ORIGINAL ARTICLE

Clinical Experience with Management of "Near-Miss" Cases in Obstetrics

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Summary

Near -miss cases in life-threatening obstetric patients occurring over a one year period are analysed retrospectively with regards to morbidity measured in terms of hospital stay, utilisation of high dependency ward and intensive care beds and adequacy of clinical management. One-hundred and twenty two cases occurred among 9932 deliveries. Massive obstetric haemorrhage (54.2%) and hypertensive disorders of pregnancy (36.9%) were the two main diagnostic groups. Seventy one (58.2%) cases were referred from peripheral centres for obstetric management and 77 (63.1%) were not booked at this hospital for antenatal care. A majority were not ill-looking (92 cases) at the time of admission but turned for the worse in the course of labour. Interventional measures taken in clinical management were considered appropriate in all cases. Delay in instituting treatment was present in 6 cases. Remediable measures were recognised in 15 (12.3%). This study, apart from supplementing mortality audits, demonstrates that high risk obstetric patients can be triaged at the time of admission to labour wards by trained midwives and junior doctors in busy obstetric units without compromising standards of care.

Key Words: Near miss, Pregnancy, Morbidity, Clinical management

Introduction

Enquries into maternal deaths have been an indispensable audit tool used world-wide to reduce maternal deaths. Such enquries have been in vogue in Malaysia since 1948 and five national reports have been published by the Ministry of Health since 1991. Recommendations and strategies have been developed using a national quality assurance approach. Obstetric units in major public hospitals remain the main referral centres for the care of high risk pregnancies. Whilst they are equipped with supportive services like blood banks, laboratories and operating theatres, the services of highly trained personnel like obstetricians are limited by the increasing demands of a heavy workload. The stratified approach to obstetric care in utilising staff midwives and medical officers in managing high risk obstetric problems in consultation with resident obstetricians appear to be an effective approach. Whilst deaths are finite events, obstetric morbidity studies present several problems in identification of measurable outcomes, drawing clear definitions and evaluating management of patients in keeping with good clinical practice. ***'Near-Miss Cases (NMC)'*** in pregnancy have been defined as an acute clinical illness in pregnancy which threatens the mother's life if immediate treatment is not administered[1]. The aim of this study was to use this practical definition to describe a cohort of obstetric patients in Ipoh hospital who fulfilled this broad definition and to evaluate the process of care in determining the extent of the problem and the factors which led to averting maternal deaths.

Materials and Methods

The Obstetric and Gynaecologic Unit in Ipoh Hospital runs a combined service with the maternity wing being located on a separate premise away from the tower block of the main hospital. There is a labour suite and operating theatre within the latter but intensive care ward (ICU) and the blood bank are located in the tower block presenting logistic problems when the latter's services are urgently required. In 1996 there were 10 maternal deaths, of which 6 occurred among patients who were referred to the hospital for further care. A total of 9,933 deliveries were conducted for the year; 55% of whom had one or more risk factors. All patients who desired to deliver in the hospital, whether booked or unbooked in the hospital, were received by attending staff midwives and resident doctors (inclusive of house officers, trainees in O&G and specialists). Specialists were often called in to see ill patients on a priority basis using clinical guidelines and protocols established in the department since 1990[2].

The general objective of this study was to determine the number of NMC among hospital obstetric population and to evaluate morbidity in terms of level of care given by health personnel *(i.e. staff midwives, house officers, trainee medical officers and gynaecologist)*, length of hospital stay, utilisation of intensive care (ICU) and high dependency ward (HDU) beds and also the utilisation of blood and blood products. The maternity delivery book was scanned to identify cases to be studied. Pregnant women who had complicated pregnancies and admitted to Ipoh Hospital between 01.01.1996 to 31.12.1996 were studied retrospectively by retrieving their case notes. Patients fulfilling the study criteria using the definition of NMC described were then categorised under three diagnostic subgroups according to obstetric complications:

i) severe hypertensive disorders of pregnancy
ii) massive obstetric haemorrhage
iii) Life-threatening medical disorders of pregnancy

Severe hypertensive disorders were defined using the objective parameters of WHO (1987) and the International Society for the Study of Hypertension (1988)[3]. Massive obstetric haemorrhage was defined as blood loss exceeding 1,500mls or when the systolic blood pressure fell below 80mmHg causing clinical deterioration warranting resuscitative measures including blood and blood component transfusion. Blood transfusion protocols were in accordance with the Consensus Statement of the National Blood Transfusion Services[4].

Life threatening medical disorders in pregnancy included cardiovascular complications resulting from vascular heart disease, congenital heart disease, primary pulmonary hypertension and peripartal cardiomyopathy. Perioperative complications like aspiration pneumonia, cerebral hypoxia due to anaesthetic complications, metabolic disorders including diabetic keto-acidosis and severe bronchial asthma; all of whom either needed ventilatory support in ICU or HDU care, were categorised under medical disorders.

Chronic systemic illness not directly related to the index pregnancy or when the clinical disorder did not contribute to deterioration of the patient were excluded from the study.

The level of care received at time of initial contact was assessed by scrutinising the personnel involved on initial contact and details of clinical management documented in patients medical records. A patient was considered well-looking if she did not have any need form of urgent therapy in the presence of some obstetric risk factor. She was considered stable but ill-looking if her vital signs were stable but warranted therapy and immediate referral to a medical officer or specialist. She was ill-looking and moribund if she was admitted with unstable vital signs, was hypotensive and warranted immediate therapy and intervention. The 'red alert' was initiated in the latter. Documentation of the presence of the anaesthetist and obstetrician in the labour ward implied the 'red alert' had been sounded[5].

The status of the patient with regards to her general condition and the quality of the level of care rendered being appropriate or otherwise was arrived in consultation with the head of the department with one other specialist and the head of the nursing division in the department who constituted the panel assisting the authors. An arbitrary time interval of one hour was considered acceptable before the patient was reviewed by at least a medical officer, in patients who had been assessed by staff midwives and thought to be well.

Those patients who were ill-looking (both with stable and unstable vital signs) were expected to be reviewed by a medical officer or specialist on admission to the labour ward without delay. The inherent bias in this evaluation was realised. Initial assessment was usually done by the staff-midwife or house-officer, except when prior telephone contact was made by referring health personnel on the transfer of an ill-looking patient to be received directly by the specialist gynaecologist. The *'red alert'* code[5] was initiated in obstetric emergencies to provide best care available in the unit.

The denominator used to calculate NMC ratio was the total number of deliveries in Ipoh Hospital in 1996. Quality of care rendered was derived after discussions held with the panel of health personnel mentioned above, in keeping with accepted standards of good clinical practice. Remediable clinical factors were identified if patient care was thought to have fallen below the standard considered as appropriate.

All data was collected manually using predetermined protocols and analysed using SPSS Statistical software.

Results

There were a total of 122 cases fulfilling the criteria for NMC, giving a ratio of 12.3 per 1000 deliveries. There were 10 maternal deaths during the study period of which 6 did not have antenatal care in this hospital. Four of the latter were orang asli women from the peripheral health centres. Two of these came with postpartum haemorrhage, and another two died of complications of sepsis. The categorisation of NMC is shown in Table I. Massive obstetric haemorrhage was the leading cause (67/122).

i) Dermographic Distribution

When the study population was analysed, maternal age ranged from 19 - 47 years with a mean of 31 ± 6 years.

Table I
Categorisation of Near-Miss Cases 1996

No.	Cause	Number	Percentage
		(n=45)	
1.	Hypertensive Disorders		
	• Eclampsia	9	7.4
	• Severe Preeclampsia	36	29.5
		(n=67)	
2.	Massive Obstetric Haemorrhae		
	• Antepartum Haemorrhage		
	- Placenta Praevia	8	6.6
	- Abruptio Placenta	12	9.8
	• Postpartum Haemorrhage		
	Retained Placenta	7	5.7
	- Uterine Atony	6	9.8
	- Genital Tract Trauma	10	9.8
	• Ruptured Ectopic Pregnancy	15	12.3
		(n=10)	
3.	Medical Disorders of Pregnancy		
	• Sepsis	6	4.9
	• Acute Pulmonary Oedema	1	0.8
	• Others	3	2.5
	TOTAL	122	100

The largest proportion was within the 21 - 40 year group comprising 88.3 percent of total NMC. The Malays *(who constituted 52% of deliveries in the hospital population)* were at highest risk compared to the other ethnic groups. Although the orang asli group was small, they appeared to be a group that needs further evaluation if ethnic group specific ratios were studied. This is largely due to the fact that orang asli patients were only seen in the hospital when they developed a severe obstetric complication warranting interventional measures. They only constituted 0.4 per cent of all deliveries in the hospital. With regards to parity, the multiparous group (G_2 - G_5) was highest in the study (56%).

ii) Pregnancy Profile

Table II shows the condition of patients at the time of admission. Seventy one (58.1%) were referred from other health facilities whilst 77 (63.1%) were not booked at any health facility for care of pregnancy. This presents peculiar problems to attending physicians at the receiving hospital as often time is lost in evaluation and documentation. Blood group, rhesus status, haemoglobin levels and pre-existing medical disorders need to be elicited in these patients. A majority of the patients (75.4%) were not ill-looking when first evaluated. During the antepartum period, severe hypertension and eclampsia formed the highest frequency. Eighteen of the post partum events were due to postpartum haemorrhage (Table III).

Obstetric complications were present in 71 (58.2%) patients prior to delivery (antepartum) and 51 (41.8%) patients clinically deteriorated with the onset of labour or immediately afterwards.

Table II
Condition at Admission, Referral Status and Antenatal Booking Status

Clinical Status	Ill - Looking Stable	Ill - Looking Moribund	Well Looking	Frequency	
Referral Status					
• Referred	20	2	49	71	58.2
• Walk-in	8	0	43	51	41.8
TOTAL	28	2	92	122	
Antenatal Booking Status					
• Booked	7	0	38	45	36.9
• Unbooked	21	2	54	77	63.1
TOTAL	28	2	92	122	100

Table III
Near Miss Cases by Time of Occurrence

	Antepartum		Intrapartum		Postpartum		Total	
	No.	%	No.	%	No.	%	No	%
Hypertensive Disorders	37		3		5		45	36.9
Obstetric Haemorrhage	32		17		18		67	54.9
Medical Disorders	2		1		7		10	8.2
TOTAL	71	58.2	21	17.2	30	24.6	122	100

iii) Level of Expertise Rendered on Admission

The first medical personnel in contact with NMC were staff midwives and house-officers in 65/122 cases. The clinical complication which qualified the patient to be included in NMC was identified in 52/122 by staff midwives with the remaining being identified with progress of labour when higher level of expertise became involved in the management. Almost two thirds of total NMC were attended to by the resident medical officer and another third by the specialist obstetrician, among cases who were not recognised to be ill-looking at the time of initial contact with the latter. When obstetric emergency was managed after initiating the red code alert, all health personnel were immediately available.

In 6 cases (5%) delay in attending to NMC averaged 6 hours. All of these were after office hours when the resident doctors were either busy elsewhere in the unit or failed to diagnose at the initial assessment.

All presenting clinical problems were successfully managed in almost 90% (107) of the cases within a duration of 1 hour of admission. Delay in diagnosis was present in 15 (12.3%). These included severe pre-eclampsia, genital tract trauma and sepsis.

(Table IV) details interventions instituted. Patients with hypertensive disorders were optimised using parenteral antihypertensives *(Labetalol or Hydralazine infusion)* and anticonvulsants *(Magnesium sulphate infusion)* with good maternal outcome. ICU care was available for all eclampsia cases. Surgical interventions like caesarean section, peripartal hysterectomy and/or internal iliac artery ligation were needed in 38 cases of massive obstetric haemorrhage. In the latter, level of experience of attending physicians was considered appropriate for the decision made.

iv) Morbidity

The mean hospital stay for obstetric admissions in 1996 was 2.6 days and for gynaecologic admissions it was 5 days. (Table V) summarises the length of hospital stay and utilisation of ICU/HDU beds. The mean duration of hospital stay for NMC was 7.2 days. Except for ruptured

Table IV
Intervention Taken In Near Miss Cases

Intervention	Hypertensive Disorders n = 45	Massive Obstetric Haemorrhage n = 67	Medical Disorders n = 10
Delivery			
• Normal	10	10	1
• Forceps	2	0	1
Surgical Intervention			
• Hysterectomy & Int. Iliac Art Ligation	0	2	0
• Hysterectomy	0	11	0
• LSCS	33	25	1
• Salpingectomy	0	0	0
• MRP	0	4	2
• Blood/Blood Products	3	65	2
Medical Intervention			
• Antihypertensives	34	1	0
• Syntocinon	0	36	1

Table V
Duration of Hospitalisation and Utilisation of ICU/HDU*

	Near Miss Cases (%) (Days)
Duration of Hospitalisation	
Mean	7.2 (3 ± 4)
Range	3 - 24
Utilisation of ICU	
Mean	0.6 (±1.1)
Range	0 - 8
Utilisation of HDU	
Mean	1.6 ± 1.6
Range	0 - 7

* *ICU - Intensive Care Unit*
HDU - High Dependency Unit

ectopic pregnancies, all these patients were nursed in the obstetric wing (if not in ICU). Considered as a whole, 43/122 required ICU management immediately after the obstetric catastrophe and 92 spent a portion of their hospital stay in HDU. All patients who were initially in ICU were transferred to HDU till they were well enough to be nursed in the general ward.

The mean hospital stay was longer than that of the average length of stay of obstetric patients in the unit (2.6 days). Hypertensive disorders stayed longest, averaging 9.2 days whilst obstetric haemorrhage category stayed for about 6.3 days.

As expected major consumers of blood/blood components were in the obstetric haemorrhage group. Whole blood was most frequently used, contributing to 62% of total usage of blood or blood products as this was readily available for correction of haemorrhagic shock. Blood products including fresh frozen plasma, cryoprecipitate and platelets were readily available for indicated cases[5].

Discussion

The prevalence of NMC of 1.2% is comparable to the findings of Yoong[1] and Stones[6]. The figures for NMC may be underestimated if only obstetric patients managed in intensive care units requiring ventilatory support were considered. The crude mortality ratio *(inclusive of patients referred to the hospital)* in 1996 was 101 per 100,000. Six of these were transferred in and did not come from the local population served by the hospital. If 122 cases of NMC were considered against the total maternal deaths, twelve deaths were apparently averted for each maternal fatality.

Haemorrhage and hypertensive disorders of pregnancy were the main diagnostic groups among NMC. The principle causes of death in Ipoh Hospital from 1991 - 1996 were postpartum haemorrhage, obstetric embolism and heart disease. Obstetric embolism is the third leading cause of death in pregnancy in Malaysia; hence it is extremely likely to end in a fatal event even with improvements in supportive care and is unlikely to be included under near-miss cases[7].

Eclampsia remains a continuing problem in developing countries despite improvements in antenatal care[9]. Effective treatment measures including anticonvulsants like magnesium sulphate, parenteral antihypertensives, intensive care management and timely interruption of pregnancy after optimisation of clinical disease could be reasons for the favourable outcome in all the patient with severe hypertensive disorders[10]. Maternal mortality has been markedly reduced among eclamptics when there is liberal use of magnesium sulphate therapy and early recourse to lower segment caesarean sections when the cervical score is unfavourable for vaginal delivery[11]. The role of magnesium sulphate in the treatment of eclampsia is no longer in dispute[12]. However, its role in severe pre-eclampsia as a prophylactic agent against convulsion is less clear. When previous eclampsia cases were audited from 1990 - 1996, there have been no cases of eclampsia in hospitalised patients when magnesium sulphate was advocated[13].

Postpartum haemorrhage is still the commonest cause of maternal deaths in Malaysia[14,15]. Massive obstetric haemorrhage was recognised as the commonest category in NMC. Efficient enactment of a logical plan of management, including a team approach to prompt recognition of morbidity and institution of effective interventional measures played a pivotal role in averting death. The *'red alert'* code was initiated whenever the need arose. This involved the active participation of consultant obstetricians, anaesthesiologist and adequate backup by blood bank[5]. Very often surgical intervention was needed.

Remediable clinical factors is preferably used to replace the term substandard care. Failure in clinical care; the underlying factors which may have produced a questionable standard of care, includes shortage of resources, administrative failure in maternity service and backup facilities such a HDU, ICU and anaesthetic facilities. Lack of ICU beds (2 cases), failure to intubate at general anaesthesia (1 case), and delay in informing senior members of the department (4 cases) were remediable clinical factors indentified in 7 cases. Emergency hysterectomy was done in thirteen cases of obstetric haemorrhage with no fatalities.

The limited availability of ICU facilities has been sited as a remediable factor in peri-operative deaths in Malaysia[16]. Twenty percent of ICU admissions in Ipoh Hospital in 1996 were for obstetric cases[13]. Utilisation of ICU resources made based on strict admission criteria set out by anaesthesiologist[17] needs to be reviewed in our context.

The level of care received by patients at the time of admission again depends on professional expertise available at that point of time; and does not reflect on actual care provided during the course of the ailment. Specific management protocols and guidelines used in the department, assisted both nursing staff and junior doctors to evaluate cases initially and then consult senior staff who were often caught up with other emergencies. Ninety two patients were not ill at the time of admission and turned for the worse during the course of their labour. This policy of priority clerking frees senior doctors, to attend to other duties of the day. This policy is further supported by the low rate of either delay in diagnosis or treatment in NMC. The constant initiation of the *'red alert'* code system in indicated cases maintains a workable and effective management system in this unit.

Despite impressive gains in recent years, pregnancy remains a very risky endeavour. Considering the fact that 55% of our deliveries are high risk pregnancies, morbidity in NMC imposes an added strain to an already stretched obstetric service, as evidenced by longer duration of hospital stay and an increase in utilisation of ICU/HDU services. From an optimistic point of view, the gains seen in this study on the optimal usage of expertise and appropriate use of scarse and expensive resources like ICU/HDU and operation facilities are comforting.

This study justifies the feasibility of mobilising junior doctors and trained nursing personnel to be well primed to recognise early onset of serious illness with the use of treatment protocols whilst beckoning senior doctors to come to their aid. Optimal obstetric care in public hospitals lies in education of grass-root obstetric staff in managing life threatening events.

Although an enormous wealth of data has been derived, giving insight into local obstetric practice, data interpretation in this study is subject to several limitations. The maternal **'near miss'** ratios obtained are, at best underestimates, as NMC lack standard definition and a large margin of error is expected. The retrospective nature of the study presents inherent problems threatening validity especially with regards to uniformity in categorisation of the status of well-being on admission, although retrieval of medical records was 100 percent. Predictive values were not estimated as absolute numbers were too small. Although all cases of ruptured ectopic pregnancies were captured complications due to abortions were not collected.

Conclusion

The NMC study has identified two major categories in the local obstetric practice and improvements in care are preferably focussed on these diagnostic groups. Although NMC audit will not replace existing

confidential enquiries into maternal deaths, it may be used as part of the development of quality assurance programs in obstetric practice. Well developed clinical management protocols can be effectively utilised reliably employing nursing personnel and junior doctors as first line assessors in busy obstetric units without compromising quality of care provided to high risk pregnancies.

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