Original Article

Access this article online

Quick Response Code:

Website: www.pogsjournal.org

DOI: 10.4103/pjog.pjog_11_25

Blood transfusion in elective gynecological surgeries in the Philippines: A multicenter study

Maria Antonia E. Habana[1], Ma. Carmen H. Quevedo[2], Elisa O. Tiu[3], Maria Corazon Zaida Noblejas Gamilla[4], Madonna Victoria C. Domingo[1], Maria Virginia S. Abalos[5], Maria Lourdes K. Otayza[6], Amelia A. Vega[7], Lynnette R. Lu-Lasala[7], Czarina Juliana L. Alcaraz[6], Efren J. Domingo[1], Nancy Marie S. Gamo[1], Delfin A. Tan[8†]

[1]Department of Obstetrics and Gynecology, Philippine General Hospital, University of the Philippines, [4]Department of Obstetrics and Gynecology, University of Santo Tomas Hospital, Manila, [2]Department of Obstetrics and Gynecology, Rizal Medical Center, Pasig, [3]Department of Obstetrics and Gynecology, San Juan de Dios Hospital Educational Foundation Inc., Hospital, Pasay, [5]Department of Obstetrics and Gynecology, Chong Hua Hospital Mandaue, Cebu, [6]Department of Obstetrics and Gynecology, Mariano Marcos Memorial Hospital and Medical Center, Batac, [7]Department of Obstetrics and Gynecology, Southern Philippines Medical Center, Davao, [8]Department of Obstetrics and Gynecology, St. Luke's Medical Center, Quezon, Philippines

Address for correspondence:
Dr. Maria Antonia E. Habana, Department of Obstetrics and Gynecology, Philippine General Hospital, University of the Philippines, Taft Avenue, Ermita, Manila, Philippines.
E-mail: mehabana@up.edu.ph

Submitted: 06-Apr-2025
Revised: 20-May-2025
Accepted: 25-May-2025
Published: 26-Jun-2025

Abstract:

BACKGROUND: Intraoperative transfusion for gynecologic surgery, when appropriately used, can improve patient outcomes. However, when utilized incorrectly, blood transfusion can worsen patient outcomes and increase patient cost. This study aimed to evaluate the blood transfusion practices of tertiary hospitals in the Philippines.

METHODS: The study utilized a cross-sectional design wherein prospective data were gathered through multiple sources across seven tertiary-level hospitals. Women admitted to undergo gynecologic surgery were recruited based on a set of criteria. A chart review was conducted, and blood utilization indices were calculated. Outcomes were compared between public versus private facilities and transfused versus nontransfused patients.

RESULTS: Among 514 patients, 79.7% underwent cross-matching and 75.1% received transfusions. Adverse events were rare, with no transfusion-related deaths. The overall crossmatch-to-transfusion ratio (C/T ratio) was 2.8, exceeding the 2.5 optimal benchmark; all public hospitals recorded a C/T ratio >2.5, whereas private centers had more efficient usage. Six hospitals met acceptable benchmarks for transfusion probability and transfusion index. Open abdominal procedures, particularly hysterectomy, accounted for the most blood used. Transfused patients had longer operative times, greater blood loss, lower preoperative hemoglobin, and more frequently involved resident physicians in training. Public hospitals recorded higher cross-match and transfusion rates, greater resident physician participation, and broader use of general anesthesia.

CONCLUSION: Results of the study highlight the importance of monitoring blood transfusion parameters to optimize blood utilization. The observed differences between public and private institutions in the country highlight the urgent need for standardized and evidence-based practice to ensure efficient transfusion protocols nationwide.

Keywords:

Blood transfusion, elective gynecologic surgery, maximum surgical blood order schedules

Introduction

Blood transfusion during gynecological surgeries is used to correct anemia or replace intraoperative blood loss. It may also be used preemptively to raise hemoglobin levels prior to surgery or manage symptomatic anemia. However, transfusion practices have been seen to vary widely across countries, institutions, and even individual clinicians.[1] Previous studies have shown that traditional blood transfusion procedures are associated with poor patient outcomes due to adverse

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Habana MA, Quevedo MC, Tiu EO, Gamilla MC, Domingo MV, Abalos MV, *et al*. Blood transfusion in elective gynecological surgeries in the Philippines: A multicenter study. Philipp J Obstet Gynecol 2025;49:106-13.

transfusion reactions and increased patient costs.[2] Moreover, over-ordering of blood products often leads to waste, with elective and emergent surgical patients only utilizing less than half of ordered blood products.[3,4]

To address these concerns, the maximum surgical blood order schedules (MSBOSs) were developed to estimate actual blood products needed in specific types of procedures.[5] International efforts spurred by multiple researches on blood use have allowed for improvement of the MSBOS in respective institutions, as blood ordering protocols are ideally grounded on specific institutional practices and historical blood utilization of local blood banks.[6] A retrospective study in the Philippine General Hospital, a tertiary hospital and referral center, revealed a gradual increase in the ratio of cross-matched blood to transfused blood from 1.7 in 2016 to 2.1 in 2018.[7]

Since the manner of blood usage per institution differs, a multicenter study was necessary to evaluate blood transfusion practices and hopefully be able to implement a cohesive and responsive blood transfusion guide for obstetric and gynecological procedures. The present study plans to determine the blood transfusion practices on these procedures and this report will be limited to elective gynecological surgical cases performed among seven tertiary hospitals in the Philippines. The obstetrical cases will be reported separately.

Methods

Study design

This was a cross-sectional study wherein prospective data were gathered through multiple sources across seven tertiary-level hospitals. Study sites were chosen by inviting hospitals that catered to large populations or covered major areas within their provinces, as deemed by the authors. Patient demographics, preoperative and postoperative surgical blood parameters were obtained from admissions charts and laboratory results, while blood transfusion practices were collected from blood bank and intraoperative records. This study was approved by the Single Joint Research Ethics Board (SJREB-2021-96) of the Department of Health of the Philippines, as well as the local institutional review boards of each participating study site.

Participants

Participants of the current study included a sample of 514 adult (≥18 years of age) patients. Purposive sampling was performed, including all elective gynecologic admissions with planned surgical procedures who consented to include their data in the study. Sample size using OpenEpi.com was calculated based on the prevalence of blood transfusion among patients undergoing gynecologic surgery,[2] a level of significance $\alpha = 0.05$ and 80% statistical power of test. An additional 10% of the computed sample was added to account for missing and miscoded data. Sample size for each study site was determined proportionally to the local census of elective gynecological surgeries done in the year 2020.

Data collection

Relevant information was recorded for each patient through chart review which included the following: baseline demographic data (age, body mass index [BMI], gravidity parity score, manner of delivery of previous pregnancy), baseline hematologic parameters (baseline hemoglobin, hematocrit, platelet count, bleeding parameters), surgical related data (admitting diagnosis, surgical procedure done, intraoperative morbidities, estimated blood loss, operative time, surgeon's skill level, and postoperative diagnosis), blood transfusion-related data (number of blood requested to be prepared, number of donated blood, number of cross-matched blood, number of preoperative units transfused, number of intraoperative units transfused, number of postoperative units used), postoperative hematologic parameters (posttransfusion hemoglobin, hematocrit, platelet count), and reasons for transfusion and any transfusion related morbidities. All data were encoded through a secure cloud storage system in which study sites only had access to the data of participants who were enrolled in their site. Anonymity was maintained by removing identifiers from all recorded information, and a corresponding patient number was assigned to each individual patient.

A central team composed of the lead investigator and project assistant monitored data entry quality across all sites and prepared data for analysis. Only the site study team members and the central team have exclusive access to participant data. All data entry and changes to data were monitored and audited by the system to ensure accountability.

Data analysis

Descriptive statistics was used to analyze demographic data. The incidence of blood transfusion, crossmatch-to-transfusion ratio (C/T ratio), transfusion index (Ti), transfusion probability (Tp) were calculated. C/T ratio was calculated as the number of units cross-matched/number of units transfused. The Ti was calculated as the number of units transfused/number of patients crossmatched. The Tp was calculated as (Number of patients transfused/number of patients cross-matched) ×100.

The factors associated with transfusion were analyzed by a Chi-square test for categorical variables and Student's *t*-test for continuous variables. The prevalence of immediate transfusion reactions was determined through

simple proportions. Significant interactions between multiple independent variables were determined using multiple logistic regression, with transfusion status as the dependent variable. All analysis was done through STATA 14 IC (StataCorp, College Station, Texas, USA).

Results

Demographic characteristics of patients

The study included a total of 514 participants, 207 of which were from private tertiary hospitals, while 307 were from public tertiary hospitals. A summary of participant demographics can be seen in Table 1. Among the participants, 75.10% ($n = 386$) of participants required blood transfusion. A total of 764 units of blood were donated or made available for 404 patients scheduled for gynecologic surgery, with a mean of 1.49 per patient, median, and mode of 2.00 units each. Adverse events included a case of bilateral lower extremity edema ($n = 1$) and fever ($n = 2$), for a total adverse event rate of 0.78%. These events were managed accordingly, and there were no transfusion-related mortalities recorded.

Table 1: Demographic characteristics of participants

Demographic characteristics	Number of patients (%), mean±SD
Total	514 (100.00)
Age	45.21±13.41
BMI	25.76±4.41
Hospital	
Private hospital 1	94 (18.29)
Private hospital 2	45 (8.75)
Private hospital 3	68 (13.23)
Government hospital 1	67 (13.04)
Government hospital 2	116 (22.57)
Government hospital 3	83 (16.15)
Government hospital 4	41 (7.98)
Gravidity	
0	145 (28.21)
1	84 (16.34)
2	74 (14.40)
3	95 (18.48)
≥4	116 (22.57)
Parity	
0	161 (31.32)
1	89 (17.32)
2	86 (16.73)
3	92 (17.90)
≥4	86 (16.73)
Type of previous surgery	
Abdominal	100 (19.46)
Reproductive tract	57 (11.09)
Others	17 (3.31)
No previous surgeries	340 (66.15)
Transfusion	
With blood transfusion	386 (75.10)
Without blood transfusion	128 (24.90)

SD: Standard deviation, BMI: Body mass index

Procedural and operative characteristics among different hospitals

The study provides a comprehensive analysis of the procedural and operative characteristics among gynecological patients across various hospitals, as detailed in Table 2. In addition, significant differences in preoperative hematocrit and postoperative hematocrit were observed between patients treated at private versus public hospitals [Table 3]. Using multinomial logistic regression, there were no significant associations between any of the variables and transfusion status among the gynecological cases.

Blood utilization indices

Blood utilization indices for gynecological procedures were calculated. The rate of crossmatching was high for gynecological procedures, with 79.7% ($n = 315/514$) of cases requiring crossmatching. Blood utilization indices were evaluated separately for private and public hospitals. All public hospitals had C/T ratios of >2.5, reflective of inefficient blood usage among gynecological procedures, whereas private hospitals maintained the C/T ratio within the recommended limits. Overall, the crossmatching ratio for major hospitals in the Philippines (C/T = 2.8) slightly exceeded the standard value of 2.5. The transfusion probabilities (patients transfused/patients crossmatched ×100) of six out of seven hospitals were consistently ≥30%, implying appropriate blood requesting and significant blood usage. The transfusion indices (average number of units used per patient crossmatched) of six out of the seven hospitals were >0.5, indicating significant blood utilization and efficient blood usage. Blood transfusion parameters among study sites are summarized in Tables 4 and 5.

Use of blood transfusion factors

Among the participants, no significant differences were observed in age, BMI, and previous history of surgical procedures between transfused and nontransfused patients, as shown in Figure 1. On the other hand, there was a significant difference in skill levels of the surgeon between the two groups. Specifically, a larger proportion of transfused patients were operated on by resident physician trainees. Moreover, operative time and blood loss were significantly higher in transfused patients (201.7 ± 76.93 min; 739.1 ± 544.7 mL) compared to nontransfused patients (141.6 ± 70.34 min; 279.7 ± 219.5 mL). In addition, preoperative hemoglobin levels were lower in transfused patients (103.6 ± 35.05) compared to nontransfused patients (118.2 ± 29.90). Preoperative hematocrit and platelet levels were also found to be significantly different between the two groups of patients.

Table 2: Characteristics of gynecological procedures among different study sites

Procedure	Government hospital 1			Government hospital 2			Government hospital 3			Government hospital 4		
	Count	Overall percentage across all groups	Overall hospital-based (%)	Count	Overall percentage across all groups	Overall hospital-based (%)	Count	Overall percentage across all groups	Overall hospital-based (%)	Count	Overall percentage across all groups	Overall hospital-based (%)
Final procedure												
Abdominal surgery	58	11.3	86.6	90	17.5	77.6	51	9.9	61.4	34	6.6	82.9
Vaginal surgery	6	1.2	9.0	4	0.8	3.4	3	0.6	3.6	5	1.0	12.2
Laparoscopic surgery	1	0.2	1.5	10	1.9	8.6	17	3.3	20.5	0	0.0	0.0
Hysteroscopic surgery	2	0.4	3.0	12	2.3	10.3	12	2.3	14.5	2	0.4	4.9
Anesthesia												
Other anesthesia	44	8.6	65.7	75	14.6	64.7	38	7.4	45.8	32	6.2	78.0
Regional anesthesia	16	3.1	23.9	24	4.7	20.7	15	2.9	18.1	7	1.4	17.1
General anesthesia	7	1.4	10.4	17	3.3	14.7	30	5.8	36.1	2	0.4	4.9
Surgeon level												
Resident I/II	2	0.4	3.0	1	0.2	0.9	1	0.2	1.2	0	0.0	0.0
Resident III/IV	37	7.2	55.2	96	18.7	82.8	24	4.7	28.9	34	6.6	82.9
Consultant	28	5.4	41.8	19	3.7	16.4	58	11.3	69.9	7	1.4	17.1
Surgical morbidity												
No morbidity	56	10.9	83.6	110	21.4	94.8	79	15.4	95.2	41	8.0	100.0
With morbidity	11	2.1	16.4	6	1.2	5.2	4	0.8	4.8	0	0.0	0.0

Rate of blood use in gynecological procedures

Among gynecological procedures, those performed abdominally demonstrated higher rates of blood utilization compared to those not requiring abdominal incision (minimally invasive, vaginal procedures). Hysterectomies, specifically, exhibited a high rate of blood use, ranging from 0.48 to 0.68 units per patient, whereas myomectomy and adnexal surgery procedures had lower rates of 0.29 and 0.22 units per patient, respectively. In gynecological procedures performed vaginally, curettage showed a blood utilization rate of 0.25 units per patient, whereas vaginal hysterectomy with or without adnexal surgery had no blood utilization. For the laparoscopic approach, both total laparoscopic hysterectomy with adnexal surgery and laparoscopic adnexal surgery had blood use rates of 0.13 units/patient. Laparoscopic myomectomy and total laparoscopic hysterectomy had no blood utilization. Finally, in hysteroscopic procedures, myomectomy demonstrated a blood utilization rate of 0.29 units/patient, whereas polypectomy had no blood utilization. Both diagnostic laparoscopy and hysteroscopy had no blood utilization.

Effect of anemia on blood parameters

The impact of anemia status on operative parameters was evaluated in transfused patients. Among transfused gynecological patients, there was a notable disparity in operative times based on anemia status ($P < 0.018$). Specifically, operative time was found to be higher for normal/mildly anemic patients compared to severely anemic patients. However, no significant differences in operative times were detected between moderately and severely anemic patients. Furthermore, there was no statistically significant difference in blood loss depending on anemia status among gynecological participants ($P = 0.142$).

Public and private hospitals

Comparing public hospitals to private hospitals, there was a significantly higher incidence of cross-matched patients ($P < 0.05$; 49.2% vs. 33.1%, respectively), transfused patients ($P < 0.05$; 17.7% vs. 7.2%, respectively), and patients who had no prior history of surgical operations ($P < 0.05$; 43.8% vs. 22.4%) among patients admitted at public hospitals. Intraoperatively, regional anesthesia was more frequently used in private hospitals ($P < 0.05$; 14.2% vs. 12.1% in public hospitals), while other modes of anesthesia were more utilized in public hospitals ($P < 0.05$; 36.8% vs. 17.5% in private hospitals). Senior resident physicians in training operated more frequently in public hospitals ($P < 0.05$; 37.2% vs. 13.8% in private hospitals), whereas consultants performed surgeries more frequently in private hospitals ($P < 0.05$; 26.3% vs. 21.8% in public hospitals).

Table 3: Operative parameters of the gynecological procedures among study sites

Operative parameters	Private hospital 1, mean±SD	Private hospital 2, mean±SD	Private hospital 3, mean±SD	Government hospital 1, mean±SD	Government hospital 2, mean±SD	Government hospital 3, mean±SD	Government hospital 4, mean±SD
Operative time	126.00±78.00	138.00±83.00	198.00±71.00	157.00±79.00	156.00±57.00	190.00±84.00	112.00±30.00
Blood loss	196.00±278.00	371.00±594.00	612.00±522.00	339.00±251.00	436.00±280.00	440.00±408.00	400.00±190.00
Preoperative hemoglobin	122.51±23.56	103.50±28.73	121.26±17.77	123.06±15.77	115.45±22.740	122.6±16.05	124.61±8.23
Preoperative hematocrit	37.26±6.34	33.59±8.66	37.19±5.22	37.52±3.96	34.84±6.34	36.96±4.27	32.63±4.19
Preoperative platelet	303.98±115.77	360.60±134.20	331.46±105.46	336.67±95.37	330.57±105.10	315.59±79.99	297.24±57.01
Postoperative hemoglobin	112.98±17.45	108.36±15.56	109.71±9.08	106.43±12.22	108.87±17.84	107.13±21.11	112.93±9.17
Postoperative hematocrit	34.80±3.50	34.84±5.30	33.08±2.29	34.30±3.61	33.76±5.85	31.35±10.36	27.23±3.69
Postoperative platelet	298.89±77.27	328.22±119.80	284.08±62.42	316.63±67.96	266.59±82.86	285.89±85.06	299.66±39.63

SD: Standard deviation

Table 4: Summary of transfusion parameters

	Private hospital 1		Private hospital 2		Private hospital 3		Government hospital 1		Government hospital 2		Government hospital 3		Government hospital 4	
	Count	Overall (%)	Count	Overall (%)	Count	Overall (%)	Count	Overall (%)	Count	Overall (%)	Count	Overall (%)	Count	Overall (%)
Cross match status														
Cross matched	20	3.90	15	2.90	29	5.60	63	12.30	96	18.70	53	10.30	41	8.00
Transfusion status														
Not transfused	85	16.5	35	6.8	50	9.7	46	8.9	70	13.6	65	12.6	35	6.8
Transfused	9	1.8	10	1.9	18	3.5	21	4.1	46	8.9	18	3.5	6	1.2
Tp (<30%)														
Patients transfused/patients crossmatched ×100		45		67		62		33		48		34		15
Philippines total (%)								40						

Tp: Transfusion probability

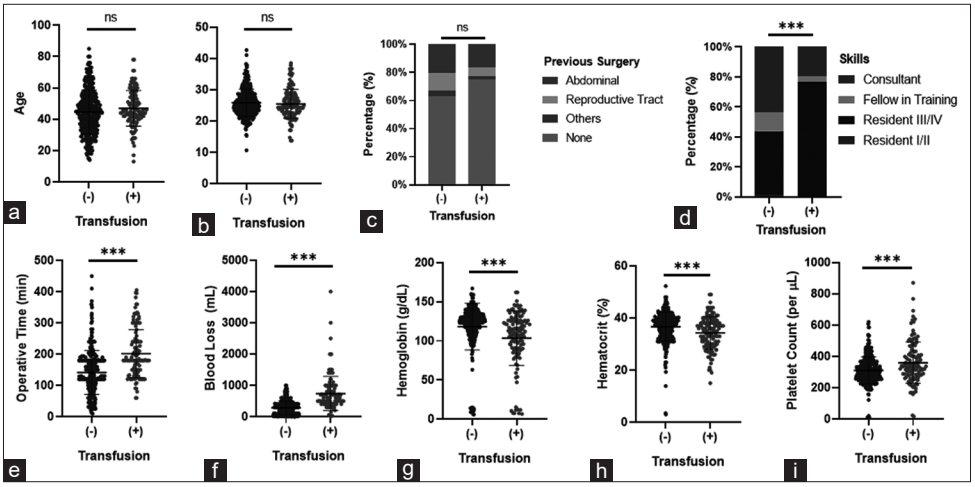

Figure 1: Factors affecting the use of blood transfusion in gynecological patients. Transfused and non-transfused patients were compared in terms of clinical characteristics, including (a) Age, (b) Body mass index, and (c) History of previous surgeries; surgical-related factors including (d) Surgeon skill level, (e) Operative time and (f) Blood loss; and hematologic parameters including preoperative (g) Hemoglobin levels, (h) Hematocrit and (i) Platelet count. ns: not significant; **P* < 0.05; ***P* < 0.01; ****P* < 0.001

Discussion

Over the years, various studies have delved into the risk of blood transfusions during different gynecologic procedures. The likelihood of needing a blood transfusion varies across gynecological procedures, from as low as 0.01% for operative hysteroscopy, between 2% and 5% for operative laparoscopy, from 0.3% to 11% for hysterectomy, around 21% for myomectomy, and even reaching up to 78% for cytoreductive surgery.[1] A previous British study reported a crossmatch rate of 28% for hysterectomy and a transfusion rate spanning from 2.8% to 8.6%.[2] In a prospective study conducted in Thailand, only 11.5% of patients undergoing elective gynecologic surgery required a blood transfusion. Among these patients, 19.5% of those undergoing

Table 5: Summary of transfusion parameters (continuation)

	Private hospital 1		Private hospital 2		Private hospital 3		Government hospital 1		Government hospital 2		Government hospital 3		Government hospital 4	
	Count	Overall	Count	Overall	Count	Overall	Count	Overall	Count	Overall	Count	Overall	Count	Overall
Blood units prepared	94	27	45	39	68	45	67	112	116	199	83	123	41	86
Blood units transfused	94	14	45	32	68	31	67	30	116	76	83	29	41	13
CT ratio (<2.5)		1.9		1.2		1.5		3.7		2.6		4.2		6.6
Number of units crossmatched														
Number of units transfused														
Philippines total		2.8												
Ti (<0.5)		0.7		2.1		1.1		0.5		0.8		0.5		0.3
Average number of units used per patients crossmatched														
Philippines total								0.7						

Ti: Transfusion index, CT: Crossmatch-to-transfusion

oncologic procedures needed transfusions, whereas only 8.6% of hysterectomy cases, with or without adnexal surgery, required transfusions.[3] A recent local study in a government tertiary hospital reported increased C/T ratio, T% and TI values for elective gynecologic procedures, comparable to other developing countries.[6] In this study, less than a third of the specific surgical populations were transfused – 23.5% of myomectomies, 10.8% of operative laparoscopies, 6.06% of operative hysteroscopies, and 32.3% of hysterectomies.

In this study, the calculated C/T ratio was 5.1 for packed red blood cell (pRBC), 7.6 for fresh frozen plasma (FFP), and 19.7 for platelet concentrates (PCs), all above the ideal target of <2.5; whereas the calculated transfusion indices (pRBCs 0.57, FFPs 0.44, and PCs 0.017) and transfusion probabilities (pRBCs 28.1%, FFPs 10.4%, and PCs 4.2%) were within the ideal targets of <0.50 and <30%, respectively.[4] Consistent with other studies, we report in this study that public hospitals had higher C/T ratios, suggesting that excessive crossmatching of blood products with minimal transfusion may be occurring in these hospitals. Blood utilization indices showed efficient blood use overall, but the crossmatching ratio in gynecological procedures slightly exceeded the standard value, suggesting room for improvement.

To ensure uniformity in forthcoming gynecological procedures, surgeons may consider adopting the computed MSBOS approach.[8] This involves multiplying obtained transfusion indices by 1.5 to determine the MSBOS, which is a set of elective procedures with corresponding number of blood units routinely crossmatched preoperatively. This method can serve as a valuable guideline for managing expected blood losses during surgery, both during the operation and in the postoperative phase. In addition, it can help set more realistic expectations for blood product donations from potential donors to benefit their intended recipients. Optimizing preoperative anemia management can reduce the need for transfusion, as higher preoperative hemoglobin levels are associated with lower transfusion rates. Since preoperative anemia is an independent risk factor for poorer outcomes, efforts should focus on minimizing preoperative bleeding and maximizing iron supplementation. Restrictive blood transfusion practices should likewise be continued. Nevertheless, it is essential to note that subjective judgment remains relevant for these cases, as surgeons must always make decisions based on their clinical expertise. Policies that necessitate the preparation of blood products for surgical admissions are not yet in place, but the findings in this study may be of help in ascertaining which procedures would benefit from preemptive blood crossmatching and standby.

Among gynecological procedures, those performed abdominally demonstrated higher rates of blood utilization compared to those not requiring abdominal incision (minimally invasive, vaginal procedures). Hysterectomies, specifically, exhibited a high rate of blood use, ranging from 0.48 to 0.68 units/patient, while myomectomy and adnexal surgery procedures had lower rates of 0.29 and 0.22 units/patient, respectively. In gynecological procedures performed vaginally, curettage showed a blood utilization rate of 0.25 units/patient, whereas vaginal hysterectomy with or without adnexal surgery had no blood use. For laparoscopic approaches, both total laparoscopic hysterectomy with adnexal surgery and laparoscopic adnexal surgery had blood use rates of 0.13 units per patient. Laparoscopic myomectomy and total laparoscopic hysterectomy had no blood utilization. Finally, in hysteroscopic procedures, myomectomy demonstrated a blood utilization rate of 0.29 units/patient, whereas polypectomy had no blood use. Both diagnostic laparoscopy and hysteroscopy had no blood utilization. As previously noted, abdominal procedures

tend to utilize more blood units compared to other surgeries; therefore, appropriate allowances should be considered for these surgeries when reserving blood. In contrast, procedures with low blood utilization may be better managed through intraoperative blood requests rather than as a routine preoperative requirement, depending on the intraoperative course.

Several studies have explored and emphasized the importance of patient and surgeon perception of blood transfusion, and difference in demographic groups influence blood transfusion practices.[9] A study by Marcucci *et al*. determined that the risk associated with pRBC transfusion differs significantly between countries with a low human development index (HDI) and a high HDI, an index based on life expectancy, literacy, education, and per capita income.[10] Countries with low HDI have an increased risk for infection during surgery and transfusion, while countries with high HDI have an increased risk for immunological reactions posttransfusion.

In this study, further analysis of the patient and physician profiles admitted at private and public hospitals may be warranted to fully understand the discrepancy in blood transfusion practices. The Philippine healthcare system is shared between public and private facilities.[11] Data suggest, however, that utilization of public facilities is influenced by geographical barriers, socioeconomic status and PhilHealth coverage. Patients confined in public hospitals are observed to use out-of-pocket payments coming from salary, income, loan, savings, or donation, whereas patients in private institutions utilize both out-of-pocket payments from salary and income together with insurance reimbursement (e.g., health maintenance organizations).[12]

Conclusion

This multicenter study provides a comprehensive overview of the current transfusion practices among gynecological elective surgeries in the Philippines. The findings reveal notable disparities in blood utilization patterns, crossmatching efficiency, and operative factors among institutions. While the overall transfusion indices and probabilities suggest generally appropriate use of blood products, the elevated C/T ratios–particularly in public hospitals–indicate potential inefficiencies and opportunities for better resource management. Other factors, such as training, blood availability, and financing, may play a role in shaping transfusion practices. These warrant further investigation to guide policy interventions and promote equitable and efficient care delivery.

This study supports the development of data-driven transfusion guidelines to provide evidence-based decision-making in clinical settings and improve transfusion practices in the Philippines.

Acknowledgments

We would like to acknowledge the following who assisted in data collection for the study sites: Drs. Margaret Loreen M. Bernal, Charmaine Gem G. De la Merced (San Juan de Dios Medical Center), Drs. Princess Anne D. Esposado-Briones, Clarissa Lea R. Lucas, Kamille Lika Mari G. Arellano-Macalisang, Denise B. Barlis (Southern Philippines Medical Center), Dr. Nicole Marie Eleanor S. Turaray (Rizal Medical Center), Dr. Raphael Santos, Regine Santiano (University of Santo Tomas Hospital), Drs. James Verniel Novo, Jasmin Iris Pogoy, Sheba Rae Reotro (Chong Hua Hospital Mandaue), and Dr. Gloreen Mae Retuerne-Camagon (Mariano Marcos Memorial Hospital and Medical Center). We also acknowledge Ms. Ailyn Francisco for her administrative assistance, and Mr. Carlos Diego Rozul for assisting in data management.

Authorship contributions

Maria Antonia E. Habana MD, MSc - Conceptualization, Methodology, Validation, Formal Analysis, Resources, Data curation, Writing – Original Draft, Review & Editing, Visualization, Supervision, Funding Acquisition.

Ma. Carmen H. Quevedo MD - Conceptualization, Methodology, Resources, Writing - Original Draft, Review & Editing, Supervision, Funding Acquisition.

Elisa O. Tiu MD MD - Conceptualization, Methodology, Resources, Writing - Original Draft, Review & Editing, Supervision.

Corazon Zaida N. Gamilla MD - Conceptualization, Methodology, Resources , Writing - Original Draft, Review & Editing, Supervision.

Madonna Victoria C. Domingo MD - Conceptualization, Methodology, Validation, Formal Analysis, Resources, Writing -Original Draft, Review & Editing, Visualization, Supervision, Funding Acquisition.

Maria Virginia S. Abalos MD - Conceptualization, Methodology, Resources, Writing - Original Draft, Review & Editing, Supervision.

Maria Lourdes K. Otayza MD - Conceptualization, Methodology, Resources , Writing -Original Draft, Review & Editing, Supervision.

Amelia A. Vega MD - Conceptualization, Methodology, Resources , Writing -Original Draft, Review & Editing, Supervision.

Lynnette R. Lu-Lasala MD - Conceptualization, Methodology, Resources , Writing -Original Draft, Review & Editing, Supervision.

Czarina Juliana L. Alcaraz - Conceptualization, Methodology, Resources , Writing -Original Draft, Review & Editing, Supervision.

Efren J. Domingo MD - Conceptualization, Methodology, Writing - -Original Draft, Review & Editing.

Nancy Marie S. Gamo MD - Conceptualization, Methodology, Validation, Formal Analysis, Resources, Data curation, Writing – Original Draft, Review & Editing, Visualization.

Delfin A. Tan MD † - Conceptualization, Methodology, Writing - Original Draft, Review & Editing.

Financial support and sponsorship

This study received funding from the POGS Unified Research Agenda (PURA) Grant and the PGH Faculty Grant.

Conflicts of interest

There are no conflicts of interest.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author, MAH.

References

1. World Health Organization (2001). The Clinical Use of Blood: Blood Transfusion Safety Team Handbook. Available from: https://apps.who.int/iris/handle/10665/42396. [Last accessed on 2024 Feb 10].
2. Chawla T, Kakepoto GN, Khan MA. An audit of blood cross-match ordering practices at the Aga Khan University Hospital: First step towards a Maximum Surgical Blood Ordering Schedule. J Pak Med Assoc 2001;51:251-4.
3. Sowayan SA. Use of blood in elective surgery: An area of wasted hospital resource. Ann Saudi Med 1994;14:326-8.
4. Boriboonhirunsarn D, Chaopothong P, Jirasawas T. Blood transfusion in elective abdominal gynecologic surgery. J Gynecologic Surg 2017;33:231-5.
5. Friedman BA. An analysis of surgical blood use in United States hospitals with application to the maximum surgical blood order schedule. Transfusion 1979;19:268-78.
6. Frank SM, Rothschild JA, Masear CG, Rivers RJ, Merritt WT, Savage WJ, *et al.* Optimizing preoperative blood ordering with data acquired from an anesthesia information management system. Anesthesiology 2013;118:1286-97.
7. Gamo NM, Habana MA. Rational blood transfusion in elective gynecologic and obstetrical surgeries in a tertiary hospital in the Philippines. Philipp J Obstet Gynecol; 2021;45:179-88.
8. Friedman BA, Oberman HA, Chadwick AR, Kingdon KI. The maximum surgical blood order schedule and surgical blood use in the United States. Transfusion 1976;16:380-7.
9. Vetter TR, Adhami LF, Porterfield JR Jr., Marques MB. Perceptions about blood transfusion: A survey of surgical patients and their anesthesiologists and surgeons. Anesth Analg 2014;118:1301-8.
10. Marcucci C, Madjdpour C, Spahn DR. Allogeneic blood transfusions: Benefit, risks and clinical indications in countries with a low or high human development index. Br Med Bull 2004;70:15-28.
11. Lavado RF, Ulep VG, Fernandez L. How are government hospitals performing? A study of resource management in DOH-retained hospitals. Philipp Inst Dev Stud 2010; Discussion Paper Series No. 2010-02. Available from: https://pidswebs.pids.gov.ph/CDN/PUBLICATIONS/pidsdps1002.pdf. [Last accessed on 2025 Apr 05].
12. Uy J, Nuevo CE, Casas L, Ulep VG. The financial health of select Philippine hospitals and the role of the Philippine Health Insurance Corporation as the national strategic purchaser of health services, PIDS Discussion Paper Series. Philippine Institute for Development Studies (PIDS), Quezon City; 2021. Available https://www.econstor.eu/bitstream/10419/256871/1/pidsdps2136.pdf, [Last accessed on 2025 Apr 05].