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How to do (or not to do) . . .

Obstetric audit in resource poor settings: lessons from a multi-country project auditing 'near miss' obstetrical emergencies

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Summary:

This paper outlines the practical steps involved in setting up and running multi-professional, in-depth case reviews of 'near miss' obstetrical complications. It draws on lessons learned in 12 referral hospitals in Benin, Cote d'Ivoire, Ghana and Morocco. A range of feasibility indicators are presented which measured the implementation and frequency of audit activities, the quality of participation, adherence to the planned protocol for the near-miss audits, the quality of audit discussions and the sustainability of the project. Although the principles of the audit approach were well accepted and implemented everywhere, near-miss audits appeared most successful in first referral level hospitals. Contextual factors that determine the successful implementation of near-miss audit include staff finding adequate time for audit activities, financial incentives to groups rather than individuals, involvement of senior staff and hospital managers, the ease of communication in smaller units, the employment of social workers for the incorporation of women's views at audits, and the strength of external support provided by the research team. The poor quality of information recorded in case notes was recognised everywhere as a deficiency, but did not present a major obstacle to effective case reviews. Ownership and leadership within the hospital, more easily achieved in the first-level referral hospitals, were probably the most important determinant of successful implementation. Sustainability requires a commitment to audit from policy makers and managers at higher levels of the health system and some devolution of resources for implementing recommendations.

Introduction

Effective clinical care provided by a responsive health system is the corner stone for the reduction of maternal mortality in poor countries (Goodburn and Campbell, 2001). Guidance on how to introduce and implement quality assurance systems in developing country hospitals has been limited. Audit is one such mechanism, defined as: "the systematic and critical analysis of the quality of medical care, including the procedures used for diagnosis and treatment, the use of resources and the resulting outcome and quality of life for the patient" (Department of Health, 1989, Crombie *et al*. 1997). Ensuring that care processes adhere to quality standards is one of the best approaches to improving the quality of health care in resource poor settings (Reerink and Sauerborn 1996); and specifically for preventing maternal deaths (Graham *et al*. 2000). Audit aims to address and improve technical accuracy of diagnosis or treatment, but can also address timeliness of interventions, service organisation, and staff roles and responsibilities (Ronsmans 2000).

Since the United Kingdom's introduction of Confidential Enquiries into Maternal Deaths in 1952 (Department of Health and Social Security 1982), the use of audit as a tool to promote quality of care has evolved and been applied more widely (Crombie *et al.* 1997, Lawrence & Schofield 1993). Audit, which is typically represented as a cycle, starts with a review of current clinical practice, progresses to setting standards for care, monitoring practice against these standards, analysis of findings, assessment of options for change and implementation of new practices, finally returning to the starting point of reviewing the newly instituted practice (Crombie *et al.* 1997). Approaches on how to review clinical practice vary substantially, ranging from informal discussions of a selected number of cases among peers to structured reviews involving the statistical analysis of a large number of cases. An example of the latter is criterion-based clinical audit, where a set of explicit, measurable

criteria for case management are agreed which can then be used to monitor practice and determine if standards of care have been met, through a review of patients' case notes (Graham *et al*. 2000). While in peer reviews of individual cases, a method widely used in the UK, implicit criteria which are based on clinical judgements are the norms (Robinson, 1994).

Elements of the audit cycle have been instituted or piloted in low and middle income countries over the last decade, mainly restricted to approaches for ascertaining the causes of maternal deaths. These include confidential enquiries into maternal deaths in several middle income countries (Walker *et al.* 1986, Ministry of Health 1994, Department of Health 1998, Suleiman *et al.* 1999); and the verbal autopsy method, where relatives of the dead woman are interviewed (Kwast *et al.* 1989, De Muylder 1990, Fawcus *et al.* 1996, Langer *et al.* 1999, Walraven *et al.* 2000, Supratikto *et al.* 2002; Ronsmans *et al.* in press). However, guidance on the use of audit in resource-poor settings, where health facility staff themselves identify and analyse deficiencies and apply the findings to improve their patient care practices, is limited.

The aim of this paper is to outline the practical steps involved in setting up and running multi-professional, in-depth case reviews of what are termed 'near miss' obstetrical complications. These refer to women "in whom immediate survival is threatened and who survive by chance or because of the hospital care they receive" (Ronsmans and Filippi, in press). The rationales for auditing these events are that they are more common than maternal deaths; because the woman has survived and her views and experiences of care can inform the audit; and because they allow staff to consider the positive aspects of care that contributed to the woman's survival, as well as identifying and analysing elements of poor care. The paper draws on lessons learned through conducting near miss audits in referral hospitals in Benin, Côte d'Ivoire, Ghana and Morocco. Achievements and problems

encountered are presented, followed by an analysis of contextual factors likely to determine success or failure, concluding with a summary of lessons for implementing audit in resource poor settings.

Near-miss audit project

Settings

The study took place in 12 hospitals in Benin, Côte d'Ivoire, Ghana and Morocco, 1998-2001, and was conducted by local research institutions, supported by researchers from the United Kingdom, Belgium and Italy. Hospitals (identified in this paper by letters rather than their actual names) were purposely selected to include first level referral hospitals in all countries; and more specialised – regional and/or teaching – hospitals in Benin, Côte d'Ivoire and Ghana (see table 1). The near miss incidence in these hospitals varied from 1.2 to 22.9 cases per 100 deliveries, while the maternal mortality ratio ranged from below 100 to above 3000 maternal deaths per 100,000 live births (Filippi *et al*. forthcoming; Sahel *et al.* 2002). Maternity units differ considerably in size, as expressed by the number of maternity beds (from 5 to 200) and midwives (4 to 185).

Introducing and piloting the audit approach

The audit approach was introduced in stages. First a near-miss audit enquiry committee was established in each country, comprising relevant policy makers and obstetric specialists. Then an international workshop followed by national workshops were held to agree the types of 'near-miss' complications to be audited: hypertensive disorders of pregnancy, haemorrhage, infections, obstructed labour and anaemia. Case definitions were agreed, national and international protocols for managing these complications were reviewed, and a framework for analysing case management was developed. Audit meeting guidelines and

data collection tools were prepared and audit moderators (usually senior doctors or midwives) and core audit teams from each hospital were trained in how to conduct audit meetings. This preparatory phase was followed by a 6-month piloting of the audit approach in each hospital. Findings, audit methods and objectives were reviewed at interim country workshops; and a second phase of audits was then conducted, with sometimes adjustments in methods, followed by a final assessment of lessons learned.

Near-miss case review methods

We chose to conduct multi-professional case reviews because many types of staff and different types of services contribute to the care of women with obstetric emergencies (Maresh 1994). They also encourage local ownership, problem-solving approaches to sub-optimal care and could be done with modest extra resources (El-Amin *et al.* 2002; Crombie *et al.* 1997). Practical steps of the audit process are presented in Box 1. Audit guidelines recommended that all those involved in the care of the women, whose cases were being audited, should attend the audit meetings, including doctors, midwives, laboratory staff and administrators. As an introduction to auditing each case, a designated staff member presented a case summary, based on a review of the woman's case notes. The meeting participants then used the 'gate-to-gate approach' to review the appropriateness and timeliness of care activities, from the time the woman arrived in the hospital to the time she was discharged (Box 2). Where they judged that elements of care were below standard, the reasons were explored and recommendations made to ensure sub-standard care did not recur. In Benin, Côte d'Ivoire and Ghana, a social scientist or a social worker interviewed the women whose cases had been selected for audit and reported the women's experiences of quality of care to the audit meetings. Audit guidelines advised that recommendations should focus on measures which were within the resources and the capacity of the hospital to implement. An important ground rule had been established, which was that audit meeting

discussions were to be kept confidential and blame was not to be attributed to individual staff who had cared for the women.

Audit teams were advised to develop explicit criteria of care for each type of near-miss for assessing clinical management of specific complications before starting the audit process. External support was provided during the inter country meetings and some national meetings, promoting the principles of evidence-based medicine, and encouraging the use of international case management guidelines. The aim was to introduce an alternative to guide clinical discussions to sometimes outdated textbooks, consensus of opinions or personal experience. Unlike the criterion-based audit, where data on criteria are extracted from a large number of cases and achievements towards targets are measured quantitatively (Wagaarachchi *et al*. 2001), the focus here was on a qualitative in-depth review of a small number of cases. Between one and three cases were reviewed every month in each hospital, and criteria were to be used as a checklist against which to review care, rather than as a basis for quantitative analysis. One of the criteria used by Morocco was, for example, 'the interval of time between decision and intervention for all surgical near-miss cases should not exceed 45 minutes'.

If successfully established, in-depth case reviews have a number of advantages over other approaches in resource poor settings: conducted by health facility staff involved in the care, they are less reliant on quality of case notes or on statistical expertise, they allow a more comprehensive review of the quality of care (including organisational or attitudinal factors, which do not easily translate into criteria), and, when conducted on a confidential basis without external oversight, staff may be more willing to reveal and address quality of care shortcomings (Baker, 1999).

Evaluation of feasibility

The feasibility, enabling factors and obstacles to implementing clinical audit were evaluated, mainly qualitatively, using the observational notes of audit implementation and 223 audit meetings that had been prepared by local and international researchers (several of those whom became the authors of this paper); analysis of audit documents including minutes and lists of attendance for 228 meetings; and 162 individual interviews with audit team members and other hospital staff conducted by the local and international researchers. The results of four group evaluations were also used. On this basis, a range of feasibility indicators were prepared, which measured the implementation and frequency of audit activities, the quality of participation, adherence to the planned protocol for the near-miss audits, quality of audit discussions and the likely sustainability of the project (table 2).

Achievements

Hospital audit teams were successfully established in all hospitals and a range of different categories of staff directly involved in the care of the cases attended audit meetings, including administrators, midwives and obstetricians (table 2). Ten out of 12 teams met regularly until the end of the project. The two exceptions were Hospital D in Benin where two lead moderators left in succession and Hospital H in Ghana where audit team meetings were infrequent, because the project failed to engage sufficient commitment from senior staff, notably the Head of the Obstetrics Department (Brugha *et al.* 2003). Midwives were actively involved almost everywhere and often moderated meetings in eight, mainly first-level referral hospitals. The ground rule of avoiding blame was well accepted, if not always adhered to in two hospitals, where the care provided by a named staff member were frequently debated.

The poor quality of information recorded in women's case notes was often recognised as a deficiency, but did not present a major obstacle to effective audit when staff who had cared for the woman were present, who could contribute missing information. The improvement of recording practices by doctors and nurses was a recommendation of audit meetings in all hospitals, and the quality of patient records improved during the course of the project in some. Hospital audit teams expressed appreciation of the audit meeting process, notably that it promoted discussion and reflection on their own quality of care practices in a non-hierarchical environment, involving different categories of hospital staff. They expressed interest and sometimes surprise during audit meetings on hearing the views of the women, as they generally had not been aware of their expressing negative attitudes to the women or their failure to explain to the women what care they had received. The women's views were presented at the audit meetings in three of the countries; and separately at the end of each audit cycle in Morocco.

Audit teams identified areas for quality of care improvement and used several methods to address these including the following examples: feedback to staff (everywhere), development of protocols and guidelines (everywhere), reorganisation of screening procedures for emergency cases (Hospital B), re-design of patients' case notes to improve recording practices (Hospital H), allocation of new resources for emergency drugs (Hospitals C and K), and re-organisation of staff rosters including on-call emergency cover (Hospital I). At the end of the project, some hospitals continued to conduct audits despite lack of external funding (Hospitals A, E, G, K and L), and one country (Morocco) is in the process of going to scale. The other three countries are seeking funds for a regional or national scale-up, with UNFPA funding already available in Benin for rolling out to 6 first referral level hospitals where other quality assurance activities are taking place.

The project was less successful in the following areas. The preparatory phase took longer than expected (12 months instead of 7) in Benin, Cote d'Ivoire and Ghana, which reflected the complex and deep-rooted changes that audit requires in staff practices and professional culture. The near-miss enquiry committees set up to advice on implementation and facilitate dissemination, involving busy policy makers and obstetric specialists, did not meet regularly. Hospital teams were not proficient – and probably not sufficiently trained – in documenting the audit meeting processes. There was only partial engagement from hospital managers in most hospitals in Benin, Côte d'Ivoire and Ghana. Explicit criteria to assess performance and adherence to agreed standards of care were not developed in most settings, except in Morocco and after the first audit cycle in Ghana. Elsewhere, the appropriateness of care was mostly judged on implicit criteria based on 'expert' consensus during audit meetings.

Table 2 summarises the performance of hospitals and countries in implementing the audit approach. It suggests that it worked best in first level referral hospitals in Morocco (Hospitals K and L), Côte d'Ivoire (Hospital G), Ghana (Hospital J) and Benin (Hospital E); and also one regional hospital in Benin (Hospital C). The least successful were the tertiary hospitals in Ghana, Benin and Côte d'Ivoire. There were differences in the way the audit approach was implemented and meetings were organised, reflecting different country contexts and – notably – differences between district level and tertiary teaching hospitals. Analysis of these contextual features throws light on factors likely to influence implementation and potential sustainability.

Factors that determine successful implementation of audit

Competing for staff time

Finding adequate time for staff to carry out audit activities is one of the principal barriers to institutionalising audits (NICE, 2002). The average duration of audit meetings was between 1.5 and 2 hours, within which one or two cases were reviewed in-depth. Meetings were scheduled to take place monthly in each hospital, at a fixed time and place, usually towards the end of the morning or the beginning of the afternoon when there were reduced clinical activities.

These were busy referral hospitals, with a high patient load, including emergencies to which staff had to respond promptly. This was a major obstacle if staff who had cared for the case being audited were absent from the meeting, especially when case-notes were of poor quality. Staff involvement in activities outside of their hospitals also interfered. Staff in some hospitals supplemented their income by working outside routine working hours. Several obstetricians in urban specialist hospitals had off-site private practices; not infrequently they were interrupted by their mobile phones during meetings or called away. In district and rural hospitals, it was not uncommon for senior doctors, especially those with management responsibilities, to be called at short notice to meetings and workshops, which necessitated rescheduling audit meetings.

The time commitment and effort to prepare for and conduct audit meetings is considerable, especially for staff who are responsible for preparing case summaries and recording audit meeting processes. It is only feasible if it is given a high priority by senior staff and those higher in the health system (see below); and also requires that staff are motivated and remunerated adequately so that their primary commitment is to on-site clinical care.

Incentives

The near miss audit project entailed hospital staff taking on additional duties, on top of routine commitments. Staff were also aware that this was, relative to their salaries, a well-resourced research project, employing some full-time researchers. The decision to provide incentives to encourage staff to take on additional duties was hotly debated among researchers. In Ghana, Benin and Cote d'Ivoire, the project awarded a relatively generous stipend to core members of hospital audit teams for audit meeting preparatory activities and completion of research data collection forms; and in Ghana a small allowance as well as refreshments to all audit meeting participants. In Morocco, audit teams were given a computer; while in Benin, they were given a sum of money to administer themselves over the full length of the project which, among other uses, reimbursed them for transport. In Benin and Morocco, awarding incentives to audit teams was believed to have promoted team spirit, whereas the absence of this practice was reported to have undermined wider involvement of maternity staff in the tertiary hospital in Ghana.

Financial incentives can be unavoidable (and understandable), where a new activity is being piloted under research conditions in resource poor settings (El-Amin *et al.* 2003) However, quality assurance systems are unlikely to become embedded and sustainable in such settings if reliant on them. In Morocco and a handful of Beninese hospitals, alone, audit meetings continued after the project ended. Interviews with participants in other countries reported that staff wished to see the audit meetings continue, underpinned by policy directives from higher levels of the health system.

Local leadership

Involvement and regular attendance at audit meetings by senior staff, particularly department heads, was critical; where provided, leadership encouraged high attendance by more junior staff. An example of lack of leadership was at Hospital H, the Regional Hospital in Ghana, where the head of the Obstetrics Department retired soon after the project started. Despite efforts to involve him, his successor showed little interest and, instead, prioritised staff attendance at morning department meetings and monthly mortality meetings, which were well attended. The multi-disciplinary review and scrutinising of case management, often of cases that had been managed by senior medical staff, helped to deconstruct hierarchical and professional boundaries, especially in the smaller hospitals in all four countries. This can be a powerful, 'soft' effect of the audit approach, especially in settings where open critical comment on the practices of senior staff is usually avoided. By auditing near-miss events, where the woman had survived the complication, criticism of substandard care could be balanced by acknowledgement of the ultimately positive outcome.

Involvement of hospital managers

The involvement of hospital managers was seen as central to the project, in that many recommendations required action by management. In Morocco, district managers and hospital directors actively participated in the selection of cases for discussion, and attended all the audit meetings. Elsewhere, attendance by managers was sporadic or rare. Various factors may have accounted for this, for example low levels of importance attached to the initiative and perceptions that this was an activity for clinical staff. A plausible reason was a reluctance by managers to attend meetings where requests would be made of them which they could not fulfil. An example of this in Ghana was the plea to an audit meeting by one hospital manager to stop making recommendations that required money (Brugha *et al.* 2003).

A project hypothesis was that quality improvements could more easily be achieved in resource poor settings, if recommendations were restricted to those that could be implemented within available resource limitations (Reerink and Sauerborn, 1996). While this was useful and acceptable guidance in the first cycle of the project in Côte d'Ivoire, frustrations crept in at a later stage when audit teams felt that they had addressed all the locally soluble problems, and recommendations to address remaining problems would require additional resources. In Côte d'Ivoire and elsewhere, state hospitals are increasingly being transformed from institutions directly managed by the Ministry of Health to autonomous institutions, and many hospitals still lack the resources, skills, systems and mechanisms of accountability that are critical to the effective implementation of a user fee system (Gohou *et al.* forthcoming).The potential of locally-driven quality assurance systems in resource poor settings is dependent on the degree of decentralisation of resources, as well as decision making, to enable implementation of local recommendations.

Size of maternity units

Routine audit meetings were implemented and the effects on staff practice were rolled out more easily in smaller hospitals, where a high proportion of maternity and support staff participated. Midwives in these hospitals were also more likely to moderate meetings and take an active role in discussions, which probably reflected a closer working relationship between different categories of staff in these smaller units and more transparency in the rules of accountability. In the teaching hospitals, only a small proportion of staff who had been directly involved in managing the case attended audit meetings. Dissemination of recommendations to other staff proved difficult. In Benin, involvement of the head of the obstetrics department who was the lead local collaborator on the project, facilitated this process. Whereas in the teaching hospital in Ghana, the project was described as belonging

to a few, middle level consultants; and wider ownership and implementation of recommendations were not achieved (Brugha *et al.* 2003).

Patients' (women's) views

The perspectives and views of the women themselves were genuinely appreciated by hospital staff in all countries. Previously they had had little opportunity to evaluate patient satisfaction and were unaware of their failure to respond to women's need for information on the care they had received. In Morocco, there was initial reluctance to having women's views collected for presentation at audit meetings. The reason given was that this would require setting up a new system of data collection, hiring someone to conduct interviews in advance of audit meetings, which would be unsustainable once the research had ended. In Ghana, a researcher with social science training conducted the interviews with women. Potentially the most sustainable system was that in Benin and Côte d'Ivoire, where social workers who were employed as hospital staff interviewed the women and presented their experiences at audit meetings. Social workers could play a useful role in informing quality assurance strategies in the area of responsiveness to patients' needs, providing for example information on the extent and the reasons for delays in receiving emergency care (Gohou *et al.* forthcoming), or on the financial burden of hospital care (Borghi *et al.* 2003). By focusing on patients who have experienced near-miss events, audit has the potential to improve quality of care in all of its main dimensions (Ronsmans and Filippi, in press).

External support

Local research teams varied in their approach to implementing the project, some taking a more active role in shaping the audit process while others strictly adhered to their observer roles. This ranged from Morocco, where audit meetings in the first phase were moderated by the researchers, to Ghana, where some meetings in the teaching hospital were not attended

by researchers. Hospital audit teams generally welcomed the external view provided by the researchers. The Moroccan teams compensated for the withdrawal of the researchers at the end of the project by inviting a university professor in obstetrics to attend some of their meetings. Another mechanism used to get an external perspective was by inviting representatives from other hospitals to attend audit meetings. Although, in theory, the audit approach should be driven and led by hospital staff, external interest and support is probably essential, especially during the implementation phase.

Sustainability: getting audit into policy and practice

Early involvement of decision-makers, notably Ministry of Health policy makers and programme managers, was considered important for getting project lessons subsequently into policy and practice. This was facilitated by inviting them to participate on near-miss enquiry advisory committees. In practice, involvement of senior policy makers and programme managers proved difficult in all countries. At the systems or policy level, there had been little experience in developing quality assurance systems within hospitals, apart from Morocco where the district medical officers showed sustained interest in the project. Lessons learned from a project to reduce patient waiting times and excessive prescribing at hospitals in Ghana, conducted several years earlier, was beginning to be rolled out in different regions during the course of the near miss project. This illustrated the lengthiness and inherent delays in the process whereby project lessons inform policy and practice more widely.

A recommendation from an audit moderator in one hospital, at the final audit meeting, was that the audit process should be simplified when it shifted from project to routine service mode (Brugha *et al.* 2003). This reflected the tension between collecting sufficient data for research and the feasibility of incorporating the approach into routine service work. Another

inherent limitation to sustainability, in a project focused on a small number of hospitals, was staff turnover. Several key hospital staff transferred away from the participating hospitals during or shortly after the project had finished.

Conclusions

Our near-miss case reviews resulted in a large range of positive, well customised changes in the procedures and resources available for the management of obstetric complications. Lessons learned from first level referral and specialist or teaching hospitals in the four countries point to recommendations for how to introduce and conduct obstetric audit in resource-poor settings. Ensuring that the principles of the audit approach are well understood and accepted is essential, notably that audit is a lesson learning exercise to enable local staff to improve their practices. The multi-disciplinary approach, bringing doctors, nurse midwives, social workers and other support staff together in a common forum, is a novel approach to quality assurance, which is also well accepted, especially in the smaller hospitals. Incorporating the views of patients into their quality of care assessments offer staff a new perspective on the care they provided, also providing insights into patients' behaviour. The gate-to-gate approach gives audit meeting participants a framework for reviewing how the different activities of staff contributed to (or detracted from) the quality of care the woman had received from the time of her arrival at the hospital.

Critical to the introduction of audit, as with other new initiatives that require fundamental changes in staff attitudes and practices, is a cluster of factors around leadership, systems' support and an understanding of incentive systems. Ownership and leadership within the hospital, more easily achieved in the first-level referral hospitals, is the most important determinant of successful implementation. Where it exists, staff are more likely to allocate

time to preparing for and conducting audits. The engagement of district and hospital managers, achieved in Morocco but much less so in the three poorer countries, may depend partly on the availability of resources to implement quality improvement recommendations. Guidance to hospital audit teams to work as far as possible within local resource constraints is appropriate. However, if it is to become successfully embedded, audit for quality assurance requires some modicum of support in the form of devolution of resources from higher levels for implementing recommendations. Incentives to implement the audit approach are shaped by the context, constrained in resource poor settings where salaries are relatively low and staff may engage in other activities to make ends meet. Realistic mechanisms must also be found for dealing with the constraints of staff time, including fuller integration into existing hospital activities such as other staff meetings in the maternity unit. However, if prioritised by policy makers and managers at higher levels of the system, audit is feasible, acceptable to staff and less reliant on external inputs than other quality assurance approaches.

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Table 1: characteristics of participating hospitals

	Benin					**Cote D'Ivoire**		**Ghana**			**Morocco**	
Type/level of facility	**Hospital** Teaching/ tertiary level	**Hospital** Regional	**Hospital** Regional	**Hospital** Mission district	**Hospital** District	*Hospital F* Training/ tertiary level	*Hospital G* District	*Hospital H* Teaching/ Tertiary Level	**Hospital** District	*Hospital* Mission district	*Hospital* District	*Hospital L* District
Number of maternity beds	78	200	73	14	23	13	5	138	40	26	16	12
Number of doctors covering maternity*	19	24	7	2	2	50	5	40	6	3	4	2
Number of midwives	42	42	25	14	4	22	5	185	18	29	16	6
1 to 1 monitoring[a]	Yes	Yes	Yes	No	No	Yes	No	Yes	Yes	Yes	Yes	No
Availability of O negative blood[b]	Sometimes	Sometimes	Sometimes	Sometimes	Sometimes	Sometimes	Sometimes	Always	Sometimes	Usually	Usually	Sometimes
Availability of Caesarean sections[c]	Always	Always	Always	Usually	Usually	Usually	Usually	Always	Usually	Usually	Always	Usually
Availability of emergency drugs[d]	Usually	Usually	Usually	Usually	Usually	Usually	Usually	Always	Usually	Always	Usually	Usually
Maternal mortality ratio[e]	1200	900	3200	No death reported	700	3000	45	1100	1000	1100	160	70
Near-Miss Incidence[f]	10.4	7.6	22.9	8.9	8.1	22.5	1.2	6.0	3.8	1.9	9.9	3.2

notes: a. maternity has an area specifically assigned for very ill patients where 1 to 1 monitoring can take place; b. O negative blood is available in blood bank 365 days/365 days, 24h/24h; c**.** Caesarean sections can be done in the service 365 days/365 days, 24h/24h; d. Emergency drugs are immediately available in the service; e. per 100,000 live births (rounded figure) – (in Benin and Ghana, data are for 1999; in Cote d'Ivoire for 2001; in Morocco for 2000); f. per 100 deliveries.

Table 2: Feasibility evaluation of near-miss audit project in Benin, Cote d'Ivoire, Ghana and Morocco

	Benin					**Cote d' Ivoire**		**Ghana**			**Morocco**		**TOTAL**
	Hospital A	**Hosp. B**	**Hosp. C**	**Hosp. D**	**Hosp. E**	**Hosp. F**	**Hosp. G**	**Hosp. H**	**Hosp. I**	**Hosp. J**	**Hosp. K**	**Hosp. L**	
Near-miss audit committee set up	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	12
NMEC meets regularly	N	N	N	N	N	N	N	N	N	N	N	N	0
Hospital teams set up	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	12
Regular meetings till the end	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	10
Regular participation of Ob/Gyn Head+	N	N	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9
Regular participation of managers+	N	N	N	Y	Y	N	Y	N	N	Y	Y	Y	6
Active participation of midwives	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	11
Midwives leadership in meeting*	Y	Y	Y	Y	Y	N	Y	N	Y	Y	N	N	8
Views of women presented at meeting	Y	Y	Y	Y	Y	Y	Y	y/n	y/n	y/n	N	N	8.5
Hospital teams produced detailed audit documentation	N	N	N	N	N	N	N	N	N	N	Y	Y	2
Implemented solutions go beyond feedback	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	12
Objective standards used during audit	N	N	N	N	N	N	Y	y/n	y/n	y/n	Y	Y	4.5
Audits continue after project end	N	N	Y	N	Y	N	Y**	N	N	N	Y	Y	5
Preparations made for scaling up	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	12
Scaling up achieved***	N	N	N	N	N	N	N	N	N	N	Y	Y	2
Total yes	8	8	10	9	11	8	12	5	9	10	12	12	

NB: Y: yes; N:No; N/y: sometimes
+ attend > 75% of meetings
* midwives moderated meetings on occasion (at least once in each cycle)
** one meeting only
*** at the time of writing this paper

Box 1: Steps in the audit process

1. Identification of near-miss cases
2. Selection of case(s) for audit
3. Interview(s) with the woman(en)
4. Invitation of persons involved in the management of the case(s)
5. Preparation of medical summary
6. Assessment of quality of care provided (see box 2)
    i) Reconstruction of the itinerary of the woman and identification of deficiencies
    ii) Identification of reasons for deficiencies
    iii) Identification of solutions to address deficiencies
7. Follow-up recommendations on solutions

Box 2: Case review framework

Identification of deficiencies (gate to gate approach)

- Referral
- Admission
- Diagnosis
- Treatment
- monitoring and further treatment
- Discharge

Identification of reasons for deficiencies**:**

- Personnel
- Drugs
- Equipments and supplies
- Protocols
- Organisation and administration
- Patient and family
- Infrastructure