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QUALITY OF COMPREHENSIVE EMERGENCY OBSTETRIC CARE THROUGH THE LENS OF CLINICAL DOCUMENTATION ON ADMISSION TO LABOUR WARD

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ABSTRACT

Background: Clinical documentation gives a chronological order of procedures and activities that a patient is given during their management.

Objective: To determine the level of quality of comprehensive emergency obstetric care, through the lens of clinical documentation of process indicators of selected emergency obstetric conditions that mostly cause maternal mortality on admission to labour ward

Design: Multi-site cross sectional survey.

Setting: Twenty two Government Hospitals in Kenya with capacity to offer comprehensive emergency obstetric care.

Subjects: Process variables were abstracted from patient' case records with a diagnosis of normal vaginal delivery, obstetric haemorrhage, severe pre-eclampsia/eclampsia and emergency cesarean section.

Results: Availability of structure indicators were graded excellent and good except for long gloves, misoprostol, ergometrin and parenteral cefuroxime that were graded low. A total of 1,216 records were abstracted for process analysis. The median (IQR) for the six variables of obstetric history was five (4-5); five variables of antenatal profile was four (1-5); five variables of vital signs documentation was three (2-4); five variables for obstetric exam was four (4-5); seven variables of vaginal examination one (0-2); ten variables for partograph was seven (2-9); five variables for obstetric hemorrhage was three (2-4) and eleven variables for severe pre-eclampsia/eclampsia was five (3-6). The median (IQR) from decision-to-operate to caesarean section was three (2-4) hours.

Conclusion: Quality of emergency obstetric care based on documentation depicts inadequacy. There is an urgent need to objectively address the need for proper clinical documentation as an indicator of quality performance.

INTRODUCTION

Evidence on quality of emergency obstetric care services offered to mothers during delivery is largely based on availability of signal functions; key high impact interventions for reducing maternal mortality in health facilities offering maternity services. For a facility to be regarded as providing basic emergency obstetric care services they must have a set of six interventions and a set of eight interventions for comprehensive emergency obstetric care services (Box) (1, 2). This approach of assessing quality of obstetric care is limited, as it does not evaluate actual care mothers received. According to the Donabedian model, quality is evaluated by structure, process and outcome (3). Availability of signal functions in this regard is the structure, and the actual care given to mothers during delivery is the process. Evaluating process has been shown to be most relevant in improving maternal morbidity and mortality especially where criterion-based clinical audit is utilised. The criterion-based clinical audit framework, is well described and has been utilised before in auditing obstetric care including by the World Health Organisation (WHO) near-miss approach for maternal health. This frame work requires a consensus from experts and specialist to draw a concise criterion of good quality of care, in context with evidence based best practices, existing care protocols and available resources. Criterion-based clinical audit has been shown to be feasible in two developing countries; Ghana and Jamaica who continue to suggest poor quality of care (4-8). Outcome on its own is not a good measure of quality; it needs to be interpreted in the context of structure and process, and is largely confounded by many variations including patient factors, case mix, severity of condition, co-morbidities, care prior to labor and the way data are collected (9).

Kenya, like many developing countries is still grappling with a high maternal mortality ratio, which currently stands at 488/100,000 live births, more than three times short of the 2015 Millennium Development Goal (MDG) target of 147/100,000 live births (10). In a cross sectional survey of health facilities providing maternal and neonatal health services, conducted between 2009 and 2011 in six developing countries including Kenya, lack of a complete package of emergency obstetric

care interventions was demonstrated, only 2% of designated basic emergency obstetric care facilities and 12% of designated comprehensive obstetric care facilities had a complete package (1). These results were replicated in a 2010 quality of care survey carried out in Kenya that showed that, only 3% of basic emergency obstetric care facilities and 3% of comprehensive emergency obstetric care facilities had a complete package (11). Both these surveys carried out in Kenya focused mainly on the structure. In addition to lack of structure, the other major contributor to poor quality of obstetric care is most likely inadequate process.

The procedure of evaluating structure in the provision of emergency obstetric care is well known and has been carried out across many developing countries by determining the availability of signal functions (1, 2, 12, 13). The challenge however, has been how to determine the process of emergency obstetric care provision. This challenge is further compounded mainly by poor clinical documentation (1). Clinical documentation gives a chronological order of procedures and activities that a patient is given during care. This documentation is considered primary data and should be accurate, objective, detailed, complete and legible. High quality primary data is important since it impacts on patients' management plans, supports continuity of care, and provides information for quality assessment including for medico-legal purposes (14).

Assuming that, only what is done is documented and what is not done is not documented, then it is intuitive to evaluate the process of care given to women during delivery by using documented clinical notes. Such an evaluation will compare against a criterion drawn based on standard of care guidelines, best practices and in context with existing resources. Subsequently, a determination whether the correct management was given or not will be done.

Based on this assumption we evaluated availability of signal functions and determined the level of quality of comprehensive emergency obstetric care, through the lens of clinical documentation of process indicators of selected emergency obstetric conditions that mostly cause maternal mortality (15, 16), on admission to labor ward in 22 Kenya Ministry of Health Hospitals with capacity to offer comprehensive emergency obstetric care, in July 2012.

Signal functions for Emergency Obstetric care

Basic	Comprehensive
1. Parenteral antibiotics	7. All included in 1-6 under basic
2. Oxytocic drugs	8. Cesarean section
3. Parenteral anticonvulsants	9. Blood transfusion
4. Removal of retained products of conception by manual vacuum aspiration	
5. Manual removal of placenta	
6. Assisted vaginal delivery by ventouse	

Source: WHO 2009: Managing emergency obstetric care: a hand book

MATERIALS AND METHODS

Study design: This was a rapid multi-site cross sectional survey based on assessment of capacity to provide signal functions (structure) and retrospective case record audit to determine process indicators of quality of obstetric care.

Maternal care Specialist from the Ministry of Health and the University of Nairobi used a criterion-based clinical audit approach frame work to develop the survey tools. This was done by identification of obstetric conditions that cause most of the maternal mortalities in the country and specific process indicators for each in context of the Ministry of Health standard guidelines, best practices and available resources. The following obstetric conditions were prioritised for audit: normal vaginal delivery, obstetric haemorrhage (ante-partum haemorrhage, post-partum haemorrhage and ruptured uterus), severe pre-eclampsia/eclampsia and emergency Caesarean section.

Survey sites: The survey was carried out in 22 of the 40 Kenyan first level referral hospitals. These hospitals are internship training centres, staffed with consultants and other technical and support staff in each of the four main disciplines in medicine (Obstetrics and Gynecology, Paediatrics, Surgery and Internal Medicine). In addition, they are equipped with theatres, laboratories, pharmacy and radiology services. All these hospitals are required to have capacity to offer comprehensive emergency obstetric care according to the Kenya Ministry of Health guidelines. Care in labour ward is provided by a team compliment of midwives, clinical officers, medical officer interns, medical officers and obstetrician gynaecologist. Thus clinical documentation is paramount for a seamless continuum of care.

Study population: Patient case records with the following obstetric conditions: normal vaginal delivery, obstetric haemorrhage, severe pre-eclampsia/eclampsia and emergency Caesarean section were retrieved and reviewed. Any consecutive case that was managed on or before 31st May 2012 was included in the study until adequate sample size was achieved.

Sample size and sampling procedure: Of the 40 'internship training centres', the Ministry of Health identified 22 hospitals that were geographically representative of the country. The selection of these hospitals was informed by available resources for the survey and logistics which included: ease of accessibility and adequate security for the Investigators and Research Assistants. Using the cluster survey design and with 22 hospitals as the units of clustering, assuming a conservative prevalence of 50% correct performance

in each of the four obstetric conditions and adjusting for a design effect of 1.5 to account for clustering, based on previous hospital studies in these settings, reporting a precision of $\pm 7.5\%$ would be possible with a minimum of 12 case records per condition for each of the 22 hospitals, that is 1,056 cases in total. We aimed to retrieve 15 case records for each of the obstetric condition per hospital, that is 1320 cases in total. The records required were identified from ward registers by working backwards from 31st May until 15 case records closest to the survey were retrieved.

Variables: Variables for signal functions were availability of: magnesium sulphate, oxytocin, misoprostol, ergometrin, parenteral antibiotics, vacuum (ventouse extractor) long gloves for manual removal of placenta, safe blood and a theatre for cesarean section. Documentation on admission was assessed for: obstetric history, antenatal profile, physical examination and vaginal examination. Completeness of partograph charting on admission was assessed for: foetal heart rate, state of liquor, degree of moulding, cervical dilation, foetal head descent, contractions, maternal blood pressure, maternal pulse rate, maternal temperature and maternal respiratory rate. For severe pre-eclampsia/eclampsia documentation on admission was assessed for: blood pressure charting, pulse rate charting, respiratory rate charting, foetal surveillance monitoring, loading dose magnesium sulphate, maintenance dose magnesium sulphate, input output chart, full haemogram, urea/electrolytes/creatinine, liver function Tests and tendon reflexes monitoring. For obstetric haemorrhage documentation on admission for: blood pressure charting, pulse rate charting, foleys catheter insertion and input output chart. Documentation of time of decision-to-operate and operation time for emergency Caesarean section was abstracted.

Data collection and management: Availability of signal functions was directly observed. Process specific data from case records were abstracted. All data were entered directly into computers by trained Research Assistants using a database developed using Research Electronic Data Capture (REDCap) software (17). Data was checked for validity, consistency and missing variables at site using pre-developed Stata scripts.

Data analysis: We computed the proportions of hospitals where signal functions were available, and graded the availability as excellent if available in all 22, good if available in 17-21, moderate if available in 11-16 and low if available in 0-10. For process specific data, a median documentation score with accompanying inter-quartile range (IQR) from total scores of each variable per category was reported. Each variable was scored 1. The adequacy of documentation of process

indicators was graded as adequate if documented in >75%, as moderately adequate if documented in 51-74%, and as inadequate if documented in <50% of the records. Around process indicator estimates, 95% confidence intervals are reported. All analyses were undertaken using Stata V11 (Stata Corp, Texas, USA).

Research ethics: Scientific and ethical approval for the study was obtained from the Kenya Medical Research Institute National Scientific and Ethical Review Board. This study was considered a clinical audit hence minimum risk. Hospitals were de-identified before analysis. Patients were not interviewed.

RESULTS

Structure results: Table 1 shows availability of signal functions. Availability is excellent for magnesium sulphate, operating theatre and pre-operative/induction/maintenance anesthetic drugs. Availability was graded good for oxytocin, parenteral metronidazole, safe blood, all operating equipment and reversal/spinal anesthetic drugs. Vacuum (ventouse) extractors, parenteral benzathine penicillin, gentamycin, and ceftriaxone were graded moderate in availability. Availability was graded low for long gloves, misoprostol, ergometrin and parenteral cefuroxime.

Process results: A total of 1,216 records were reviewed and abstracted for process analysis. This section presents important variables of the selected four obstetric conditions (normal delivery, obstetric hemorrhage, severe pre-eclampsia/eclampsia and emergency cesarean section). Adequacy of clinical documentation of obstetric history and antenatal profile on admission to labour ward is shown in Table 2. Obstetric history was adequately documented with a median (IQR) of 5 (4-5) except for parity and previous deliveries that were graded as moderately adequate and inadequate respectively. Documentation of antenatal profile was moderately adequate, median (IQR) 4 (1-5). Notable is the wide IQR, meaning some hospitals scored 1 and hemoglobin level was graded inadequate.

Table 3, summarises clinical documentation of physical examination including vaginal examination. Median (IQR) for vital signs documentation was 3 (2-4) with blood pressure being the only variable

adequately documented. Median (IQR) for obstetric examination was four (4-5) with all variables except fundal height graded adequate. All the seven variables of vaginal examination were inadequately documented except dilatation which was moderately adequate, median (IQR) 1 (0-2). There were cases that had no documentation of any variable of vaginal examination.

Of the abstracted case files, 364 patients were required to use a partograph, out of these, 333 (96%) had the partograph plotted. Table 4 shows documentation of partograph variables on admission to labour ward. Out of the ten variables of the partograph, six (cervical dilatation, contractions, foetal heart rate, maternal blood pressure, foetal head descent and maternal pulse) were graded moderately adequate and four (liquor, degree of moulding, maternal temperature and maternal respiratory rate) were graded inadequate, median (IQR) seven (2-9).

Table 5, shows documentation of key procedures in patients with obstetric haemorrhage and severe pre-eclampsia/eclampsia on admission to labour ward. Median (IQR) of the five variables assessed for obstetric hemorrhage was three (2-4), with blood pressure and pulse rate graded adequate, respiratory rate moderately adequate and both foleys catheter insertion and input output chart inadequate. Eleven variables were assessed for severe pre-eclampsia/eclampsia, median (IQR) five (3-6): three variables (blood pressure, pulse rate and fetal surveillance) were graded adequate, four variables (loading dose magnesium sulphate, maintenance dose magnesium sulphate respiratory rate and input output chart) were graded moderately adequate and four variables (full blood count, urea/electrolytes/creatinine, liver function test and deep tendon reflexes) were graded inadequate.

Of the 329 cases that underwent emergency Caesarean section, only 139 (42%) had time and date recorded. The median (IQR) from decision-to-operate to Caesarean section was THREE (2-4) hours. Indications of emergency caesarian section were: foetal distress (28%), obstructed labour (20%), previous scar (12%), prolonged labour (9%), cephalopelvic disproportion (7%), breech (7%), antepartum haemorrhage (5%) and other indications (12%).

Table 1
Availability of signal functions in labor ward, in 22 Government Hospitals with capacity to offer comprehensive emergency obstetric care, in May 2012

	N=22	percentage (%)	Grade
Labour ward supplies			
Vacuum (Ventouse) extractor	15	68	Moderate
Long gloves for manual removal of placenta	10	45	Low
Pharmacy supplies			
Magnesium sulphate	22	100	Excellent
Oxytocin	17	77	Good
Misoprostol	7	32	Low
Ergometrin	6	27	Low
Antibiotics			
Parenteral Metronidazole	17	77	Good
Benzathine Penicillin	16	73	Moderate
Gentamicin	15	68	Moderate
Parenteral ceftriaxone	13	59	Moderate
Parenteral cefuroxime	1	5	Low
Safe blood	18		Good
Operating theatre	22	100	Excellent
Operating equipment			
Oxygen supply	21	95	Good
Air way	20	91	Good
Standard operating table	20	91	Good
Operation lamp	19	86	Good
Anesthetic machine	19	86	Good
Pulse oximeter	19	86	Good
Theatre sterilising unit	18	82	Good
Diathermy machine	17	77	Good
Anaesthetic drugs			
Pre-operative	22	100	Excellent
General induction	22	100	Excellent
General maintenance	22	100	Excellent
Reversal of anesthesia	20	91	Good
Spinal	19	86	Good

Table 2
Adequacy of obstetric history and antenatal profile documentation on admission to labour ward, in 22 Government Health Hospitals with capacity to offer comprehensive emergency obstetric care, in May 2012

Variable scored N=1216	% of records with variable documented	Grade	95% CI
Obstetric History:			
Median (IQR) 5(4-5)			
Gravida	94	Adequate	88-97
Parity	93	Adequate	87-97
Last menstrual period	84	Adequate	79-87
Expected day of delivery	82	Adequate	76-87
Parity	51	Moderately adequate	87-97
Previous deliveries	50	Inadequate	43-57
Antenatal Profile:			
Median (IQR) 4 (1-5)			
VDRL	78	Adequate	49-66
HIV	67	Moderately adequate	57 -75
Blood group	66	Moderately adequate	56-74
Rhesus	65	Moderately adequate	56-74
Haemoglobin	50	Inadequate	41-58

Table 3

Adequacy of physical and vaginal examination documentation on admission to labour ward, in 22 Government Hospitals with capacity to offer comprehensive emergency obstetric care, in May 2012

Variable scored (N=1216)	% of records with variable documented	Grade	95% CI
Vital signs and general exam: median (IQR) 3 (2 -4)			
Blood pressure	84	Adequate	80-87
Pulse rate	63	Moderately adequate	67-79
Respiratory rate	54	Moderately adequate	42-65
Temperature	50	Inadequate	39-61
State of Pallor	28	Inadequate	16-45
Obstetric exam median (IQR) 4 (4- 5)			
Foetal heart rate	86	Adequate	82-89
Presentation	85	Adequate	81-88
Foetal lie	78	Adequate	73-83
Foetal head descent	77	Adequate	72-82
Fundal Height	74	Moderately adequate	53-72
Vaginal examination: median (IQR) 1(0-2)			
Cervical dilatation	60	Moderately adequate	55-65
External genitalia	36	Inadequate	27-46
Membranes	24	Inadequate	18-32
Liquor	15	Inadequate	10-22
Caput	4	Inadequate	3-7
Moulding	2	Inadequate	1-4
Cord checked	0.4	Inadequate	0-1

Table 4

Completion of partograph parameters on admission to labour ward, in 22 Government Hospitals with capacity to offer comprehensive emergency obstetric care, in May 2012

Variable Scored (N=333)	% of records with variable documented	Grade	95% CI
Median (IQR) 7(2-9)			
Cervical dilatation	73	Moderately adequate	65-80
Contractions	72	Moderately adequate	64-78
Foetal heart rate	71	Moderately adequate	63-78
Maternal blood pressure	67	Moderately adequate	58-74
Foetal head descent	65	Moderately adequate	56-73
Maternal pulse rate	59	Moderately adequate	50-68
Liquor	48	Inadequate	40-57
Degree of moulding	36	Inadequate	26-47
Maternal temperature	42	Inadequate	32-51
Maternal respiratory rate	31	Inadequate	20-43

Table 5

Key procedures in patients with obstetric haemorrhage and severe pre-eclampsia and eclampsia, in 22 Government Hospitals with capacity to offer comprehensive emergency obstetric care, in May 2012

Variable scored	% of records with variable documented	Grade	95% CI
Obstetric Haemorrhage (N=274): median (IQR) 3 (2-4)			
Blood pressure charting	80	Adequate	64-90
Pulse rate charting	76	Adequate	59-88
Respiratory rate charting	70	Moderately adequate	55-82
Foleys catheter insertion	39	Inadequate	29-51
Input-output chart	25	Inadequate	14-41
Severe Pre-eclampsia/eclampsia (N= 249): median (IQR) 5 (3-6)			
Blood pressure charting	90	Adequate	75-96
Pulse rate charting	81	Adequate	67-90
Foetal surveillance	76	Adequate	60-87
Loading dose-			
Magnesium sulphate	65	Moderately adequate	52-76
Maintenance dose-			
Magnesium sulphate	58	Moderately adequate	45-70
Respiratory rate	56	Moderately adequate	43-67
Input output chart	51	Moderately adequate	37-66
Full blood count	17	Inadequate	11-25
Urea/Electrolytes/Creatinine	12	Inadequate	6-21
Liver Function Test	5	Inadequate	2-11
Deep tendon reflexes	0	Inadequate	0

DISCUSSION

Our study evaluated availability of signal functions and determined the level of quality of comprehensive emergency obstetric care, through the lens of clinical documentation of process indicators of selected emergency obstetric conditions on admission to labour ward in 22 first referral hospitals in Kenya, July 2012.

Overall, signal functions were graded excellent to good in majority of hospitals. There was a wide variation in process indicators, of selected obstetric emergencies ranging from adequate to inadequate on admission to labor ward. These findings are reassuring for structure indicators but raise a concern on the processes indicators. This concern is more so, because labour takes a short period of time, usually not more than 24 hours. An inadequate process can therefore lead to a poor obstetric outcome (18, 19).

There is an impressive improvement in the availability of signal functions, compared to findings from the surveys carried out in 2009 and 2010 in Kenya (1, 11). Our data showed that all the hospitals had

magnesium sulphate, an operating theatre and pre-operative/induction/maintenance anaesthetic drugs. Signal functions were available in 17-21 hospitals for oxytocin, parenteral metronidazole, safe blood and operating equipment. Improvement needs to be done for availability of vacuum extractors, long gloves for manual removal of placenta, misoprostol and other parenteral antibiotics. Adequate structure is a key ingredient of quality of care (3), and continuous sustainable improvement is needed for all signal functions. In contrast, process indicators as shown by clinical documentation on admission to labor ward showed a wide variation in terms of adequacy.

Obstetric history and antenatal profile was largely adequate, of note was the haemoglobin level that was inadequately documented. Determination of haemoglobin level during the antenatal period is important in the diagnosis and management of anemia in pregnancy, a common indirect cause of maternal mortality in Kenya (16). The inadequate documentation of hemoglobin in our study is compounded by an inadequate documentation of the state of pallor on admission to labour ward and lack of adequate iron for supplementation in

antenatal clinics as shown by a 2010 survey (11). This is despite obstetric haemorrhage being the leading cause of indirect maternal mortality in Kenya (15, 16). Maternal anemia in labor worsens obstetric haemorrhage when it occurs. Timely identification of maternal anemia during antenatal period with appropriate supplementation has been shown to reduce maternal anemia and its sequela (20).

Obstetric examination was adequate. Disappointingly though, vaginal examination was in particular inadequate with some cases having no documentation of vaginal examination. Of all the seven variables of vaginal examination studied, only cervical dilatation was graded moderately adequate the rest were inadequate. The vaginal examination finding mirrors the findings on completion of partograph on admission to labour ward. Despite a high uptake of partograph use (96%), cervical dilation examination was graded moderately adequate and other parameters that required a vaginal examination were inadequate. Though there are no randomised clinical trials currently, on evidence to support or reject the routine use of vaginal examinations during labor (21), vaginal examination still remains critical in decision making of any woman in labor at least on admission to labour ward, hence should be adequate for correct timely management. Any lax on this procedure should be unacceptable.

Process indicators for patients managed for obstetric haemorrhage was adequate for blood pressure and pulse rate. Of concern, is the inadequacy in input-output charting. Pre-renal failure is a real concern in these patients, an input-output chart can avert this complication by early identification of low urine output and subsequent appropriate management (22).

For patients with a clinical diagnosis of severe pre-eclampsia/eclampsia, blood pressure charting and pulse rate was graded adequate. Despite all hospitals having magnesium sulphate the drug of choice for management of this condition, loading and maintenance dose of magnesium sulphate was moderately adequate, which is an improvement from the 2010 survey, where only 1% of the health care providers knew all the correct management steps (11). Given this condition is a top killer of Kenyan mothers (15, 16), there is a need for each health care provider to perfect its management process. Deep tendon reflexes was not documented in any of the cases reviewed yet this is the other only way to monitor magnesium sulphate toxicity other than monitoring respiratory rate which is moderately adequate. In our setting, magnesium serum levels are not available routinely in the public hospitals. Laboratory investigations were inadequately documented, yet these investigations are important in grading disease severity and guiding management.

Less than half (42%) of the patients who had

an emergency caesarean section had time and date recorded, echoing the poor clinical documentation noted in our study. Of those who had time and date recorded, the time from decision-to-operate to caesarean section was six times (median [IQR] 3(2-4) hours) more than widely recommended 30 minutes (23).

The processes in labour and delivery are carried out by a team and not an individual. Activities outside labor like antenatal care also impact on obstetric outcomes. This complexity necessitates that each individual member of the team clearly documents processes for smooth continuum of care. Our study has demonstrated that clinical documentation is not adequate. While documentation of investigations can be attributed to a possible lack of laboratory support which is an auxiliary service, inadequacy in documentation of basic examination findings that require only the clinician, remained prevalent across all disease conditions.

The main limitation of this study can be viewed as its retrospective nature and an assumption that, what is done is documented. On the flip side, the retrospective design is a strength of this study, in that it reduces the likelihood of health care providers modifying care because of their awareness of being observed (hawthorne effect) (24). Use of clinical documentation on admission to labour ward to evaluate process can also be viewed as strength because women in labour are managed by a team who depend on clinical notes for continuity of care. Second, a relatively small number of 22 hospitals that was purposively selected may be a potential source of bias. Although we cannot definitively report on the state of obstetric services in the remaining 18 hospitals, most of these hospitals were in more remote parts of the country and anecdotal evidence suggests that they less well-resourced and staffed. The large sample size, criterion-based clinical analysis of process indicators in addition to signal functions and broad geographical representation may be indicative quality of care practices more widely in smaller facilities run by clinicians who qualify from these internship training centres.

In conclusion, quality of emergency obstetric care based on documentation depicts inadequacy. There is an urgent need to objectively address the need for proper clinical documentation as an indicator of quality performance.

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