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### Delay in safe motherhood

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## Chapter 5

# **Implementing safe motherhood: A low-cost intervention to improve the management of eclampsia in a referral hospital in Malawi**

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## **Abstract**

We evaluated the effect of so-called monitoring and treatment charts on the management of eclampsia in a referral hospital in Malawi. Baseline characteristics, clinical management, as well as overall maternal and perinatal outcome were compared by reviewing the medical files of two groups, before and after introduction of the charts in 2006.

The use of the charts has resulted in improved monitoring of women with eclampsia and may have contributed to the reduction in planned prelabour caesarean section rate from 87% to 33%, as more women underwent induction of labour after stabilisation ( $P = 0.020$ ). Overall maternal and perinatal outcomes were similar.

## Introduction

“She who is living between life and death” is the exact translation of the phrase that describes a pregnant woman in Malawi, illustrating the risk a woman faces when she becomes pregnant. In Malawi the maternal mortality ratio remains high at around 1000 maternal deaths per 100,000 live births.<sup>1</sup> Causes are well known and include haemorrhage, infection, abortion, obstructed labour and hypertensive disorders. Most of these deaths are preventable with timely and appropriate treatment. To reach the fifth Millennium Development Goal, reducing maternal mortality by two thirds between 1990 and 2015, efforts should now focus on implementation of effective safe motherhood interventions on the ground.<sup>2</sup>

In Africa 9.1% (3.9-21.9) of all maternal deaths are caused by hypertensive diseases of pregnancy.<sup>3</sup> Audit results in South Africa as well as in the UK demonstrate that factors resulting in substandard care clearly play a major role. Auditors call for the introduction of management guidelines for pre-eclampsia and eclampsia.<sup>4</sup> However, the implementation of guidelines is difficult and will not automatically lead to a change in practice of healthcare workers. Barriers to change may occur at different levels; within the organization of care, within the hospital culture or within the individual health professional. A comprehensive approach combining interventions at different levels might offer the best results.<sup>5</sup>

Bwaila Hospital Maternity (BHM) in Lilongwe, Malawi serves as the district and referral maternity unit for the entire central region with a catchment population of four million people. The annual delivery rate is approximately 12 000, with over 150 admissions on any given day. The medical personnel comprise two medical specialists, a registrar and four clinical officers. Four nurses provide 24-hour coverage of the labour ward. To improve the care for women with eclampsia, management guidelines based on the World Health Organisation (WHO) guidelines were introduced in 2004.<sup>6</sup> The major impetus for doing so was that routine treatment was often found to be suboptimal. Women with eclampsia were, as a rule, rushed to the operating theatre to undergo an emergency caesarean section without being properly stabilised. However, two years following the introduction of the treatment guidelines, cases of suboptimal care remained, indicating that a protocol adherence tool such as the one now described, was needed. We came to this conclusion by means of daily clinical experience and observation of care provided.

This report describes and evaluates a low-cost intervention, the introduction of monitoring and treatment charts, aimed at improving quality of care for women with eclampsia in a referral hospital. The adequacy of clinical monitoring and

management, as well as the overall maternal and perinatal outcomes of eclamptic women, before and after the introduction of such charts were compared.

## Methods

In 2004, management guidelines for eclampsia were introduced that recommended intravenous access, intravenous and intramuscular magnesium sulphate, maintenance of airway and breathing and monitoring of vital signs, reflexes, diuresis and fetal condition. For diastolic blood pressure >110 mmHg, hydralazine was recommended to achieve pressures of 90–100 mmHg. Delivery was effected within 12 hours of the onset of convulsions. After two years, adherence to the management guidelines appeared to be insufficient.

To improve the implementation of the guidelines, simple and comprehensive eclampsia monitoring and treatment charts were introduced in 2006. (appendix 1) These charts were designed based on patient monitoring standards and the WHO guidelines for treatment of eclampsia.<sup>6</sup> The design focused on simplicity, accuracy and efficiency in charting. Items were included based on observations that specific guideline components were either not followed correctly or not effectively documented. The monitoring chart contains a description of the Glasgow Coma Scale as well as space for documentation of vital signs, patellar reflexes, Glasgow Coma Scale score, any intravenous fluids given, urine output and urine protein. The treatment chart contains the clinical protocol in sequenced steps as well as space for documenting medication and blood pressure during administration of medication. At all stages of its design, input from nursing staff was sought and staff approval for the final charts was obtained. Introduction of these simple charts did not require much 'on the job' training of staff and was supported by reminders during daily ward rounds. Cost was limited to the price of printing the forms.

The primary aim of this observational study was to evaluate guideline adherence before and after introduction of the charts. For this we used indicators to identify how many women were properly monitored and treated according to the standard guidelines. A secondary aim was to elucidate whether introduction of the charts influenced maternal and perinatal outcome. Data were collected through retrospective chart review. The pre-intervention (no-charts) cohort included all women with eclampsia admitted in the year 2005. We did not include 2004 and 2006 because we felt these were transition periods. The post-intervention (charts) cohort included all women with eclampsia admitted in 2007. All women were identified by reviewing the admission book and the labour ward report book, as well as the postnatal ward report book. In addition, maternal mortality records were reviewed to ensure that no maternal deaths related to hypertensive disease were missed. Eclampsia was defined as tonic-clonic

convulsions, with diastolic blood pressure  $\geq 90$  mmHg after 20 weeks of gestation and proteinuria  $\geq 1+$ . Baseline characteristics, clinical management and outcome for mother and child were recorded.

Statistical analysis was done using SPSS 11.5. For continuous variables, the two sample t-test was used. For discrete variables, the  $X^2$  test was used. The significance level was set at  $P < 0.05$ .

## Results

Characteristics of the study population as well as management and outcome characteristics are summarized in Table 1 and 2. We identified 89 women in the no-charts and 75 in the charts group. The hospital records were missing for 32% of these women, so these women were excluded from the study, leaving 56 and 55 women in the no-charts and charts cohort, respectively. Both groups were comparable for age, parity, gestational age at presentation and antenatal care attendance. One twin pregnancy occurred in each group.

**Table 1** Comparison of characteristics in pre-intervention and posts-intervention cohort

Characteristics	2005 cohort		2007 cohort		P-value
	no-charts		charts		
	n = 56		n = 55		
	mean	range	mean	range	
Age (years)	21	15-32	21	15-39	0.639
Parity (median)	0	0-6	0	0-4	0.331
Gestational age (weeks)	35	20-40	36	27-40	0.140
Admission systolic BP (mmHg)	158	100-230	151	120-200	0.172
Admission diastolic BP (mmHg)	105	60-140	102	80-140	0.400
	n	%	n	%	
Primigravida	42	75	43	78	0.823
Attended antenatal care at least once	17	30	26	47	0.179
Onset of convulsions					
<i>antepartum</i>	23	41	15	27	0.065
<i>intrapartum</i>	21	38	34	62	
<i>postpartum</i>	11	20	6	11	
<i>unknown</i>	1	2	0	0	

**Table 2** Comparison of management indicators in pre-intervention and posts-intervention cohort

Management Indicators	2005 cohort		2007 cohort		P-value
	no-charts		charts		
	n = 56		n = 55		
	n	%	n	%	
Treatment chart used	NA		50	91	
Observation chart used	NA		37	67	
MgSO4 administered	55	98	55	100	0.319
Correct loading dosage MgSO4	28	51	54	98	
<i>not documented</i>	22	40	1	2	0.000
Correct maintenance dosage MgSO4	40	74	52	95	
<i>not documented</i>	13	24	3	5	0.012
Correct duration of MgSO4	11	20	28	51	
<i>too short</i>	39	70	26	47	
<i>not documented</i>	4	7	0	0	0.005
Correct interval of MgSO4	28	50	29	53	
< 4 hourly	18	32	25	45	
> 4 hourly	1	2	0	0	
<i>not documented</i>	9	16	1	2	0.036
Hydralazine administered	49	87	45	82	0.796
Correct dosage hydralazine	48	98	45	100	0.335
BP measured ≥ 4 times/day	44	79	51	93	0.092
Urine output measurement	32	57	48	87	0.002
Urine protein tested	11	20	32	58	0.000
Patellar reflexes checked	9	16	44	80	0.000
Glasgow coma scale calculated	0	0	31	56	0.000
Induction of labour	3	6	11	20	0.020
Primary Caesarean Section*	20	87	5	33	0.001
<i>Due to eclampsia</i>	18	90	5	100	
<i>Due to cephalopelvic disproportion</i>	1	5	0	0	
<i>due to unknown reason</i>	1	5	0	0	

P values significant at P<0.05.

\*In women who developed eclampsia antepartum.

We found a significant improvement in the treatment of eclampsia, as demonstrated by the percentage of women who received the correct magnesium sulphate loading and maintenance dose, with the correct duration and treatment interval.

Blood pressure treatment with hydralazine was already up to the desired standard prior to introduction of the charts and did not improve further.

Before introduction of the monitoring chart, blood pressure was already correctly monitored in 79% of women. Monitoring of urine output, urine protein, patellar reflexes and Glasgow Coma Scale all improved. More women underwent successful induction of labour in the charts cohort instead of a planned caesarean section before the onset of labour ( $P = 0.001$ ).

Following introduction of the charts, the number of admission days decreased significantly from 8 to 6 days ( $P = 0.012$ ). No statistically significant differences were found in birth weight, APGAR score, or overall perinatal and maternal outcome. There were no cases of magnesium sulphate intoxication reported in either group. In the no-chart group one mother died after being referred for eclampsia during labour at 34 weeks gestation. She died some time after a vaginal birth from unknown causes.

## Discussion

Introduction of structured monitoring and treatment charts for women with eclampsia in our low-resource setting has resulted in significant improvement in guideline adherence. We also observed a significant reduction in the rate of planned caesarean section before the onset of labour in women with eclampsia. Reducing the caesarean section rate may reduce mortality in a setting where the chances of dying as a result of a caesarean section is about 1/150. Avoiding a caesarean section will benefit women in subsequent pregnancies because a uterine scar is associated with an increased risk for uterine rupture, abnormal placentation and other maternal and neonatal morbidities.<sup>7,8</sup> However it is unlikely that the observed reduction in caesarean section can be ascribed to the introduction of the charts alone. We also believe that heightened awareness about the management guidelines accounted for the changes observed.

The treatment charts were designed with the goal of not only increasing adherence to the protocol but also decreasing errors and improving documentation. The format of the charts was clearly laid out according to the treatment guidelines. For this reason, there was no confusion concerning documentation, the route and dosage of medication and the timing of delivery. The monitoring charts were designed so that all the aspects of monitoring were located on the sheet, providing a reminder of what parameters needed to be checked, observed and documented on each woman. This left no room for excuses for non-adherence or cutting corners in patient care. The design integrated the protocol guidelines and the observation chart, making the protocol a routine working tool. Reasons for non-adherence to guidelines and suboptimal patient care are not completely clear, but contributing factors may include ignorance, lack of conviction about the need for monitoring or the heavy workload.



The design of this study has limitations. There is no control group and one third of the patient files could not be retrieved due to poor hospital filing systems. However, missing files were evenly distributed between both groups and we have no reason to believe there were differences between missing charts and those that were available. Whether improvements in the indicators reflected an actual change in behaviour or merely in documentation cannot be ascertained. The effect of introducing monitoring and treatment charts on lowering caesarean section rates cannot be derived from our study and several confounding factors may still be at play.

We believe the charts encouraged the adherence to the guidelines in the following ways. They served as a reminders, with the charts indicating what clinical parameters should be recorded and what treatment should be given. Furthermore, they raised awareness of the importance of monitoring and guided the communication between doctors and nurses on treatment plans. The charts also facilitated efficient supervision and feedback and were constant reminders of the necessity to follow and use the prescribed guidelines.

The scope of this report is limited to one component of maternal health care-- care of women with diagnosed eclampsia within a referral hospital. Efforts to reduce maternal mortality within a population cannot be limited to a hospital setting alone. The organisation of maternity services, proper diagnosis of hypertensive disease of pregnancy, early referral and treatment as well as the continued presence of senior clinicians are of utmost importance to reduce the number of women who develop eclampsia. The last caution is that this study took place in a hospital with a high caseload of eclamptic patients. On average, almost two patients per week were seen. In most hospitals, in resource-rich countries, eclampsia is a relatively rare event and healthcare staff have limited exposure to this problem. It is unclear whether the effect we found of the use of monitoring and treatment charts can be extrapolated to those situations.

Our findings at Bwaila Hospital Maternity indicate that successful introduction of management guidelines for the treatment of severe pre-eclampsia and eclampsia is facilitated and supported by the use of simple and comprehensive monitoring and treatment charts. Whether our findings will translate to other countries or to hospitals of different size and/or patient acuity is unclear. Ideally, the benefit of the monitoring and treatment charts should be further evaluated in a cluster randomized trial; however, these trials are expensive and difficult to conduct in low resource settings.

In conclusion, the use of standardized monitoring and treatment charts to support the introduction of management guidelines has resulted in improved monitoring of women with eclampsia. It is a successful example of a practice improvement in

a low-resource, high-patient-load environment that, importantly, may also have contributed to a reduction in planned caesarean delivery rate.

## Reference list

1. National Statistical Office (NSO) Malawi, ORC Macro. Malawi Demographic and Health Survey 2004. 2005. Calverton, Maryland, NSO and ORC Macro.
2. Freedman LP, Graham WJ, Brazier E, Smith JM, Ensor T, Fauveau V et al. Practical lessons from global safe motherhood initiatives: time for a new focus on implementation. *Lancet* 2007; 370(9595):1383-1391.
3. Khan KS, Wojdyla D, Say L, Gulmezoglu AM, Van Look PF. WHO analysis of causes of maternal death: a systematic review. *Lancet* 2006; 367(9516):1066-1074.
4. Moodley J. Hypertensive emergencies in pregnancies in underresourced countries. *Curr Opin Obstet Gynecol* 2008; 20(2):91-95.
5. Grol R, Grimshaw J. From best evidence to best practice: effective implementation of change in patients' care. *Lancet* 2003; 362(9391):1225-1230.
6. World Health Organization. Integrated management of pregnancy and childbirth. Managing complications in pregnancy and childbirth: a guide for midwives and doctors. Geneva: World Health Organization; 2003.
7. Galyean AM, Lagrew DC, Bush MC, Kurtzman JT. Previous cesarean section and the risk of postpartum maternal complications and adverse neonatal outcomes in future pregnancies. *J Perinatol*. 2009 Nov;29(11):726-30. Epub 2009 Jul 23.
8. Zwart JJ, Richters JM, Ory F, de Vries JI, Bloemenkamp KW, van Roosmalen J. Uterine rupture in The Netherlands: a nationwide population-based cohort study. *BJOG: An International Journal of Obstetrics & Gynaecology*. 116(8):1069-78; discussion 1078-80, 2009 Jul.



