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ORIGINAL ARTICLE

Blood transfusion in patients having caesarean section: a prospective multicentre observational study of practice in three Pakistan hospitals

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ABSTRACT

Background: Increasing awareness of the risks of blood transfusion has prompted examination of red cell transfusion practice in obstetrics. A six-month prospective observational study was performed to examine blood transfusion practices in patients undergoing caesarean delivery at three hospitals in Pakistan.

Methods: In the three hospitals (two private, one public) 3438 caesarean deliveries were performed in the study period. Data were collected on patient demographics, indications for transfusion, ordering physicians, consent, associations with obstetric factors, estimated allowable blood loss, calculated blood loss, pre- and post-transfusion haemoglobin and discharge haemoglobin.

Results: A total number of 397 (11.5%) patients who underwent caesarean section received a blood transfusion. The highest transfusion rate of 16% was recorded in the public tertiary care hospital compared to 5% in the two private hospitals. Emergency caesarean delivery and multiparity were associated with blood transfusion ($P < 0.05$). More emergency caesarean sections were performed in the public compared to the private hospitals (85.4% vs. 41.6%). More multiparous patients underwent caesarean section in the public hospital (57.8% vs. 40.4%). Attending physicians took the decision for transfusion in 98% of cases. In 343 (86%) patients, blood transfusion was given even when the haemoglobin was >7 g/dL. The method for documenting the indication or consent for transfusion was not found in any of the three hospitals.

Conclusion: Blood transfusion was prescribed more readily in the public hospital. Identification of a transfusion trigger and the development of institutional guidelines to reduce unnecessary transfusion are required.

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Keywords: Caesarean section; Red cell transfusion; Blood transfusion practices; Public sector hospitals; Private sector hospitals

Introduction

Caesarean section (CS) is one of the most commonly performed procedures worldwide.¹ Review of contemporary series has indicated that 3–5% of all blood transfusions are related to obstetrics, with a higher rate in CS patients compared to those undergoing normal vaginal delivery (1–7% vs. 1%).^{2,3} The potential risk associated with blood transfusion has led to increased scrutiny of its use by health care providers,⁴ which has resulted in a downward trend in the rate of transfusion. Blood transfusion for CS has decreased to 1.1–1.6% in some

centres but remains higher (5.2–6.8%) in others.^{5,6} Existing data are largely based on retrospective analyses from developed countries.^{7,8} A small retrospective study on 126 patients undergoing CS at a university hospital in Karachi found a transfusion rate of 15%.⁹ Variability of patient population, technical skills and financial resources between institutions suggest that the study is unlikely to reflect general trends in Pakistan.

We performed a prospective multicentre observational study of practice at three institutions in Pakistan to determine: (1) the prevalence of blood transfusion at each institution; (2) the indication for blood transfusion; (3) baseline and discharge haemoglobin concentrations in patients receiving a blood transfusion; and (4) which physicians, and their level of seniority, ordered the blood transfusion.

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Methods

After obtaining institutional review board approval from each hospital, a prospective observational study was performed on patients undergoing CS from January to June, 2010 at three separate centres. All patients undergoing emergency and elective CS during the study period were included. The three centres were from two cities in Pakistan. The Aga Khan University Hospital (AKUH) in Karachi is a private tertiary care university hospital with 4–5000 deliveries per year. The Civil Hospital Karachi (CHK) is a public tertiary care university hospital with 10–12 000 deliveries per year. The Shalimar Institute of Medical Sciences (SIMS) in Lahore is a private university hospital, with 2–3000 deliveries per year.

A pre-piloted data form was used to collect information on demographics, location of transfusion, ordering physician, consent, association of obstetric disease with transfusion, estimated allowable blood loss, calculated blood loss, related laboratory data and indications for blood transfusion. Pre-specified reasons for transfusion were recorded as low haemoglobin (Hb), symptoms of anaemia (tiredness, dizziness, shortness of breath) and on-going blood loss. “Surgeon preference” was also included if blood loss was anticipated and transfusion was requested.

Allowable Blood Loss (ABL) was calculated by:¹⁰

$$\frac{\text{EBV} \times (\text{H}_i - \text{H}_f)}{\text{H}_i}$$

H_i = initial Hct (Baseline Hct).

H_f = final lowest acceptable Hct.

EBV (estimated blood volume) = weight (kg) × average blood volume.

The average blood volume of a full term pregnant patient was assumed to be 70 mL/kg, and final lowest acceptable (H_f) was 24%.

Baseline Hb and Hct were recorded at the time of admission for either elective or emergency CS. This baseline Hct value was used in the formula to calculate ABL. In addition pre- and post-transfusion and pre-discharge Hb values were recorded.

Statistical analysis

Statistical analysis was performed using Statistical Packages for Social Science V19 (SPSS Inc., Chicago, IL, USA). Quantitative data are presented as mean ± standard deviation (SD), median [IQR] and analysed with analysis of variance (ANOVA). Qualitative data are presented as frequency and percentage, and analysed by chi-square test and simple logistic regression; *P* < 0.05 was considered significant. The primary outcome was the number of patients receiving a blood transfusion; others were explanatory variables. The CS rate and prevalence of blood transfusion were calculated. Data extracted from AKUH, SIMS and CHK were analysed with respect to the other hospitals.

Results

During the six-month study period the total number of deliveries in the three centres was 9281: 3438 (37%) were by CS. There were 2497 deliveries at AKUH of which 974 (39%) were by CS. At SIMS there were 1046 deliveries with 513 (49%) CS and at CHK 5738 patients were delivered, 1951 (34%) by CS. Blood transfusions were given to 397 (11.4%) patients (AKUH *n* = 49, 5.0%; SIMS *n* = 27, 5.3%; CHK *n* = 321, 16.5%).

Patient characteristics and the use of blood transfusion in those women who underwent CS are summarised in [Table 1](#). At CHK women who received blood were significantly older, weighed less, were shorter in height and of a lesser gestational age than those not transfused. At AKUH, mean gestation was significantly less in those transfused.

In all hospitals transfusion was more likely with increasing American Society of Anesthesiologists (ASA) status. At CHK transfusion was 1.6 times more likely with ASA II [OR = 1.54, 95%CI 1.07–9.43] and ASA III [OR = 1.6, 95%CI 1.01–2.71] as compared to ASA I. At SIMS transfusion was 3.9 times more likely with ASA II [OR = 3.9, 95%CI 1.63–9.43] and at AKUH over 20 times more likely with ASA IV as compared to ASA I.

Of patients undergoing CS in the three centres, 1729 (50.3%) were multiparous: CHK had the highest proportion of multiparous patients (CHK *n* = 1128/1951, 57.8%; AKUH *n* = 345/974, 35.4%; SIMS *n* = 256/513, 49.9%). At CHK, transfusion was more likely in multiparous compared to nulliparous women (OR = 1.79, 95% CI 1.38–2.32), although the rate of transfusion was not statistically significant between nulliparous and multiparous parturients at AKUH and SIMS.

Of the 3428 CS, 2284 (66.4%) were performed as emergencies. The percentage of emergency procedures varied between hospitals (AKUH *n* = 500/974, 51.3%; SIMS *n* = 118/513, 23%; and CHK 1666/1951, 85.4%). At CHK transfusion was 1.5 times more likely in emergency CS [OR = 1.5, 95%CI 1.01–2.15] compared to elective surgery.

Associations between transfusion and obstetric factors are shown in [Table 2](#). In all three centres there was a significant association between transfusion and placental abruption and placenta praevia. However, multiple gestation was associated with transfusion only at AKU and CHK. An association with preeclampsia was noticed only at AKU. In SIMS, patients undergoing primary CS were less likely to receive a blood transfusion than those with a history of previous CS.

Indications for transfusion are shown in [Table 3](#). The most common indication was low Hb followed by on-going blood loss. Blood was transfused either preoperatively on the ward, intraoperatively in the operating room (OR), postoperatively in the recovery room

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