is important in modern health care. However, the clinicians who prescribe this life-saving, scarce, and costly resource have often been found to lack awareness of the best practices required for optimal and safe clinical use of blood components. This study aimed at determining the self-reported practices and attitudes of Kenyan-trained medical doctors in BT. **Methodology**: A cross-sectional study was carried out among eligible medical doctors, who were selected using a stratified random sampling technique. A questionnaire was used to collect data that was analyzed by way of percentages, mean and median, Kruskal-Wallis H, Mann-Whitney U, and Spearman correlation. **Results**: A total of 150 participants were studied, with a mean age of 29.9 ± 3.6 and a male to female ratio of 3:2. About 73.3% of the participants had a positive attitude towards the practice of BT with attitude being associated with having participated in training after undergraduate medical education ($p = 0.036$). Overall, only 36.7% of the self-reported procedures conformed to the recommended best practices, and practice competency was associated with the site of practice ($p = 0.007$) and the cadre of the clinicians ($p = 0.035$). There was no correlation between attitude and practice competency scores ($r_s = 0.053$, $p = 0.521$). **Conclusion**: The majority of the clinicians had a positive attitude towards BT, yet just above a third of their reported practices conformed to the best recommended practices. Participation in training after undergraduate medical education was associated with attitudes towards BT. There is therefore a need for additional education in BT in order to improve clinicians' awareness of the best practices in the field.

Subject Areas

Blood Transfusion

Keywords

Blood Transfusion, Self-Reported Practices, Attitudes, Medical Doctors

1. Introduction

Blood transfusion is vital in the treatment of various medical and surgical conditions. However, the clinicians who prescribe this life-saving, scarce, and costly resource have often been found to lack awareness of the best practices required for optimal and safe clinical use of blood components [1] [2] [3] [4]. Merriam-Webster dictionary [5] defines best practice as "a procedure that has been shown by research and experience to produce optimal results and that is established or proposed as a standard suitable for widespread adoption". In health care, best practices are health practices, methods, interventions, procedures, or techniques based on high-quality evidence aimed at obtaining improved patient and health outcomes [6]. Blood transfusion best practices are based on a set of measures whose primary purpose is to provide health professionals with optimal strategies for enhancing transfusion safety [7]. Best practices in blood transfusion include, among others, adopting a restrictive transfusion strategy [8], a patient blood management approach [9], prescribing the right blood component to the right patient at the right time [10], and the use of clinical guidelines [11]. Variation in transfusion practices among clinicians has been shown, and this difference leads to inconsistent transfusion practices and, often, inappropriate transfusions [2] [12] [13]. Transfusion behaviour or practice is influenced by attitudes [3] [4] [14] and this is supported by the theory of "planned behaviour", which posits that adoption of a good practice depends on the individual's attitude [15]. There is a dearth of literature in our setup on the practice competency and attitudes of medical doctors in BT. The purpose of this study was therefore to determine the medical doctor's self-reported practices and attitudes towards BT in order to establish areas for improvement.

2. Methodology

2.1. Study Design, Site and Population

A cross-sectional study was conducted among a total of 200 doctors (based on the Taro Yamane formula) [16] working at a national, teaching and referral hospital-Moi Teaching and Referral Hospital (MTRH), Eldoret and 10 county-level hospitals in western Kenya.

2.2. Sampling of Participants

The participants were recruited using stratified random sampling and probabili-

ty proportional to size methods. Within each hospital, participants were selected through simple random sampling.

2.3. Data Collection Tool

Data was collected using a pre-tested questionnaire. The first section of the questionnaire had demographic, educational background, and site of practice variables. The second part captured attitude and self-reported practice competency questions.

The attitude and self-reported practice were assessed using Likert scale items, where the attitude scale was 1 to 5 (1 = strongly disagree, 5 = strongly agree) and the self-reported practice scale was 1 to 5 (1 = never, 5 = always). The attitude questions were adapted from a study by Ddungu, *et al.* [1]. The self-reported practice competency questions were adapted from studies by Ddungu, *et al.* [1] and Graham, *et al.* [17].

2.4. Validity and Reliability

In this study, validity was ensured by sharing the data collection tool with experts in the field of BT and adapting questions from similar studies that had used validated instruments. Reliability was ensured by carrying out a pilot study and calculating Cronbach's alpha coefficient. The alpha coefficients for the attitude and self-reported practice were 0.636, and 0.803, respectively. Minor changes were made to the questionnaire after the pilot test.

2.5. Data Analysis

Data was analyzed using Statistical Package for the Social Sciences (SPPS) version 25. Categorical variables were summarized using percentages and continuous data was summarized using mean, standard deviation (SD), median, and interquartile range (IQR). Bivariate analysis was by way of Kruskal- Wallis H, Mann-Whitney U, and Spearman's correlation. A $p < 0.05$ was taken as statistically significant.

The overall level of attitude was categorized using Bloom's cut-off point [18] [19] as follows: positive if the score was 75% - 100%, neutral if the score was 50% - 74%, and negative for scores less than 50%. The scores of the items for attitude and practice competency, respectively, were combined to generate a composite score that was used to perform interferential statistics.

2.6. Ethical Considerations

Ethical approval for the study was obtained from the Institutional Research and Ethics Committee (IREC) of Moi University and MTRH; informed consent was obtained from the study participants; and confidentiality was maintained.

3. Results

A total of 150 (75%) of the 200 medical doctors that were enrolled returned completed questionnaires. The mean age of the participants was 29.9 ± 3.6 and

median of 29 (IQR: 27, 33), with a range of 25 - 45 years. The male: female ratio was 3:2, with a majority (n = 93, 62%) working in county referral hospitals. The cadre distribution was 59 (39%), 52 (34.7%), and 39 (26%), for medical officers, interns, and residents, respectively (see Table 1).

3.1. Attitude Scores

The awareness mean score was 3.8 ± 0.4 (76% ± 8%) with the median of 4.0 (80%), and interquartile range (IQR) of 3.6, 4.1 (72%, 82%). The range of the scores was 2.6 - 4.9 (52% - 98%). About 91% (137) of the study participants strongly agreed (54.7%) or agreed (36.7%) that there are costs associated with the processing and administration of blood components. Whereas, about 73% (n = 109) strongly agreed (28.7%) or agreed (44.0%) that they are more prudent in the use of blood due to the risks and costs associated with it.

Table 1. Study characteristics of the participants.

Characteristic	Category	n	%
Age (years)	25 - 29	81	54.0
	30 - 34	53	35.3
	≥35	16	10.7
Sex	Male	90	60.0
	Female	60	40.0
Hospital	MTRH*	57	38.0
	County	93	62.0
Nature of the curriculum of undergraduate training	Conventional	99	66.0
	Innovative	51	34.0
Cadre	Interns	52	34.7
	Medical officers	59	39.3
	Residents	39	26.0
Number of years after graduation from medical school	≤1 year	52	34.7
	2 - 5 years	53	35.3
	>5 years	45	30.0
Whether given induction in BT prior to internship	Yes	24	16
	No	126	84
Whether participated in training in BT after undergraduate education	Yes	40	26.7
	No	110	73.3
Frequency of prescribing BT	Once a month	25	16.7
	Once a week	69	46.0
	At least once per day	56	37.3

*MTRH: Moi teaching and referral Hospital (a National Referral Facility).

On the issue of consent, 88.0% (n = 132) either strongly disagreed (56.7%) or disagreed (31.3%) with the statement that consent is implied and therefore there is no need to obtain one from a patient who requires a BT or their guardians. About 53% (n = 80) of the doctors either strongly agreed (20.7%) or agreed (32.7%) that the presence of fatigue, weakness, and pallor is a good indication for a BT. When it comes to what could influence the clinician's decision to prescribe BT, about 91% (n = 137) strongly agreed (49.3%) or agreed (42.0%) that the availability of blood components, the cost of a transfusion, and awareness of transfusion guidelines would influence their decision to transfuse a patient. In the same vein, 46% (n = 69) either strongly agreed (34.0%) or agreed (12.0%) that encountering a patient with chronic kidney disease and a haemoglobin (Hb) of >8.0 g/dL would make them decide to order a BT. These findings are depicted in Table 2.

Table 2. The distribution of the ratings of the attitude toward aspects of BT.

Aspect	Strongly disagree n (%)	Disagree n (%)	Not sure n (%)	Agree n (%)	Strongly agree n (%)	Mean (SD)	Median
Donated blood is free, but there are significant costs associate with blood processing and administration	5 (3.3)	1 (0.7)	7 (4.7)	55 (36.7)	82 (54.7)	4.5 (0.9)	4.5
As a clinician I understand the risks and costs of allogeneic transfusion, and because of this, I try to minimize the use of BT	8 (5.3)	14 (9.3)	19 (12.7)	66 (44.0)	43 (28.7)	3.8 (1.1)	4.0
Consent for BT is implied and therefore there is no need to obtain one from the patient	85 (56.7)	47 (31.3)	7 (4.7)	7 (4.7)	4 (2.7)	4.4 (1.0)	4.5
Presence of fatigue, weakness, dizziness, and pallor is a good indication for a BT	23 (15.3)	32 (21.3)	15 (10.0)	49 (32.7)	31 (20.7)	2.8 (1.4)	2.6
Formulation and implementation of evidence based clinical practice guidelines reduce variation in blood use by clinicians and promote practices in transfusion medicine	2 (1.3)	2 (1.3)	14 (9.3)	48 (32.0)	84 (56.0)	4.4 (0.8)	4.5
The availability of blood components, the cost of a transfusion and awareness of transfusion guidelines would influence my transfusion decision	4 (2.7)	4 (2.7)	5 (3.3)	63 (42.0)	74 (49.3)	4.3 (0.9)	4.5
Compared with red blood cells, platelet transfusions are associated with a lower risk of transmission of diseases; hence I can use platelets without worries	1 (0.7)	12 (8.0)	37 (24.7)	56 (7.3)	44 (29.3)	3.9 (1.0)	3.9
A patient with chronic kidney disease and a Hb of >8.0 g/dL would make me decide to transfuse blood to patient	18 (12.0)	33 (22.0)	30 (20.0)	51 (34.0)	18 (12.0)	3.1 (1.2)	3.2

Based on the modified Bloom's cut-off points, about 73.3% (n = 110) of the participants had a positive attitude towards the practice of BT, whereas 26.7% (n = 40) were neutral. None of the participants had a negative attitude. These results are shown in Table 3.

3.2. Self-Reported Practice Competency Scores

The self-reported practice competency mean score was 3.9 (78%) ± 0.6 (12%), with a median of 4.0 (80%) and an interquartile range (IQR) of 3.5, 4.4 (70%, 88%). The range of the scores was 23 - 49 (46% - 98%). About 46% (69/150) of the participants reported that they prescribe blood once a week. Overall, only 36.7% (551/1500) of the self-reported practices conformed to the recommended best practices. About 42.0% of the respondents (n = 63) reported that they always prescribe the right blood component to the right patient at the right time, whereas 23% (n = 35) reported that they either never or rarely used Hb as the sole deciding factor for prescribing a BT. Though 44.7% (n = 67) of the respondents (n = 67) reported that they always obtained consent from patients or their guardians before transfusion, only 22.7% (n = 34) reported that they always record the evidence of the consenting in the patient's medical records. Obtaining and labeling pre-transfusion specimens was the procedure that the largest majority of the respondents (73.3%, n = 110) reported to always perform followed by the performance of posttransfusion Hb estimation, (51.3%, n = 77) and documentation of the clinical and laboratory outcome of the BT (38%, n = 56) and (46%, n = 69), respectively. The self-reported frequency of performing selected BT procedures is summarized in Table 4.

3.3. Factors Associated with Attitude and Self-Reported Practice Competency

There was a statistically significant association between attitude scores and having participated in training after undergraduate medical education (p = 0.036). Self-reported practice competency was significantly association with the site of practice (p = 0.007) and cadre of the clinicians (p = 0.035). The details of these findings are depicted in Table 5. Spearman correlation showed no correlation between attitude score and practice competency score (r_s = 0.053, p = 0.521).

Table 3. Categorization of the overall attitude scores based on the Bloom's cut-off.

Category	Scores	n	%
Positive	≥75% - 100% (≥30 - 40)	110	73.3
Neutral	≥50% - <75% (≥20 - <30)	40	26.7
Negative	<50% (<20)	0	0

Table 4. Self-reported frequency of performing BT procedures.

Procedure	Never n (%)	Rarely n (%)	Sometimes n (%)	Often n (%)	Always n (%)	Median
Prescribe the right blood component to the right patient at the right time	1 (0.7)	1 (0.7)	16 (44.7)	67 (44.7)	63 (42.0)	4.3
Use of Hb (Hb) level as the sole deciding factor in starting a transfusion	8 (5.3)	27 (18)	54 (36.0)	41 (27.3)	20 (13.3)	2.7
Complete the blood request form accurately and legibly, including the reason for transfusion	2 (1.3)	7 (4.7)	16 (10.7)	40 (26.7)	85 (56.7)	4.5
Document/record the indication and the blood component to be transfused the medical notes and lab requests	0 (0.0)	3 (2.0)	22 (14.7)	45 (30.0)	80 (53.3)	4.4
Obtain verbal consent from each patient prior to transfusion (either yourself of a member of the team)	4 (2.7)	10 (6.7)	25 (16.7)	44 (29.3)	67 (44.7)	4.3
Record evidence of this conversion (verbal consent) in the medical notes	28 (18.7)	32 (21.3)	37 (24.7)	19 (12.7)	34 (22.7)	2.9
Obtain and correctly label blood samples for pre-transfusion compatibility testing	4 (2.7)	2 (1.3)	11 (7.3)	23 (15.3)	110 (73.3	4.7
Perform post transfusion Hb estimation	2 (1.3)	3 (2.0)	23 (15.3)	45 (30.0)	77 (51.3)	4.4
Document the clinical outcome of the transfusion (e.g., improvement in symptoms)	5 (3.3)	12 (8.0)	25 (23.3)	42 (28.0)	56 (37.7)	4.0
Document the laboratory outcome of the transfusion (e.g., Hb increment)	7 (4.7)	8 (5.3)	31 (20.7)	35 (23.3)	69 (46.0)	4.2

Table 5. Bivariate analysis of the factors associated with knowledge score, attitude score, self-reported practice score, and self-confidence score.

Variable	N	Attitude score		Practice competency score	
		Median	p-value	Median	p-value
Age			0.144		0.075
25 - 29	81	3.9		4.1	
30 - 34	53	4.0		3.9	
≥35	16	3.9		3.6	
Sex			0.508		0.766
Male	90	4.0		4.0	
Female	60	3.9		4.0	
Cadre of clinician			0.404		**0.035†**
Intern	52	3.9		4.0	
Medical officer	59	3.9		4.2	
Resident	39	4.0		3.7	

Continued

Site of practice (Hospital)			0.640		**0.007#**
MTRH	57	4.0		3.8	
County	93	3.9		4.1	
Nature of the curriculum of undergraduate training			0.253		0.165
Conventional	99	3.9		4.0	
Innovative/PBL	61	4.0		3.9	
Number of years after graduation			0.393		0.096
≤1 year	52	3.9		4.1	
2 - 5 years	53	3.9		4.1	
>5 years	45	4.0		3.8	
Whether offered induction in BT before internship			0.514		0.116
Yes	24	3.9		4.1	
No	126	3.9		4.0	
Whether participated in training in BT after graduation			**0.036#**		0.301
Yes	40	4.0		3.9	
No	110	3.9		4.0	
Frequency of prescription of BT			0.934		0.617
Once a month	25	4.0		4.0	
Once a week	69	4.0		4.1	
More than once a week	56	3.9		4.0	

†Kruskal-Wallis test, #Mann-Whitney Test.

4. Discussion

4.1. Attitude towards BT

The majority (73.3%) of the respondents had a positive attitude towards the practice of BT. A comparable finding was demonstrated by Khatiwada, *et al.* [20] and Sack, *et al.* [21]. A positive attitude towards BT is key to ensuring that blood resources are used in a rational manner, thus the minimizing risks and costs associated with BT practice and the conservation of a scarce resource. Blood and blood components are classified as essential medicines by the World Health Organization (WHO). According to WHO, as cited by Kshirsagar [22], "Rational use of medicines involves their correct/proper/appropriate use so that their selection, dose, and duration are according to the guidelines, suitable for clinical needs, at the lowest cost to the provider, community, and patient, and are correctly administered."

Most of the participants either strongly agreed or agreed that BT is a costly procedure, that the practice is associated with risks, and that a consideration of

these factors influence their use of BT. Previous studies have reported similar results [1] [4] [14]. The health care workers who utilize blood and blood components in the management of patients must be aware of these associated risks and costs and should therefore use this scarce resource prudently and rationally.

In a study by Hartford, *et al.* [23], increased reliability of the blood supply, among other factors, influenced the decision of their study participants (doctors) to transfuse patients. Similarly, awareness and adherence to guidelines have been reported previously to influence the transfusion behavior of clinicians [4] [14] [23].

The majority (88%) of the doctors were aware that consent is required before administering a BT. Comparable results have been reported in studies by Alsharidah, *et al.* [24] and Al-Riyami, *et al.* [25], where 95.6% and 80% of the participants, respectively, acknowledged the importance of the consenting requirement. Despite the impressive awareness by clinicians on the necessity of consent, deficiencies in the consent process have been noted [26]. Indeed, in our study, despite the high acknowledgement of the need for consenting, only 44.7% indicated that they always obtain verbal consent, and a paltry 22.7% reported that they recorded the evidence of consent in the patient's medical records.

About 54% of the doctors were cognizant that the presence of fatigue, weakness, and pallor is a good indication for a BT with 46% correctly specifying that they would definitely transfuse a patient with chronic anaemia with a Hb of >8.0 g/dL In a South African study, the doctors' decision to transfuse blood was not only based on the level of Hb but also intention to relieve symptoms attributed to anaemia [4]. In another study in Mozambique, low Hb levels and pallor received a significantly higher level of importance in influencing the clinician's decision to transfuse when compared with tachycardia, planned surgery, slow capillary refill, low blood pressure, malaria, burns, and age ($p < 0.001$) [23]. It is recommended that, until more definitive evidence is available, symptomatic patients should only be transfused when symptoms can be attributed to anaemia and not to another pathophysiological process [4].

With repeated evidence of the noninferiority and sometimes superiority of a restrictive transfusion threshold (Hb < 7 g/dL) versus a liberal one (Hb of 8 - 10 g/dL) [27] [28] and increased awareness of transfusion risks and escalating costs, the traditional transfusion "trigger" of Hb < 10 g/dL, proposed by Adams & Lundy [29], is no longer justifiable [13]. Current transfusion guidelines on red blood cell transfusion recommend a restrictive transfusion strategy where a transfusion trigger of Hb threshold of 7 - 8 g/dL should be used in adults [8] and an age-appropriate Hb threshold in children [28].

The only factor that was found to be positively associated with attitude towards the practice of BT was participation in training post undergraduate medical education**.** Similar results were demonstrated by Lin, *et al.* (2019), Smith, *et al.* [30], and Pandey, *et al.* [31]. In our study, attitude and practice were not significantly associated, and this finding is comparable to that of Sack, *et al.* [21], but differs from that of Khatiwada, *et al.* [20].

4.2. Self-Reported Practice Competency

Ninety-eight percent (98%) of the study participants reported that they prescribe blood at least once a month. This finding concurs with that by Graham, *et al.* [17] (98%) but differs from studies by Hartford, *et al.* [23], Barrett, *et al.* [32], and Vaena & Alves (29), where similar prescription frequency among their study participants was 75%, 81.8%, and 83.9%, respectively. According to Graham, *et al.* [17], this level of frequency of prescription among doctors, when combined with appropriate training and reflective practice, should be enough to maintain competency in BT.

In our study, just above a third of the self-reported procedures conformed with the recommended best practices. The result compares with that of a study by Salem-Schatz, *et al.* [3] conducted in the US, where only 30% of the study participants appeared to be fully aware of best practices for the clinical utilization of blood and blood components. The majority (81%) of the respondents reported that they had not used transfusion guidelines to guide their practice, and a similar finding was reported by Ddungu, *et al.* [1] and Babo, *et al.* [33]. The main impediment to the utilization of BT guidelines is a lack of access [1] [33]. It is interesting to note that the high rates of non-adherence occur despite the WHO recommendations that the prescription of blood and blood components be based on national guidelines on the clinical use of blood while taking individual patient needs into account [34]. Clinical guidelines can improve the quality of clinical decisions [35] [36] and have also been shown to decrease unnecessary transfusions that increase costs and expose patients to potential infectious or noninfectious risks [37] [38].

Only 40.0% of our respondents reported that they always prescribe the right blood component to the right patient at the right time. Clinicians responsible for transfusing blood components are expected, as best practice, to always administer the right blood component to the right patient at the right time to ensure a safe transfusion. This practice entails proper patient identification during sample collection, laboratory testing, collecting the blood component from the blood bank, or administration of the transfusion at the bedside. Haemogilance reports, especially from the UK Serious Hazards of Transfusion (SHOT) initiative (http://www.shotuk.org) and the Australian Haemovigilance Report (https://www.blood.gov.au/haemovigilance-reporting) have shown that the majority of serious hazards attributed to BT are as a result of the administration of blood units to the wrong patient. These reports have further demonstrated that these incidents are always caused by human error involving clinical staff, where the root cause is misidentification of the patient and can result in life-threatening haemolytic transfusion reactions and other significant morbidities [39].

About forty percent of our study population reported that they always or often used Hb level as the sole deciding factor before prescribing a BT. This finding contrasts with a South African study where a Hb-based transfusion trigger was reportedly used by 76.2% of respondents, 23.1% reported using a clinical trigger, and one respondent reported using both a clinical and Hb-based trigger [32].

Good clinical practice requires that both the Hb level and the clinical status of the patient be the basis for the decision to transfuse [8] [34] [39]. When it comes to making the decision to transfuse a patient, the decision should be supported by the need to relieve clinical signs and symptoms and prevent significant morbidity and mortality [34]. The clinical variables to be taken into consideration when making the decision to transfuse include the rate of decline in hemoglobin level, intravascular volume status, shortness of breath, exercise intolerance, lightheadedness, chest pain thought to be cardiac in origin, hypotension or tachycardia unresponsive to fluid challenge, and patient preferences [8].

Though 74.0% of the participants claimed that they always or often obtained consent from patients or guardians before transfusion, only 35.4% reported that they recorded this in the medical records. This finding compares with that of Graham, *et al.* [17], but it is higher than in a Ugandan study, where only 25% of the clinicians indicated they obtained signed consent from patients before administering a transfusion [1]. It is recommended, as best practice, that the clinician or a registered member of the health team always obtain informed written or oral consent from patients requiring BT or their guardians. The patients or their guardians should be explained the risks, benefits, consequences, and alternatives of the BT in a timely and understandable manner. The valid consent obtained should then be documented in the patient's clinical record [39].

The majority (83.3%) of the participants reported that they always or often document the indication and the blood component to be transfused in the medical notes and in the laboratory request form. This result is supported by findings from a Kenyan study, where the indication for the transfusion was documented in 91.1% of the patients' charts [40]. However, it differs from a UK study where 67% of the non-specialist medical doctors stated that they always document the indication for transfusion in the medical notes [17]. It is a good practice for the prescribers of BTs to clearly record the reason for the BT in the patient's medical record [34]. According to a British Society for Haematology Guideline, documentation is one of the key principles of safe transfusion, and it should include the clinical indication for the transfusion [39]. Proper documentation reduces the risk of treatment errors and improves the likelihood of positive patient outcomes [41]. Documentation is also important in that it can prevent future costs resulting from a malpractice claim, as cases of malpractice are frequently decided based on the documentation that occurred [42].

Though not statistically significant in the multivariate analysis, there were marginally significant differences in the self-reported practice competency scores among the different cadres in the bivariate analysis, where the median scores were 4.0, 4.2, and 3.7 for the medical interns, medical officers, and residents, respectively. Studies by Babo, *et al.* [33] and Ray, *et al.* [43] have reported similar findings.

5. Limitations

The use of self-assessment to assess the constructs of our study could have led to

social desirability bias. However, this was mitigated by ensuring that the responses to the questionnaires were anonymous.

6. Conclusion

The majority of the clinicians had a positive attitude towards BT, though only slightly above a third of their reported practices were as per the best recommended practices. Participation in training after undergraduate medical education was positively associated with a better attitude towards BT. There is therefore a need for additional education in BT in order to improve clinicians' attitudes and adoption of best practices in the field.

Conflicts of Interest

The authors declare no conflicts of interest.

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