

# A clinical audit of the management of postpartum haemorrhage in Malawi

E Kongnyuy, N Broek

## Citation

E Kongnyuy, N Broek. *A clinical audit of the management of postpartum haemorrhage in Malawi*. The Internet Journal of Gynecology and Obstetrics. 2007 Volume 9 Number 2.

## Abstract

**Objective:** To assess and improve the management of postpartum haemorrhage in maternity units in Malawi.

**Methods:** A criterion based audit was conducted in 8 hospitals in three districts in Malawi. A retrospective review of 40 case notes was conducted and the results compared with standards for postpartum haemorrhage, established based on evidence the World Health Organisation manuals. Results of the audit were presented, recommendations made and implemented. A re-audit (45 case notes) was conducted 3 months later.

**Results:** There was a significant improvement in three standards: typing and cross-match carried out ( $p = 0.034$ ), patient's hematocrit or haemoglobin established ( $p = 0.029$ ), and fluid intake/output chart maintained ( $p < 0.001$ ). There was a trend towards an improvement in the close monitoring of vital signs (32.5% vs 53.3%) and a trend towards a decrease in case fatality rate (10.0% vs 6.7%). There was no significant change in two standards in which 100% attainment was achieved during the first audit: intravenous access achieved and intravenous fluids administered (100.0% vs 97.8%), and oxytocic drugs administered (100.0% vs 95.6%).

**Conclusion:** Criterion based audit can improve the management of postpartum haemorrhage in countries with limited resources.

## INTRODUCTION

The World Health Organisation (WHO) defines postpartum haemorrhage (PPH) as vaginal bleeding in excess of 500ml after childbirth [1]. Globally, PPH occurs in 10.5% of live births [2]. It is the leading cause of maternal mortality worldwide (25%) and a major contributor of maternal deaths in Africa (33.9%) [3,4]. Factors associated with PPH include increasing maternal age, primiparity, foetal macroomia, multiple pregnancies, fibroids, antepartum haemorrhage, history of PPH, previous Caesarean section, prolonged labour, and episiotomy [5,6]. However, none of these factors has an adequate positive predictive value for a good screening tool. Therefore, experts recommend that all women should benefit from active management of the third stage of labour, the only intervention known to prevent PPH [1]. Active management of the third stage of labour reduces the incidence of PPH by one third, and therefore a significant proportion of women will proceed to develop PPH despite this active management [7]. Skilled birth attendants must therefore be conversant with proper

management of PPH.

In Malawi, 43% of women give birth outside health facilities [8], implying that these women do not have access to timely and quality emergency obstetric care. When PPH occurs outside the health facilities, a significant proportion of women will die before arrival to the health facility. If they are fortunate to arrive to a health facility they are usually in a state of shock with very low blood pressure, weak and fast pulse, cold and clammy skin, rapid breathing, anxious or confused, and sometimes unconscious. Many women will go into shock with moderate bleeding because the baseline haemoglobin is usually low [9]. Therefore in health facilities, birth attendants should take extra care and respond rapidly to any signs of moderate to excessive bleeding or shock following childbirth. A confidential enquiry into institutional maternal death in Malawi revealed that obstetric haemorrhage is the cause of 26.7% of maternal deaths that occur within 24 hours of admission and identified poor quality of care as a major contributing factor [10]. This

enquiry recommended the use of criterion based audit to improve the quality of emergency obstetric care in Malawi.

We sought to assess and improve the management of postpartum haemorrhage in Malawi by introducing criterion based audit in three districts.

## METHODS

### STUDY SETTING

We conducted the criterion based audit as part of an international collaborative programme to improve quality of maternity care and reduce maternal mortality and morbidity in the three districts (Lilongwe, Kasungu and Salima) in the Central Region of Malawi. The population of the three districts is estimated at 2,812,183 and there are about 127,000 deliveries per year of which only 40% take place in the health facilities [11]. Eight hospitals participated in the study (4 mission hospitals, 2 district hospitals, 1 government community hospital and 1 tertiary referral hospital).

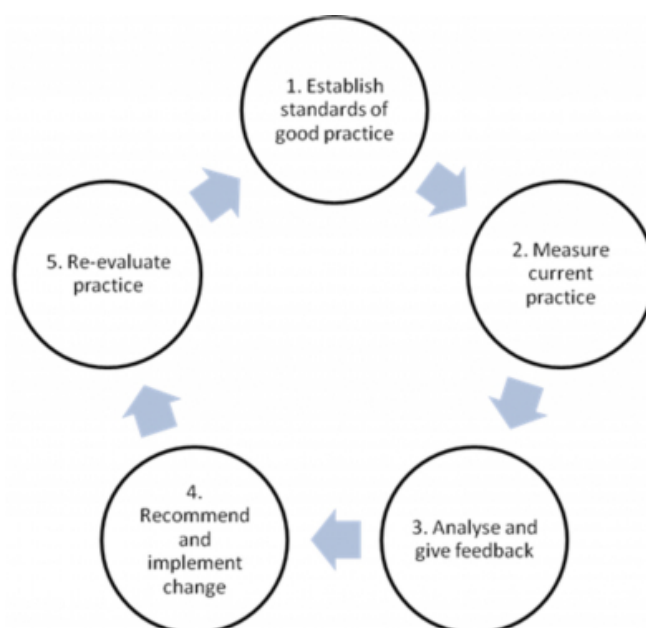
Maternity care is free in all government health facilities in Malawi, but private and mission facilities charge user fees which limit access to their services. These hospitals receive obstetric emergencies from 60 health centres and numerous traditional birth attendants. Each hospital has at least one ambulance, but each ambulance serves several health centres implying that it is almost impossible to handle several emergencies simultaneously. Each health centre has a shortwave radio that links the health centre to a hospital, but only about half of the radios are actually functioning. Other challenges include insufficient staff, shortages of medication and supplies, and poor quality of maternity care.

### CLINICAL AUDIT CYCLE

The classic steps of a clinical audit cycle were followed in this study (Figure 1). The first audit was conducted in May and June 2007 and the second audit in October and November 2007. In-between the two audits, we allowed a period of three months to implement the changes.

**Figure 1**

Figure 1: Clinical audit cycle



### STEP 1: ESTABLISHMENT OF STANDARDS FOR POSTPARTUM HAEMORRHAGE

We used evidence from existing guidelines, namely Malawi national guidelines and WHO manuals [12,13]. Where necessary this was supplemented by evidence from the Cochrane database, standard textbooks and articles from peer-reviewed journals. A multidisciplinary team (including maternal health experts and policy makers) established local standards for obstructed labour, during a workshop that brought participants from the three districts. At the end of this two day workshop, the participants agreed on 10 objectives and developed the structure, process and outcome criteria for each objective. The initial list of 205 criteria was reduced to a shorter list of 6 criteria by identifying the most important criteria for the management of PPH. Postpartum haemorrhage was defined as showed in Table 1. The six criteria for the management of PPH are presented in Table 2.

**Figure 2**

Table 1: Working definition of postpartum haemorrhage

Essential features	Additional features
<ul style="list-style-type: none"> <li>Bleeding from genital tract within 24 hours of delivery</li> <li>Gestational age <math>\geq 24</math> weeks</li> </ul>	At least one of the following <ul style="list-style-type: none"> <li>Perceived blood loss of more than 500ml</li> <li>Signs of shock (pulse <math>&gt;110</math>/min and systolic blood pressure <math>&lt;90</math>mmHg)</li> </ul>

**Figure 3**

Table 2: Standards for the management of postpartum haemorrhage

1. Intravenous line (IV) should be set up and IV fluids (crystalloids or colloids) given continuously until cross-match blood is available
2. Typing and cross-match is done
3. Patient's haemoglobin or hematocrit is established
4. Vital signs (pulse and blood pressure) are monitored at least half hourly for 2 hours
5. A fluid intake/output chart (IV fluid and urine output) is maintained
6. Oxytocic drugs are administered

## STEP 2: MEASUREMENT OF CURRENT PRACTICE

Current practice was measured by a retrospective review of case notes. A multidisciplinary quality improvement team (made up of nurses, midwives, laboratory technicians, clinical officers, and doctors) was established in each hospital. The teams reviewed the cases of PPH in May and June 2007 and extracted the data into a data collection sheet. Forty cases of PPH were reviewed in the 8 hospitals.

## STEP 3: ANALYSIS OF FINDINGS AND FEEDBACK

The percentage of attainment of each standard was calculated and the results presented during a quality improvement workshop that brought together representatives from the 8 hospitals.

## STEP 4: RECOMMENDATION AND IMPLEMENTATION OF CHANGE

The gaps between current level of care and standards were discussed during the quality improvement workshop (see step 3). Most recommendations made were common to all hospitals, although a few recommendations were specific to some hospitals. When the participants returned to their hospitals, they briefed the rest of the staff and management about the gaps identified and the recommendations made during the workshop. The staff and management then worked jointly to implement the recommendations. The recommendations made and implemented are presented in Table 3.

## STEP 5: A RE-AUDIT OF STANDARDS TO ASSESS PROGRESS

Three months later after the first audit, a second audit was performed to assess the progress made. Forty five case notes were reviewed during this second audit.

**Figure 4**

Table 3: Recommendations made and implemented after the initial audit

<i>Recommendations made and implemented</i>
1. When setting up and intravenous line in patients with postpartum haemorrhage (PPH), blood should be collected for haemoglobin or hematocrit
2. Typing and cross-match should be done routinely in all patients with PPH
3. Sufficient blood is made available in blood banks in all hospitals. Hospitals took the commitment to predict properly and order blood in a timely manner from the Malawi Blood Transfusion Service, which collects bloods centrally, store and distribute to hospitals across the country.
4. Oxytocic drugs be administered routinely (or repeated if it has been given before) in all patients with PPH
5. A fluid intake/output chart is maintained in all patients with PPH
6. Workshops to improve the technical skills and foster positive behaviours of staff with respect to data recording in maternity registers and completeness of case notes
7. Strengthen the referral system by repairing non-functioning shortwave radios in health facilities across the districts
8. Maternity staff be trained in life saving skills – emergency obstetric care, especially on the diagnosis and management of hypovolemic shock
9. Standards for the management of postpartum haemorrhage should be displayed permanently in the labour and maternity wards
10. Commitment to proper stock inventory (good predictions, and timely ordering of drugs and supplies from the Central Drug Store) to prevent frequent shortages of drugs and supplies
11. Proper supervision and follow-up of traditional birth attendants (TBA) by TBA coordinators
12. Review work schedules and make sure staff are available especially at night to handle emergencies quickly and properly
<i>Further actions taken by individual hospitals</i>
1. Kasungu District Hospital positioned health surveillance assistants at the entrance of the hospital to receive all labouring women with or without obstetric emergencies and guide them to the labour ward in order to reduce institutional delay in starting treatment
2. Nkhoma Hospital (a mission hospital) developed a new maternity register that was user-friendly and captures data that was missing from the old register
3. Measures were taken to strengthen infection prevention in Kasungu District Hospital, Salima District Hospital and Kamuzu Central Hospital
<i>Recommendation made but was not implemented</i>
1. Number of qualified staff in maternity units should be increased

## STATISTICAL ANALYSES

It was estimated that a minimum sample size of 37 was required for a power of 80% to detect a 30% increase (that is from 17% to 47%) in standard attainment between the first and second audits with 95% confidence interval. The 17% baseline value was obtained when a pilot assessment showed that 17% (2/12) of women with PPH were properly managed according to standards in the Kamuzu Central Hospital in Lilongwe.

Statistical analyses were performed with the SPSS version 15.0 for Windows. Categorical variables were compared by Chi-square test (or Fischer's exact test if a cell had an expected frequency <5) and continuous variables were compared using Student's t-test (or Mann Whitney U test if the distribution was skewed). All significance tests were two-tailed.

## RESULTS

### BASELINE CHARACTERISTICS

The mean age was 25 years in the initial audit and 24 years in the re-audit, but there was no statistically significant difference in age between the audits ( $p = 0.646$ ) (Table 4). Similarly, median parity and percentage of primiparous women were similar in the two audits. There was no significant change in perinatal mortality ( $p = 1.000$ ). However, there was a trend towards a decrease in case

fatality rate (10.0% vs 6.7%).

**Figure 5**

Table 4: Baseline characteristics

Characteristic	Initial audit (n = 40)	Re-audit (n = 45)	p-value
Mean age in years (SD)	25(6)	24(6)	0.464
Median parity (range)	3(1-9)	3(1-10)	0.384
Primiparity (%)	17.5	20.0	0.684
Perinatal mortality (%)	5.0	4.4	1.000
Case fatality rate (%)	10.0	6.7	0.702

Perinatal mortality = stillbirths + early neonatal deaths

Case fatality rate = proportion of women with PPH who die

## AUDIT RESULTS

When the first audit was performed, wide gaps were identified between current practice and four standards: typing and cross-match carried out (65.0%), patients' haemoglobin or hematocrit carried out (67.5%), vital signs monitored closely (32.5%), and fluid intake/output chart set up (0.0%). Two standards were attained in 100% of cases: intravenous (IV) access and continuous administration of IV fluid until cross-match blood was available, and administration of oxytocic drugs.

When the second audit was conducted, there was a significant improvement in three standards: typing and cross-match carried out ( $p = 0.034$ ), patient's hematocrit or haemoglobin established ( $p = 0.029$ ), and fluid intake/output chart maintained ( $p < 0.001$ ). There was a trend towards an improvement in the close monitoring of vital signs (32.5% vs 53.3%). There was no significant change in two standards in which attainment was 100% during the first audit: IV line set up and IV fluids given (100.0% vs 97.8%), and oxytocic drugs administered (100.0% vs 95.6%).

**Figure 6**

Table 5: Attainment of standards in the first and second audits

Criteria	Initial audit (n = 40)	Re-audit (n = 45)	OR(95% CI)	p-value
IV set up and IV fluids given until cross-matched blood is available	40 (100.0%)	44(97.8%)	0.00(0.00-21.38)	0.735
Typing and cross-match of blood done	26 (65.0%)	38(84.4%)	2.92(1.03-8.61)	0.034
Patient's hematocrit or haemoglobin	27 (67.5%)	39(86.7%)	3.13(1.05-9.82)	0.029
Vital signs monitored closely at least half hourly for 2 hours	13(32.5%)	24(53.3%)	2.37(0.97-5.88)	0.065
Fluid intake/output chart (IV fluid and urine output) maintained	0(0.0%)	15(33.3%)	infinity(5.45-infinity)	<0.001
Oxytocic drugs administered	40(100.0%)	43(95.6%)	0.00(0.00-3.89)	0.357

## DISCUSSION

This study describes the use of criterion based audit to assess and improve the management of PPH in Malawi. There were significant improvements in some aspects of PPH management, namely typing and cross-match, carrying out patient's hematocrit or haemoglobin, maintaining fluid intake/output chart and a trend towards an improvement in the monitoring of vital signs. However, there was no significant change in the administration of IV fluids and oxytocic drugs, because almost all women with PPH in both audits receive IV fluids and oxytocic drugs.

Before the introduction of criterion based audit in the three districts, typing and cross-match, establishing of patient's haemoglobin or hematocrit, close monitoring of vital signs and maintaining a fluid intake/output chart were not carried out routinely in all patients with PPH. They were only done at the discretion of the clinical officer or doctor taking care of the patient. Although many cases of PPH treated in hospitals occur after hospital delivery, some are referred from health centres or from traditional birth attendants. Referred cases often arrive the hospital in a state of shock and many did not recover from the shock. The introduction of criterion based audit helped standardise and improve the management of PPH in the three districts.

Criterion based audit has just recently been introduced in developing countries [14,15,16]. Earlier studies assessed the feasibility of criterion based audit maternity units in Uganda [14], and Ghana and Jamaica [15,16]. Similar to findings from previous studies, we found that criterion based audit was feasible in resource-limited countries. However, the way we established standards for PPH differed from traditional method described by other authors [14,15,16]. Traditionally, standards have been developed by a panel of experts and implemented by a multidisciplinary team. In obstetrics, this panel of experts is usually made up of obstetricians, while midwives only get involved during the implementation phase. We involved midwives from the very process of developing standards and this promoted ownership and sustainability among the health care providers. We equally involved policymakers and managers from the early stages of criterion based audit and this facilitated organisational changes, release of finances and resources, and approval where necessary to help implement the changes recommended by the audit.

We encountered some challenges in the process of introducing criterion based audit in Malawi. These

challenges included shortage of staff, difficulty changing old practice, inadequate knowledge and skills to manage emergency obstetric complications, poor documentation, and lack of resources. Fortunately, all these challenges except shortage of staff were overcome by the very process of criterion based audit. Three months between the initial audit and the re-audit was too short for us to expect a significant change in staffing level. However, criterion based audit helped improve documentation especially cases notes and maternity registers, and devised ways of introducing new practice without making the providers feel threatened [17]. Quality improvement is generally believed to be a very expensive process. Fortunately, criterion based audit is an inexpensive tool. Therefore, using criterion based audit we were able to implement effective and locally appropriate recommendations using very few resources. The knowledge and skills of providers were improved by delivering a three day life saving skills – emergency obstetric care course designed and delivered by the Royal College of Obstetrics and Gynaecology International Office [18]. Two courses have been delivered in two districts (Kasungu and Salima), while another course is planned for the third district (Lilongwe). Comparing knowledge before and after the course, we found a significant improvement in knowledge on the management of obstetric emergency complications including PPH.

In conclusion, criterion based audit can improve the management of PPH countries with limited resources. We suggest that standards with 100% level of attainment during the initial audit should be re-audited because a drop in this level could be picked up by the re-audit.

## **References**

1. World Health Organisation. Managing complications of pregnancy and childbirth: a guide for midwives and doctors. Geneva: WHO, 2003.
2. Dolea C, AbouZahr C, Stein C. Global burden of maternal haemorrhage in the year 2000. Geneva: Evidence and Information for Policy, World Health Organisation, 2003.
3. World Health Organisation. The World Health Report: make every mother and child count. Geneva: WHO, 2005.
4. Khan KS, Wojdyla D, Say L, Gülmezoglu AM, Van Look PF. WHO analysis of causes of maternal death: a systematic review. *Lancet*. 2006; 367(9516): 1066-74
5. Selo-Ojeme DO, Okonofua FE. Risk factors for primary postpartum haemorrhage. A case control study. *Archives of Gynaecology & Obstetrics* 1997; 259(4):179-87.
6. B-Lynch C, Keith LG, Lalonde AB, Karoshi M (eds). *A Textbook of Postpartum Haemorrhage: a comprehensive guide to evaluation, management and surgical intervention*. Kirkmahoe, UK: Sapiens Publishing, 2006.
7. Mahajan NN, Mahajan KN, Soni RN. Reducing postpartum hemorrhage in Vietnam: assessing the effectiveness of active management of third-stage labor. *J Obstet Gynaecol Res* 2006;32(5):489-96.
8. National Statistical Office (Malawi), ORC Macro. 2004 Malawi Demographic and Health Survey, Calverton: ORC Macro, Maryland, 2005.
9. van den Broek NR, Rogerson SJ, Mhango CG, Kambala B, White SA, Molyneux ME. Anaemia in pregnancy in southern Malawi: prevalence and risk factors. *BJOG*. 2000;107(4):445-51.
10. Ratsma YE. Why more mothers die: confidential enquiry into institutional maternal deaths in the Southern region of Malawi. Blantyre, Malawi: National Safemotherhood Project, 2001.
11. Hofman J, Kongnyuy EJ, van den Broek N. Baseline survey of maternal and neonatal health care in three districts (Lilongwe, Kasungu and Salima) in Malawi. Lilongwe, Malawi: The Health Foundation Consortium, 2006.
12. Ministry of Health and Population (Malawi), JHPIEGO. *Malawi National Reproductive Health Services Delivery Guidelines*. Lilongwe: Ministry of Health and Population, Malawi, 2001
13. World Health Organisation. Integrated Management of Pregnancy and Childbirth series (IMPAC). Geneva: WHO, 2005, (retrieved April 20, 2007) [http://www.euro.who.int/pregnancy/esscare/20051103\\_3?language=german](http://www.euro.who.int/pregnancy/esscare/20051103_3?language=german)
14. Weeks AD, Alia G, Ononge S, Mutungi A, Otolorin EO, Mirembe FM. Introducing criteria based audit into Ugandan maternity units. *BMJ* 2003;327:1329-1331.
15. Graham W, Wagaarachchi P, Penney G, McCaw-Binns A, Antwi KY, Hall MH. Criteria for clinical audit of the quality of hospital-based obstetric care in developing countries. *Bull World Health Organ*. 2000;78(5):614-20.
16. Wagaarachchi PT, Graham WJ, Penney GC, McCaw-Binns A, Yeboah Antwi K, Hall MH. Holding up a mirror: changing obstetric practice through criterion-based clinical audit in developing countries. *Int J Gynaecol Obstet*. 2001 Aug;74(2):119-30; discussion 131.
17. Lewison H. Power at local level. *Mod Midwife*. 1994;4(11):14-6.
18. Grady K. RCOG International Office Educational Initiatives. *RCOG International Newsletter* 2007; 1: 22-26

**Author Information**

**Eugene J Kongnyuy, MD, MPH**

Child and Reproductive Health Group, Liverpool School of Tropical Medicine

**Nynke van den Broek, FRCOG, PhD**

Child and Reproductive Health Group, Liverpool School of Tropical Medicine