

ORIGINAL ARTICLE

Audit of severe maternal morbidity in Uganda – implications for quality of obstetric care

PIUS OKONG^{1,3}, JOSAPHAT BYAMUGISHA^{2,3}, FLORENCE MIREMBE², ROMANO BYARUHANGA^{1,3} & STAFFAN BERGSTROM³

¹Department of Obstetrics and Gynecology, St Francis Hospital Nsambya, ²Department of Obstetrics and Gynecology, Faculty of Medicine, Makerere University, and ³Division of International Health (IHCAR), Karolinska Institutet, Stockholm, Sweden

Abstract

Background. For every maternal death, there are probably 100 or more morbidities, but the quality of health care for these women who survive has rarely been an issue. The purpose of this study is to explore audit of severe obstetric morbidity and the concept of near miss in four referral hospitals in Uganda. **Methods.** This was an exploratory systematic enquiry into the care of a subset of women with severe morbidity designated as near miss cases by organ failure or dysfunction. Patient factors and environmental factors were also explored. Data were abstracted from clinical records and from interviews with patients, relatives, and health workers. **Results.** Records of 685 women with severe maternal morbidity were examined and 229 cases fulfilled the criteria for near miss cases. Obstetric hemorrhage, rupture of the uterus, puerperal sepsis, and abortion complications were the major conditions leading to the near miss state in more than three quarters of the patients. Nearly half the cases were at home when the events occurred. More than half the cases delayed to seek care, because the patients were unwilling, or relatives were not helpful. Similar proportion also experienced substandard care in the hospitals. **Conclusions.** A systemic analysis found substandard care and records, and patient-related factors in more than half the cases of severe maternal morbidity. Audit of near miss cases might offer a non-threatening stimulus for improving the quality of obstetric care.

Key words: Audits, near miss, quality obstetric care, severe maternal morbidity, Uganda

Abbreviations: UN: United Nations, WHO: World Health Organization, UNFPA: United Nations Population Fund, NGO: Non-Government Organization, HIV: human immunodeficiency virus, AIDS: acquired immunodeficiency syndrome, APH: antepartum hemorrhage, PPH: postpartum hemorrhage, DIC: disseminated intravascular coagulation, HD: heart disease, SVD: spontaneous vertex delivery, CS: cesarean section, HVS: high vaginal swab, ICU: intensive care unit, Hosp: hospital, BP: blood pressure, IV: intravenous

High maternal mortality ratios have been used in order to highlight women's ill health on the international scene (1). However, for every maternal death, there are over 100 or more women with acute morbidity (2), which may not attract the same international or national attention as maternal deaths, HIV/AIDS, tuberculosis, or malaria. Monitoring of obstetric morbidity has recently found public health application in Safe Motherhood programs (3–5). However, in many countries, audit of

maternal morbidity has not been accorded the same public health importance as maternal death audits.

Women who experience and suffer complications in pregnancy, childbirth, postpartum, and post-abortion periods are difficult to define or classify in the same way as maternal deaths. Stones et al. who first suggested the use of 'near miss cases' in obstetrics to describe women who suffer complications and survive (6) investigated the pattern of obstetric morbidity at St Mary's Hospital in London.

He went further to suggest the need to have an agreed definition of near miss cases and their inclusion in perinatal audit meetings. Subsequently, the concept of near miss cases has been used in order to refer to obstetric patients requiring (ICU) critical care (7,8). However, in many settings in low-income countries, ICU facilities are scarce or not available at all and so the application of ICU context would not be relevant. More recently, obstetric near miss cases have been defined as women who have organ failure, dysfunction, or requiring certain management options, such as hysterectomy (9).

Audit of near miss cases can provide clinicians and managers with a tool for critical review of the management of patients with severe maternal morbidity and may also serve as a useful proxy for assessing needs for prevention programs and health care resources. A woman who survives after a near miss event can be interviewed for clearer description of events surrounding her illness and care (9). In order to study the problem of severe maternal morbidity, it seems appropriate to develop and use a site-specific or settings-specific relevant definition especially as there are varying definitions of obstetric near miss cases (6,9–11).

In Uganda, published studies (12–14) have shown that the health infrastructure is weak. In order to promote safer pregnancy, one of the critical requirements is good quality of care. The purpose of this study is, therefore, to explore the concept of near miss within severe maternal morbidity in four referral hospitals in Uganda, identify prospects for audit, and identify implications for quality of obstetric care.

The study was performed in four hospitals in three districts in Uganda, viz. Hoima, Kiboga, and Kampala. Hoima Regional Hospital is situated on the eastern shores of Lake Albert and is a referral center (approximately 250 beds) for three districts, including Kiboga to the south-east, which has its own district hospital (100 beds). Hoima and Kiboga districts have a population of approximately 680 000 and more than 85% percent are peasant farmers. Approximately one-fifth of all births in the two districts are in the two hospitals. Mulago National Referral and University Teaching hospital with 1000 beds and St Francis Hospital Nsambya, a 361 NGO hospital, are both in the capital city Kampala whose population is approximately 1.2 million. They account for approximately 60% of all facility births in Kampala district. Mulago Hospital also receives referrals from all surrounding districts and special high-risk obstetric cases from all parts of the country. The only ICU for the 24.7 million

Ugandans is in Mulago Hospital, and is often constrained by shortage of beds and resources.

Patients and methods

This was a cross-sectional descriptive multicenter study, involving the audit of maternal near miss cases, from January 1999 to September 2000. A near miss case was defined as a woman who is pregnant or recently pregnant up to 6 weeks after pregnancy termination, with obstetric or other complications leading to organ dysfunction or failure or requiring radical surgery or admission in an ICU. This is a modified definition adopted from the one introduced by Mantel et al. (9).

Trained midwives identified cases with obstetric and or other complications managed in the obstetric and gynecologic departments of these hospitals. Sources of information were manual registers from labor wards, surgical theatre, acute gynecologic or women's wards, ICU, and daily ward reports. The midwives visited these units daily or after the weekend to review these data sources. The cases identified were reviewed with the resident obstetrician and records of women with severe morbidity were retrieved for further scrutiny. For each case, efforts were made in order to identify two key factors, namely organ system failure or dysfunction and near miss markers, as stated in Table I. Records of women fitting the definition of maternal near miss cases were retained for study. Information about live births and maternal deaths in these hospitals was also collected from records as part of maternal mortality audits. Women identified as near miss cases were approached to participate in the study, after they had sufficiently recovered from the event(s) and were about to be discharged from the hospitals. The nature of the study was explained to the woman or to a relative of consenting age and verbal consent to participate in the study was obtained. A verbal consent was also obtained from relatives and health personnel who were interviewed.

Pre-coded and partly open-ended questionnaire, which had been pre-tested, was used in order to collect retrospective data from patient clinical records. The information included demographic details, history of presenting problems, and efforts to seek care, details of current pregnancy, past obstetric history, past medical and surgical history, findings on physical examination, investigations, diagnosis, care plan, management, and problems encountered during management, maternal and fetal outcomes, and duration of stay. In order to complete gaps in patient clinical record information and to facilitate the audit, an interview was performed with

Table I. Clinical criteria for inclusion as near miss cases (modified criteria used in South Africa (9)).

| Organ dysfunction or interventions | Clinical markers |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cardiac dysfunction | Cardiac arrest, pulmonary edema necessitating intravenous diuretics |
| Vascular dysfunction | Absent peripheral pulses/BP for 30 min or more because of septic or other shock. Hypovolemia because of hemorrhage requiring a transfusion of five or more units of blood. |
| Renal dysfunction | Oliguria because of any condition in pregnancy up to 6 weeks postpartum, with no response to fluid replacement and IV diuretics and urine less than 400 ml in 24 hr. |
| Liver dysfunction | Jaundice with preeclampsia or eclampsia |
| Coagulation dysfunction | Clinical diagnosis of DIC with non-clotting blood at bedside test. |
| Metabolic dysfunction | Diabetic ketoacidosis or hypoglycemia. Thyroid crisis. |
| Cerebral dysfunction | Coma because of any condition lasting 24 hr or more. Convulsions because of eclampsia. |
| Emergency hysterectomy | Life-threatening hemorrhage, trauma, or sepsis. |
| Anesthetic accidents | Cardiac arrest or hypotension associated with spinal anesthesia (systolic BP of less than 90 for 1 hr or more). Failed tracheal intubations requiring anesthetic reversal. |
| Severely ill obstetric patient | Admission to ICU |

the patient and or relatives and health workers involved in her care. A trained midwife not wearing uniform performed the interviews, in an empathetic manner (not apportioning blame). All the interviewees were assured that the information was confidential and would be used only for research purposes. The interview usually lasted half an hour or less and was recorded in narrative. In about half the cases, interviews were performed in local vernaculars and were immediately translated by the interviewer. Once discharged from the hospitals, near miss cases were not followed because of logistical reasons.

A daily clinical audit was not routine practice in any of the hospitals at the time of the study. Using the completed questionnaires and interviews, audit was performed in Kampala by the study midwife and the first author using standard criteria for quality of care. Ten percent of the near miss cases were randomly selected and were also audited by a team of obstetricians performing monthly maternal death audits in Kampala. The team’s audit findings were found to be in general agreement with the assessment of the obstetrician and midwife.

The following broad criteria supplemented by national guidelines for managing specific conditions were used in the audit process:

- Delays in seeking care related to the woman herself-e.g. lack of information or refusing to heed advice – was also investigated during the interviews. There was special focus to elaborate on the role of the spouse who might have been absent or refused her to seek care immediately or did not give support, e.g. money. The roles of any relatives involved were also investigated.
- Delays to reach a facility included the lack of transport, long distances, long time to travel,

person responsible to organize transport, and means of transport. There are no emergency ambulance services from the community to the hospitals in these districts and families are responsible for travel arrangements.

- Facility barriers to access care included availability of personnel with the necessary skills to make a correct diagnosis, draw and implement care plan, and monitor/evaluate clinical progress of the patient. Adequacy, timely administration or lack of blood transfusion, and essential medications were also assessed. Unprofessional conduct included the absence of the anesthetist, doctor, midwife, or laboratory technician or other care-team members or sleeping while on duty. Incomplete and missing clinical notes were also considered substandard care.

Permission to perform the studies was obtained from the District Directors of Health Services, verbal consent from the patients and other interviewees and Ethical clearance was also obtained from Karolinska Institutet ethical committee.

Quantitative data was entered in Epi Info program version 6.0; it was cleaned and frequency tables were generated. Narrative data were cleaned and read; information relevant to audit criteria was abstracted to complete the audit of each case. Standards of care were derived from the national guidelines for each disease or emergency condition.

Results

There were 685 women with severe maternal morbidity, whose records were retrieved in the 21-month period and 229 (33%) fulfilled the criteria of near miss cases. There were 55 803 live births and 269

maternal deaths during the study period, giving a maternal mortality ratio of 482/100 000 live births for the four hospitals. The ratio of records of women with severe maternal morbidity retrieved to maternal deaths was 2.5:1. The ratio of near miss cases to maternal deaths was 0.8:1.

The age range was 17–43 years, with an average of 26 and duration of stay in the hospitals ranged between 9 and 35 days, average of 18 days. The majority of cases were married, illiterate, or had less than 7 years education, had parity of 1–4, and had gestational age of 28 weeks or more. Pregnancy outcomes and details of general patient characteristics have been presented in Table II.

The majority of primary factors or disease conditions leading to a near miss event were direct obstetric complications, viz. severe hemorrhage, because of APH, PPH, or retained placenta, rupture of the uterus, puerperal sepsis, abortion complications, and eclampsia (Table III). Whereas one-fifth of the patients were already in the hospitals when the acute complications leading to a near miss event occurred, more than 40% were at home, especially in the rural districts of Hoima and Kiboga (Figure 1). More than three-quarters of patients who had APH/PPH, rupture of uterus, and abortion with severe

hemorrhage were already at other health facilities or study hospitals at reported onset of events associated with near miss condition (Figure 2). Twenty-four cases had puerperal sepsis, 11 were referrals, and 13 came from their homes. The hemoglobin level was 3.0–8.5 g. Six cases had high vaginal swabs for culture and sensitivity, but all patients had initiated intravenous antibiotic therapy after admission. Sixteen cases with puerperal sepsis had been delivered by vaginal route, six by cesarean section, and two had ruptured uterus and subtotal hysterectomies. For the majority of near miss cases, HIV status was not indicated in the records, only eight had HIV tests performed and five were positive.

Indications for laparotomy were rupture of the uterus, 48 cases; ectopic pregnancy, 21 cases; peritonitis following puerperal sepsis, six cases; uterine perforation following pregnancy termination and post-abortion peritonitis/pelvic abscess, 23 cases; and 10 cases with severe postpartum hemorrhage with atonic uterus. Indications for blood transfusions were shock with hypovolemia, 120 cases, and 65 cases because of severe anemia.

Forty-two percent of women reported seeking care immediately they experienced problems (Table IV). For women who experienced delays in seeking care, one in four did not consider their condition to be serious and had hoped that it would resolve quickly. One in four women also had to wait for the spouse to get permission to go to hospital, whereas one in six women reported that the spouse refused to give money to pay for transport to the hospital. Lack of money, lack of transport, and interference by relatives who advised the women not to go to hospital were cited by one in five cases.

Approximately two-thirds of women had a diagnosis and care plan made in a timely manner in the hospitals (Table IV). For approximately 60% of cases, the health workers with the necessary skills were available during key intervention(s), but a doctor or anesthetist was often cited as absent for the delays attributed to the lack of personnel. Other staff cited as absent were from the laboratory, pharmacy, nursing, and midwifery departments; and staff were absent for periods ranging between 1 and 4 hr often in the afternoons and at night. On probing, the reasons mentioned for absence included shortage of personnel 'a lot of work', private work, and meetings. The relatives and patients found it difficult to tell the ranks of health workers in general. Any one in a white coat or uniform was taken to be a doctor (in local language 'omu-sawo'). Lack of operating room facilities, which were either occupied or lacked equipment, anesthetic medications, or

Table II. General characteristics of near miss cases.

| Characteristics/outcomes | n = 229 | Percentage |
|------------------------------|---------|------------|
| Marital status | | |
| Married | 160 | 70 |
| Single | 39 | 17 |
| Others | 30 | 13 |
| Education | | |
| No schooling | 66 | 29 |
| <7 years | 81 | 35 |
| Secondary | 61 | 27 |
| Tertiary | 21 | 9 |
| Parity | | |
| 0 | 48 | 21 |
| 1–4 | 156 | 68 |
| 5+ | 25 | 11 |
| Gestation age (weeks) | | |
| <28 | 59 | 26 |
| 28+ | 170 | 74 |
| Booking status | | |
| Booked in hospitals | 93 | 40.6 |
| Booked in other health units | 61 | 26.6 |
| Not booked | 75 | 32.8 |
| Pregnancy outcomes | | |
| | n = 170 | Percentage |
| SVD | 75 | 44 |
| Vacuum extraction | 13 | 7.6 |
| CS | 44 | 26 |
| Laparotomy | 38 | 22.4 |
| Live births | 133 | 78.2 |

Table III. Near miss cases: primary obstetric or disease condition.

| Obstetric problem or disease | One clinical marker (%) | Two clinical markers (%) | Three clinical markers (%) | Total |
|------------------------------|-------------------------|--------------------------|----------------------------|-------|
| APH/PPH | 52 (73) | 16 (23) | 3 (4) | 71 |
| Rupture uterus | 33 (69) | 11 (23) | 4 (8) | 48 |
| PA sepsis/perf. | 3 (23) | 7 (54) | 3 (23) | 13 |
| PHhemorrhage | 20 (80) | 4 (16) | 1 (4) | 25 |
| Puerperal sepsis | 17 (71) | 6 (25) | 1 (4) | 24 |
| Eclampsia | 5 (28) | 10 (55) | 3 (17) | 18 |
| Ectopic | 18 (86) | 2 (9) | 1 (5) | 21 |
| Heart disease | 0 (0) | 2 (0) | 1 (9) | 3 |
| Diabetic complications | 0 (0) | 0 (0) | 1 (9) | 1 |
| Malaria | 0 (0) | 5 (0) | 0 (9) | 5 |
| Total | 148 (65) | 63 (27) | 18 (8) | 229 |

PA sepsis/perf: septic abortion with uterine perforation or other genital tract trauma.
 PAhemorrhage: post-abortion hemorrhage.

suture materials was reported for one in four cases experiencing delays in surgical interventions.

The majority of patients received blood transfusions as requested. There were patients who did not receive blood transfusion, even though it had been requested (Table IV). This was a result of the lack of blood in the hospital blood bank for two in three cases, and for one in three cases it was because of the lack of transport to the national blood bank in Kampala or the lack of blood in the national blood bank. Some patients did not receive medications as prescribed; a quarter of cases because the drug cupboard or the pharmacy was locked and the others because of the lack of medications in the hospital. None of the hospitals had designated as 'emergency teams' in critical care areas.

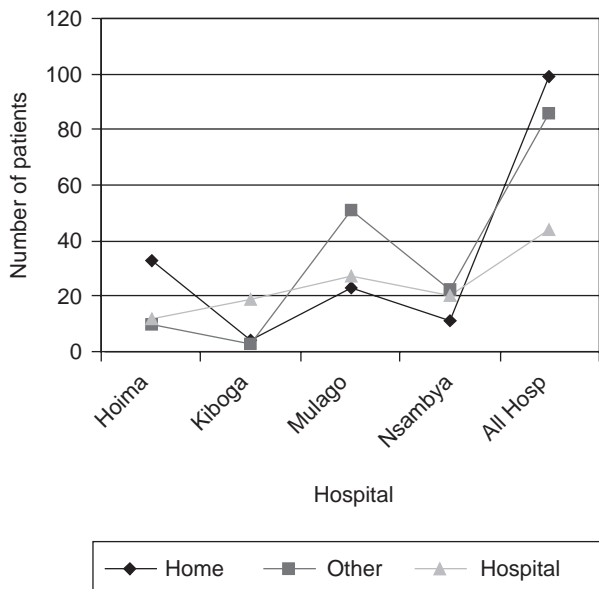


Figure 1. Location of patients at the onset of events. Home: patients at home; other: patients at other health facilities; hospital: patients already at the study hospitals.

Less than half the records were adequate for the audit of all aspects of the study, and were supplemented by interview information. The common problems were loose pages, lost pages, undated notes often with no times indicated, and very brief notes. Junior and Senior Residents in Mulago Hospital, Junior residents in Hoima, and Nsambya Hospitals and Medical Officers in Kiboga Hospital, generated most of the patient clinical notes.

Discussion

There is a wide spectrum of maternal morbidity in obstetrics with no general agreement on how it should be defined or graded. Pediatricians used the concept of near miss cases in the 1980s in relation to sudden infant death (15); and it was also used by radiographers and surgeons in order to describe

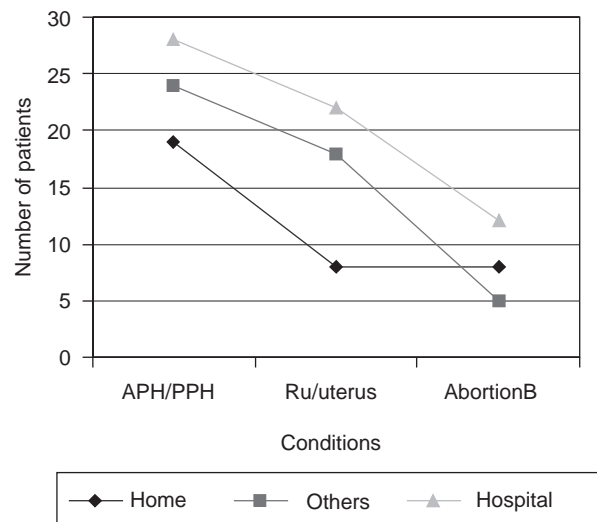


Figure 2. Location of patients for three conditions. Home: patients at home; other: patients at other health facilities; hospital: patients already at the study hospitals.

Table IV. Summary of audit findings.

| Audit results: adequate care | No. of patients (%) | Audit results: inadequate care | No. of patients (%) |
|-------------------------------------------------------------------------|---------------------|---------------------------------------------------------|---------------------|
| Patient sought care in timely manner* | 97 (42) | Patient did not seek care immediately | 132 (58) |
| Patient reached hospital timely* | 107 (47) | Lack of transport, long distance or inappropriate means | 122 (53) |
| Health worker(s) + necessary skills available to make diagnosis | 147 (64) | Patient had to wait for health workers | 82 (36) |
| Diagnosis made timely | 144 (63) | Wrong diagnosis or delays to reach one | 85 (37) |
| Health worker(s) with necessary skills available at key intervention(s) | 135 (59) | Health worker(s) not available for key intervention(s) | 94 (41) |
| Blood for transfusion obtained as requested† | 122 (66) | Lack of blood or transport to blood bank | 63 (34) |
| Medications timely and adequate | 153 (68) | Medications not available or inadequate | 76 (32) |
| Records available, adequate, and complete | 95 (41) | Records not available, inadequate or incomplete | 134 (58) |

*Includes 43 women admitted in the hospitals before the development of complications.

†Blood transfusion was requested for 185 patients.

injuries that narrowly missed vital organs or structures (16). In obstetrics, the concept has evolved from general obstetric morbidity as described by Stones et al. in 1991 (6) to specific organ failure (9). In addition to these earlier concepts, a quantitative score was introduced early this century in order to identify women in near miss category (17) and reference is also made to severe acute maternal morbidity (18,19). The restriction of a near miss case to severe maternal morbidity with organ failure or dysfunction was on the assumption that a clinical insult may lead to disease condition or systemic inflammatory response. The natural progression of a systemic inflammatory response might lead to organ dysfunction, which, in turn, may cause organ failure and might lead to death (9). In selecting near miss cases in this study, it was assumed that the primary obstetric or medical complication was the one that probably initiated the chain of events leading to the near miss condition, similar to classification of perinatal death (20). Therefore, a woman with a near miss event might die, if she does not receive adequate treatment. The choice of this approach based on clinical criteria only was pragmatic, because it did not rely on availability of ICU or sophisticated laboratory tests, which were scarce in the study settings (5,14). The focus of the near miss case audits in this context was the quality of care, which might have implications for the prevention of progression of complications from severe maternal morbidity to death. The ratio of women with near miss cases or severe maternal morbidity to maternal deaths was much smaller than that has been observed with process indicators (5) or in other studies (3,4,21), because this study did not set out to determine the incidence or prevalence of severe maternal morbidity or life-threatening pregnancy complications.

At the time of the study, there were no regular maternal death or maternal morbidity audits at any of the study sites. At the same time, the Association of Obstetricians and Gynecologists set up a group of obstetricians, with some facilitation, to perform maternal death audits for the three districts of Hoima, Kiboga, and Kampala. There were more cases of severe maternal morbidity than maternal deaths, and one-third of these fulfilled the criteria for near miss cases. For logistical reasons, the maternal death audit team could not audit all cases of severe maternal morbidity. This motivated the exploration of this subset of women with severe maternal morbidity, called near miss cases. In institutionalizing severe maternal morbidity audits, it has been argued to combine it with maternal death audits. However constraints of human resources, involvement of non-medical personnel, hospital management, lack of interest, and lack of time have been reported as obstacles for the implementation and sustainability of audits (22,23).

Interviewing women who survived was a unique source of information, and it was possible to elucidate the roles of spouses and relatives. It was also used in order to investigate the role of health workers and availability of equipment and medications, which were often not recorded in the patient clinical notes. Lack of equipment, medications, and blood found in this study have been reported before in Uganda (5,12,24), but in a more general way. Specifically, this study highlights the survival of women with severe maternal morbidity in spite of substandard care. Similar health system weaknesses in relation to maternal morbidity have been observed in Kenya (25). A recent World Bank report highlights staff absence as important cause of failure of health services in low-income countries. In Uganda, as many 35% of staff were absent from primary

health facilities during the survey (26). Health system failures or obstetrical accidents have been reviewed in the past but only too late when a maternal death has occurred (27) or at the stage of litigation (28). Audit of obstetric near miss cases offers the possibility of improving quality of obstetric care and might avoid the scenarios of a maternal death or litigation.

Interviewing the woman or relatives just before the woman was discharged or after discharge was an attempt to minimize recall bias. Interviews with health workers helped fill gaps in the records – e.g. the interval between junior doctors consulting a senior doctor and the time of arrival of the person consulted, which was often not written in the patient clinical notes. Interviews could have been performed when the patients had gone home and by non-medical personnel. But this was not performed for logistical reasons. One of the limitations of a midwife performing the interviews, even though she was not in uniform, was bias, and potentially making patients and staff reluctant to openly discuss painful and potentially threatening events. However, the midwife was empathetic, and had insider professional knowledge on expected care, which enabled appropriate probing.

The primary illnesses or conditions leading to near miss conditions, such as hemorrhage, ruptured uterus, puerperal sepsis, abortion complications, and malaria, are similar to the findings elsewhere (9,21,29–31). However, it was not possible to determine the magnitude of HIV-associated morbidity in this group of women, because this was not a routine practice and because of scarcity of testing facilities. The clinical records were also insufficient to assess the number of cases that may have had AIDS or aids-related complex to enable WHO disease staging. An earlier study in Uganda had highlighted HIV prevalence among women with post-abortion endometritis (32).

Previous work in Uganda points to the lack of empowerment of women in a predominantly male-dominated society (33), but this study also shows that delays in seeking care may be attributed to gender roles. Poverty and lack of awareness have also contributed to delays in seeking care. Lack of emergency transport is a chronic problem in these settings. As much as the study identified the absence of health personnel as a cause of delay in receiving care, it was not possible to get details about their absence. One can only speculate that reasons previously identified, viz. poor working conditions, low pay, and poor morale, which might encourage informal economic activities, are still present. In an attempt to complete the audit cycle, feedback was

given to the obstetricians from these institutions that were also involved in maternal death audits. This resulted in efforts to improve blood bank management in each institution, the development of protocols for management of postpartum hemorrhage, and adoption of magnesium sulfate for the management of eclampsia in the country.

The challenges posed by findings in this study range from sex issues, poverty, providing emergency transport for women with obstetric complications, and a plethora of health facility delays. Another important challenge is to involve the hospital management in the audits to ensure that changes agreed upon are implemented, to get commitment to avoid stock outs, and improve staff working environment. To develop routine quality audits requires more than enthusiasm, which may wane with time (22), but needs commitment and systematic introduction with well-defined procedures (23).

Conclusions

Using the modified definition of near miss cases, it was possible to identify women with severe maternal morbidity from all the hospitals at various levels of care. Substandard care and records, and delays because of patient-related factors were identified in more than half the cases. Audits of maternal and perinatal deaths are often perceived as threatening activities implying blame. Criterion-based audit of surviving mothers, such as near miss cases, might offer a non-threatening stimulus for the improvement of quality of obstetric care. There is a need to reach an institutional or national consensus on the definition of severe maternal morbidity and near miss cases. There is also a need to develop a policy on audit as an integral part of health facility practices and to adopt audit as a tool to improve the quality of obstetric care and monitor performance of the health system.

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