

What Is the Evidence for the Role of Audits to Improve the Quality of Obstetric Care

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Summary

Medical or clinical audit has become an acquired concept in the context of obstetric and other health care in industrialised countries, but experience in developing countries is scant. In this paper, I will introduce some important concepts and principal methods of audit by examining some of the best known examples of audits in the context of obstetric care. These examples include approaches that aim at assessing and improving obstetric care at national level such as the Confidential Enquiries into Maternal Deaths, as well as facility-based methods such as case note reviews and criterion-based audits. Lessons are drawn for application to developing countries, and examples of audit experiences in developing countries are presented. Finally, the big, and as yet unanswered question of whether audit can improve care, let alone obstetric care, is addressed briefly.

Introduction

In recent years, audit has become an acquired concept in the context of health services, and medical or clinical audit is now an accepted part of routine practice in many hospitals in Western countries. There is still much confusion as to what the word audit actually means however. As (Crombie *et al.* 1997, p2) state: "There are many approaches to audit, and almost as many views on how audit should be conducted as there are authors on the subject. The ultimate aim of audit, that it should lead to improvements in patient care, is perhaps the only aspect on which there is consensus" (Crombie *et al.* 1997). Audit, indeed, sets out to raise the quality of health care, and is in many ways similar to quality assurance or total quality management. Audit is about what is or ought to be the most essential concern of any health professional: to optimize clinical performance and provide the best possible services to patients.

It is not the intention of this paper to provide a comprehensive overview of the history of and approaches to audit, as many excellent overviews already exist (Crombie *et al.* 1997, Smith 1992, Lawrence & Schofield 1993). Instead, by using examples of applications of audit in the context of obstetric care, it will introduce some important concepts and principal methods of audit. Audit is not unique to obstetric care, but one of the oldest and highly influential examples of audit emerged from a desire to improve obstetric care. The Confidential Enquiries into Maternal Deaths, introduced as early as 1952 in the United Kingdom, are one of the first systematic initiatives to improve the quality of health care (Department of Health and Social Security 1982). This and other examples of audits of obstetric care will serve to illustrate the particular concerns that have surrounded obstetric care, and the efforts that have been made to improve it. Lessons will be drawn for application to developing countries, and examples of audit experiences in developing countries will be sought. Finally, the big, and as yet unanswered question of whether audit can improve care, let alone obstetric care, will be addressed briefly.

What is Audit?

The principal aim of audit is to improve the quality of medical care. The most commonly quoted definition of audit is: "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" (Crombie *et al.* 1997). This definition highlights two key features of the process of audit. First, audit involves a criticism of current practice. Second, audit is not restricted to the technical accuracy of diagnosis or treatment but also involves diverse issues such as for example the timeliness of interventions, the appropriateness of referral, the attitudes of staff, or the information given to the patient. Audit, in other words, crosses professional boundaries and doctors, nurses, social workers and administrators work side by side to improve the quality of care.

The audit process is generally represented in the form of a closed circle, called the audit cycle (figure 1). The natural starting point for the audit is to observe and review current practice. This can be done in a number of ways. The simplest form involves the review of a single case based on case notes, but audit may also encompass more complex data collection mechanisms such as the extraction of a large number of aggregate data from case notes, routine statistics, specially designed data collection forms or other sources. There is no single best method, each method being suited to certain types of topic and to a particular context.

An important next step in the audit cycle is to set standards against which the practice can be compared, and examples of how standards have been set for obstetric care are reviewed below. The final steps of the cycle are to compare current practice to the standards, suggest solutions for the deficiencies identified and implement the changes to improve the delivery of care. Investigations that have been set up just to explore whether the care is adequate will in general not bring about change should the care prove not to be adequate (Crombie *et al.* 1997). The explicit search for solutions for deficiencies identified and the implementation of these solutions is a crucial, although often overlooked step, of the audit process.

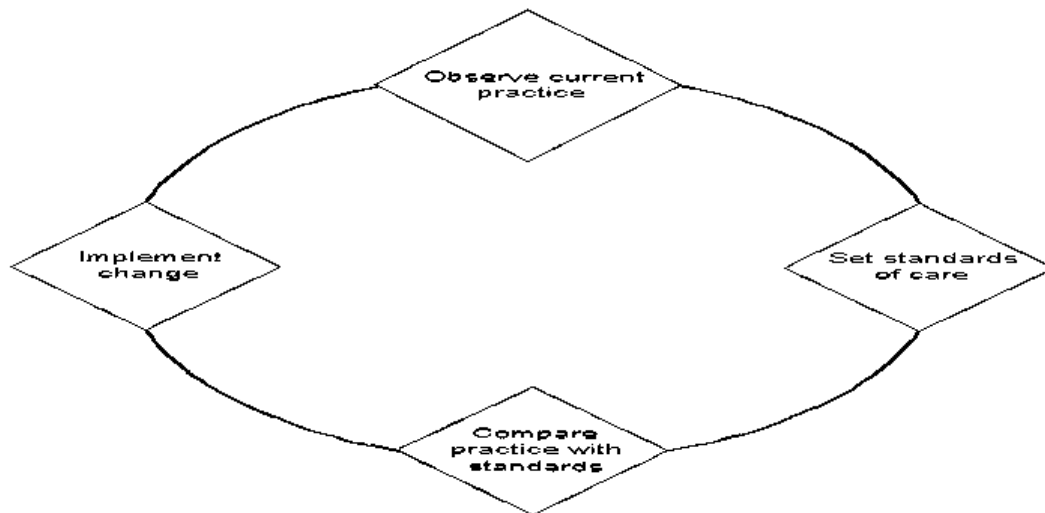


Figure 1. The audit cycle

Topics of Audit in Obstetric Care

In general, all three broad dimensions of health care (structure, process and outcome) can be audited. Structure refers to the question: 'what facilities, equipment, staff etc. were there', process implies 'what was done to the patient' and outcome questions 'what was the result for the patient in terms of mortality, morbidity or patient satisfaction'. The number of potential topics for audit is virtually unlimited and the choice will largely depend on the local relevance of and the extent to which the problem can be successfully tackled. Clinical concern is undoubtedly the most important factor as it is unlikely that the audit group will develop sufficient enthusiasm for topics that they do not perceive as clinically relevant (Crombie *et al.* 1997).

Adverse outcomes, particularly mortality, have been the focus of obstetric audit for many years. One of the best known examples of audit, the Confidential Enquiries into Maternal Deaths, was primarily concerned with avoidable maternal mortality (Department of Health and Social Security 1982). The Confidential Enquiries, introduced in England in 1952, involve a systematic review of all maternal deaths and are aimed at identifying instances of unsatisfactory management in order to make recommendations for improvements in clinical care and service provision. The aggregate analysis is published at regular intervals (every three years in the United Kingdom) and includes an independent assessment of the nature of and the frequency with which substandard care was present. National or regional enquiries into maternal deaths have now been put into place in many countries, as are national or regional enquiries into stillbirths, neonatal or perinatal deaths (De Reu *et al.* 2000, Richardus *et al.* 1997, Bouvier-Colle *et al.* 1995, Mancey-Jones 1997). Because perinatal deaths are much more common than maternal deaths, they are also seen as a useful topic for obstetric audit at facility level (Mancey-Jones 1997, Ward *et al.* 1995).

In recent years, cases of severe acute maternal morbidity have emerged as a promising alternative to the investigation of maternal deaths. In particular, cases at the very severe end of the morbidity spectrum, the so-called near misses, are seen as a useful outcome measure for the evaluation and improvement of maternal health services (Stones *et al.* 1991, Filippi *et al.* 1996, Baskett & Sternadel 1998, Mantel *et al.* 1998). Severe obstetric complications have the advantage over maternal deaths in that they are more common and possibly less threatening to providers than deaths, and since the woman survives she can be interviewed about the care she received. The latter is important as it reveals aspects of quality of care such as patient satisfaction, that may otherwise be overlooked. However, unlike maternal deaths, severe obstetric morbidity is not so easy to define. Obstetricians may not agree on common criteria of severity and in most countries, severe cases are defined on the basis of management rather than clinical criteria. For obstetric morbidity to become a useful topic for audit, much more work needs to be done in the search for precise and reliable criteria of severity (Filippi *et al.* 1996, Ronsmans & Filippi 2000).

Other than mortality and morbidity, the most common type of audit is that of process, examining what was done to the patient in terms of investigations, diagnosis and treatment. The numbers of examples of process audits are endless, and only a few are listed here. One of the most prominent examples of process audit in obstetric care is that of caesarean sections. The widely observed increasing trends in caesarean section rates has been a cause for concern, and multiple investigations have compared the clinical indications for caesarean sections across regions or hospitals (Barrett *et al.* 1990, Rosenberg *et al.* 1982, Opit & Selwood 1979). Audit might then be used, for example, to set a desirable rate of caesarean sections in a particular type of health facility or to reduce the number of caesarean sections for specific indications, such as in women with a previous caesarean section (Joffe *et al.* 1994, Lomas *et al.* 1991). Other examples of processes of care that have been the subject of audit include the mode of delivery in breech presentations (Healey *et al.* 1997, Biswas & Johnstone 1993), the use of magnesium sulphate for the treatment of eclampsia (Taylor *et al.* 1998), and the use of a prostaglandin vaginal gel for induction of labour (Somerset *et al.* 1995). Clearly, all these processes represent clinically important problems. Whether or not

they are a useful topic for audit largely depends on the willingness and enthusiasm of those involved in the audit to tackle the deficiencies that may emerge as a result of the review.

Setting Standards in Obstetric Care

The use of defined standards of medical care is the hallmark of audit. Their primary purpose is to highlight deficiencies, by comparing the care that was given to the care that ought to have been given. Standards are explicit statements of how a patient should be managed, taking into account the resource context of the care that is under review. Since ownership of the findings is crucial, standards are usually negotiated internally within the audit group, although external bodies such as the government or the World Health Organisation might also set standards. Standards are usually developed through a combination of clinical experience and a review of the available evidence. Clinical judgement can be used as an implicit standard, and can be sufficient when deficiencies are so large as to be self-evident. Where possible however, published research should be used to back up clinical judgement and expert opinion.

One of the main advantages of audits in obstetric care is that evidence-based practice guidelines have been developed based on scientific literature (Chalmers *et al.* 1989). The Cochrane Pregnancy and Childbirth Database, for example, provides access to systematic reviews of randomised trials of interventions in pregnancy and childbirth that are updated on a six-monthly basis (Cochrane Collaboration 1997). In addition, explicit criteria of quality of obstetric care have been established for those processes for which we have sound scientific evidence or a formal consensus of experts that the criteria, when applied, lead to an improvement in health (Benhow *et al.* 1997). Such process criteria have been developed in a number of countries, including more recently in two developing countries (Graham *et al.* 2000). Although these criteria are by no means exhaustive, they are certainly a useful starting point for establishing criteria of best practice in obstetric care. Based on these external criteria internal standards can be negotiated within the audit group taking into account local circumstances.

Standards are not always made explicit, and a team of experts may ultimately decide whether the care is to be considered as substandard or not. In the Confidential enquiries into Maternal Deaths in England and Wales, for example, a team of experts initially assessed all maternal deaths for their "avoidability" (Department of Health and Social Security 1982). After considering the circumstances of each individual death, the assessors decided whether "an alternative choice of action by any individual would have prevented or reduced the likelihood of death. The factors were classified as "avoidable" or "not avoidable" according to whether there was a departure from generally accepted standards of care" (Department of Health and Social Security 1982). Responsibility for the death was sought at the individual level and factors were classified by the type of person responsible (i.e. patient, general practitioner, obstetrician, midwife, anaesthetist, other hospital staff, other community staff, service manager and politician) and time of occurrence (antenatal period, labour or operative procedure, and puerperium or post-operative period). In 1980, the term "avoidable" was replaced by "substandard care", because the avoidable factors were often wrongly interpreted as meaning that avoiding these factors would necessarily have prevented the death. "Substandard", on the other hand, meant that "the care that the patient received, or that was made available to her, fell below the standard which the authors considered should have been offered to her" (Department of Health and Social Security 1986). Substandard care takes into account not only failure in clinical care, but also actions by the woman herself or her relatives, and factors outside the control of physicians such as shortage of resources or administrative failures.

Methods of Audit in Obstetric Care

A variety of methods can be used to audit care, each appropriate to local circumstances and the particular topic being investigated. These methods include case presentations, case-note reviews, ad hoc studies, criterion-based audit, occurrence screening and use of routinely collected data (Crombie *et al.* 1997). A few examples of methods used in audits of obstetric care follow.

Individual Case Reviews

The simplest form of audit involves reviewing the management of individual cases in health facilities. Although there are very few published examples of this type of audit, reviews of individual maternal deaths (or a variant thereof) form part of routine practice in many maternity units in Western countries. Cases are discussed in a friendly non-confrontational manner, and the quality of care is reviewed using clinical judgement while reviewing the notes, or using a checklist of the processes of care (examining what was done to the patient in terms of investigations, diagnosis and treatment). Meetings need to be structured and members assigned responsibility for specific tasks. A common format is for meetings of up to one or two hours to be held once a month or fortnight.

The main advantage of individual case review is its low cost and simplicity, involving little administrative time and without need for external assistance, computers or statistical analysis. Rather than largely focussing on an aggregate analysis of deficiencies in care in a large number of cases, - as in the confidential enquiries and criterion-based audits presented below -, the emphasis is on the participation of and interaction between all those providing and/or organising obstetric care during each individual case review meeting. The active involvement of care providers and managers in the review process is not only expected to enhance ownership of the findings and accountability, but by encouraging a culture of self-criticism, this process may also bring about a more sustained effect on improvements in the quality of obstetric care.

The main limitation of individual case review is that only a small number of cases can be reviewed and important deficiencies in health care may be missed. In addition, because confidentiality of staff within the discussion group can not be ensured providers may perceive this process as threatening. Audits focusing on near miss obstetric morbidity may overcome some of these shortcomings, as the staff can be congratulated on saving the woman, while deficiencies in patient management can still be reviewed (Ronsmans & Filippi 2000). Positive outcomes such as near miss can remove the emotion from an incident and allow learning to take place more effectively.

Confidential Enquiries into Maternal Deaths

One of the most impressive and sustained examples of audit of obstetric care are the Confidential Enquiries into Maternal Deaths. The key features of the Confidential Enquiries are shown in Box 1. The confidential enquiries are externally organised reviews of all maternal deaths in a region or country, generally instituted by a public health authority or government (Department of Health and Social Security 1982, and, Department of Health and Social Security 1986, McIlwaine 2000, Department of Health 2000). Data on individual deaths are obtained based on standard collection forms that are sent to all those involved with the care of the woman. All deaths are reviewed individually by independent experts at regional and national level who classify the deaths as “avoidable” or “not avoidable” (more recently as “substandard” or not) according to whether there was a departure from generally accepted standards of care (Department of Health and Social Security 1982). Compliance is enhanced by strict confidentiality ensuring that the findings of the reports are used only for making recommendations for improvements of practice and not for disciplinary action. National results are published in three-yearly reports that are sent out to a large number of providers and all original data are destroyed before releasing the reports.

The main advantages of the confidential enquiries are their comprehensive and representative nature (McIlwaine 2000). Efforts to identify all maternal deaths often lead to a more complete reporting of deaths than that obtained through the routine vital registration system. Comparable data on a large number of deaths over time ensure that trends can be identified at national level. The strict confidentiality for the patients whose care was reviewed and the doctors who managed them ensures that the focus of the investigation is on recommendations rather than on punitive action. Finally, the active involvement of the government reflects a commitment that enhances collaboration between policy makers and those delivering the services and ensures that funds can be made available for changes to take place.

Box 1. The key features of the Confidential Enquiries into Maternal Deaths

- They aim to identify all deaths in each specific category
- Confidential reporting
- Multidisciplinary external review of deaths to discover avoidable factors
- Results are published in periodic reports
- Key themes are identified and recommendations made for improvement
- No mandatory compliance with recommendations
- No systematic monitoring of uptake of recommendations

SOURCE: Department of Health 2000, p62

The main limitations of confidential enquiries include their cost, the tendency to focus on medical factors and the lack of systematic monitoring of uptake of recommendations. First, a confidential enquiry is organisationally and resource intensive. Second, the enquiries have traditionally focused on medical factors, ignoring the socio-economic factors (poverty, geographical location) that may contribute to maternal deaths. Finally, the confidential enquiries have a strong focus on the rigorous analysis of information to derive lessons for practice, but it is usually left to individual services to pick up and implement specific recommendations, with little by way of systematic monitoring of uptake (Department of Health 2000). Some recommendations have resulted in service improvements but others are repeated from report to report without action being taken. The latter tend to be those which would involve substantial changes in patterns of clinical practice, and those aimed at clinicians outside the normal readership of the report such as those in general practice and accident and emergency departments.

Criterion-based Audit

In criterion-based audit, agreed standards of care based on explicit criteria are agreed by those involved in the care (Crombie *et al.* 1997, Graham *et al.* 2000, Bullough & Graham 2000). These standards do not only involve the definition of criteria of good management, but also an agreement of the extent to which these criteria ought to be met (i.e. the target). For example, in a study in Scotland one of the criteria of good management of induced abortion was that “the woman’s rhesus status should be ascertained and rhesus prophylaxis given after abortion is indicated” (Penney *et al.* 1994). Performance was considered good (i.e. attaining the target) if more than 90% of cases fulfilled this criterion. This is clearly distinct from the confidential enquiries where recommendations for improvement are made on the basis of the assessment of “substandard care” but no explicit objectives for change are set. Similarly, other review processes such as the individual case reviews often do not specify clear-cut agreed standards of care. The main hypothesis with criterion-based audits is that the knowledge on (not) meeting the agreed levels of care will lead to specific changes in clinical practice.

Criterion-based audit involves a review process whereby clinicians first agree on a number of explicit and realistic criteria of good quality, adapting external guidelines to take into account the local resource context. Rather than being comprehensive, the list of criteria has to be kept short and simple to apply. Criteria are selected based on their relevance to the audited topic, the strength of the research evidence in their support, their ease of measurement using hospital case notes, and the capacity of the facility in terms of human and other resources. To assess current against standard practice an external audit assistant reviews a large number of case notes for their conformity with the set criteria, and the findings are fed back to the providers. Using the proportions of cases in which the relevant criteria are met as a starting point for discussion, improvements in care are recommended and realistic targets set. Changes in care are suggested and the audit cycle is closed by implementing the changes and re-evaluating practice. Carefully designed criterion-based audit may provide one of the most efficient methods of audit (Crombie *et al.* 1997). The approach is relatively simple and the use of trained non-clinical staff for data gathering enables a large number of representative cases to be reviewed. The local staff’s involvement in reflecting on their current practice and setting standards is believed to be an effective mechanism for bringing about improvements in care. Even the detailed process of development of criteria may be beneficial, focusing attention on the topic and increasing the sense of ownership of the audit among the clinicians involved. Potential limitations of this approach include the sole reliance on case notes which have to be of sufficient quality, the need for external expertise (for screening case notes and statistical analysis), a tendency to focus mostly on clinical factors and possibly the high cost.

Does (Obstetric) Audit Work?

Many people who have been involved in the development or implementation of audit believe in its potential to improve clinical practice (Halligan *et al.* 1997). Yet there is little scientific evidence to date that the recommendations emanating from audits have actually been implemented (Lord & Littlejohns 1997). Some authors have voiced concern for the lack of proof for the overall cost effectiveness of audits and have called for an “audit of audit” (Maynard 1991).

The gold standard method to prove that an intervention works is the randomised controlled trial. Trials are the only way to remain free from bias and provide definitive answers to questions of effectiveness and cost effectiveness. Controlled trials of audit interventions are difficult for a variety of reasons however. As has been illustrated here, approaches to audit vary tremendously and are highly context specific, and findings from one particular trial are therefore not easy to extrapolate to other settings. Operationalising and defining the outcome of an audit (i.e. what is quality?) is also difficult. In addition, effecting quality takes time. As (Crombie 1997) states: “the most likely outcome of even a well conducted audit study is only partial success”. The Cochrane review of randomised controlled trials of audit and feedback also concluded that although the effects may be worthwhile, they are generally small (O’Brien *et al.* 1997). Small effects take large and costly trials to prove that they were due to the intervention.

A rare example of a rigorous evaluation of an audit in obstetric care is the US trial comparing “opinion leaders” with “audit and feedback” as a method to reduce the caesarean section rate in women who had a previous caesarean section. After 24 months the trial of labour and vaginal birth rates in the “audit and feedback” group were no different from those in the control group, but rates were 46% and 85% higher, respectively, among physicians educated by an opinion leader. There were no adverse clinical outcomes attributable to the interventions and the authors concluded that the use of opinion leaders improved the quality of care. While these results are impressive, it is not clear how they can be extrapolated to other settings. What the authors called “audit and feedback”, for example, was very different from clinical audit as routinely practised in the UK. Moreover, the success of the so-called “opinion leader” is contingent on personalities, relationships, professional and organisational structures and processes.

Trials of selected audit interventions in specific circumstances are not easily extrapolated to audit in general.

The most common approach to evaluating audit is by documenting whether the expected changes have occurred over time (“before-and-after” studies)(Lord & Littlejohns 1997). Penney *et al.* 1994, for example, reported in their Scottish study that a criterion based audit of the management of induced abortions led to modest improvements in some criteria of abortion care four months after the introduction of an audit cycle (Penney *et al.* 1994). Similarly, an audit of caesarean sections in a large specialist maternity hospital coincided with a fall in the rate of caesarean sections (Rosenberg *et al.* 1982). Without a truly comparable control group, however, it is never really possible to isolate the effects due to the audit from other changes that occurred at the same time, and it is not possible to attribute the changes to the audit (Lord & Littlejohns 1997). Moreover, it is far from certain whether the effects observed in the context of a research project are reproducible or sustainable over time. Research projects not only come with additional funding, the participation in research per se may be a stimulus for enthusiasm and change, and whether similar successes would be observed in an audit that is incorporated into routine practice remains to be seen.

The difficulty in providing rigorous proof of effectiveness has also plagued the Confidential Enquiries into Maternal Deaths. It is clearly impossible to do controlled trials of large-scale national programmes such as the confidential enquiries.

Implementation of lessons and recommendations is often a very slow process, and meaningful changes can only be brought about over a period of many years. There is no doubt that the periodic enquiries led to a climate in which improvements in care could take place and some recommendations have definitely resulted in service improvements (Department of Health 2000). For example, local protocols for the management of massive haemorrhage and eclampsia have been put in place, and availability of blood transfusion services has improved as a result of specific recommendations (Department of Health 2000, Benbow & Maresh 1998). Other recommendations however are repeated from report to report without action being taken (Department of Health 2000). Whether or not the confidential enquiries have contributed to the current low levels of maternal mortality in the UK is a question that will never be answered convincingly. Other European Countries have clearly achieved similarly low levels of maternal mortality (as low as 6-7 maternal deaths per 100000 births) in the absence of such systematic enquiries.

It is unlikely that the current methods of evaluation will ever convince the sceptics that clinical audit is worth doing. Lord and Littlejohns 1997 go as far as stating that "Audit will always be an act of faith: a product of personal values, experience, professional loyalties, and anecdotal evidence" (Lord & Littlejohns 1997). Audit can never be the sole stimulus to change as it acts alongside a multitude of other influences. Audit evaluations need to be pursued, but they are likely to remain context-specific exercises aimed at describing the processes involved in a particular setting. By doing so the evaluation will provide a comprehensive picture of the successes and failures, and lessons can be learned from the reasons for these successes and failures.

Audit of Obstetric Care in Developing Countries

There is so far very little documented experience with audits of medical care, let alone obstetric care, in developing countries. Applying lessons learned from experiences in Western Countries may not be straightforward, as developing countries face a number of constraints that may prevent the successful implementation of audit (box 2). The magnitude of the resource constraints or inefficiency in resource allocation in the health sector, for example, may hamper effective audit. As resources fall under the responsibility of management their shortage can overshadow problems that can readily be addressed by health providers and the audit team may fail to address deficiencies in clinical care that fall under their responsibility. The strong hierarchical structure of the medical profession may constrain a process of peer review, as not everyone may be invited to express an opinion or take part in proposing solutions. Inadequate access to scientific evidence with an over-reliance on clinical judgement may lead to standards being set on the basis of current rather than best practice, possibly perpetrating inadequate practice. The poor quality of medical case notes may prevent the systematic review of the care given, although a recent study has shown that this may not be the case (Graham *et al.* 2000). Finally, audits are resource intensive, and the limited resources to support audit activities may hamper their sustainability.

Box 2. Possible constraints to the successful implementation of audit in developing countries

- The scale of resource constraints or inefficiency in resource allocation in the health sector.
- The strong hierarchical structure of the medical profession
- Difficult access to scientific evidence
- Poor quality of medical case notes
- Limited resources to support audit activities

Numerous studies in developing countries have collected standard data on the causes of and the factors contributing to maternal death. Such studies have been done at local or national level, and usually involve the use of the “verbal autopsy” (a post-mortem interview of family members) to arrive at the causes and avoidable factors of maternal death (Kwast *et al.* 1989, De Muylder 1990, Fawcus *et al.* 1996, Langer *et al.* 1999, Walraven *et al.* 2000, Ronsmans *et al.* 2000). Although these studies may provide the information needed for audit, they should not be labelled as such. The findings are often interesting but, because an intention to induce change was not built in at the start, few such initiatives lead to the formulation of specific recommendations for change and hence to improvements in care. Often such efforts do not collect the data needed to identify the underlying causes of the problem, particularly when observations rely solely on the family’s account of what happened. Those ascertaining the contributing factors have almost invariably consisted of an external group of obstetricians or researchers, and rarely have managers, decision-makers or other relevant care providers been involved in the review process. Acknowledging the existence of problems is an important first step towards resolving them, but unless efforts are build in to address the problems, change is unlikely to occur.

A number of countries have taken initiatives that go beyond the mere external assessment of substandard care. National confidential enquiries of maternal deaths have been put into place in Jamaica (Walker *et al.* 1986), Egypt (Egypt Ministry of Health 1994), South Africa (Department of Health, South Africa 1998), Malaysia (Suleiman *et al.* 1999), and of perinatal deaths in South Africa (Ghandi *et al.* 1999) and Guadeloupe (De Caunes *et al.* 1990). In Egypt, a confidential enquiry in 1993 concluded that sub-standard care by the obstetrical team was the most important contributing factor to maternal death (Egypt Ministry of Health 1994). While the study did not arrive at explicit recommendations for change, the active involvement of providers and policy makers in the assessment of each individual death has not only ensured the credibility of the study findings but might also represent a powerful trigger for change.

In Indonesia, the government is committed to undertaking district-level audits with the aim to bring both continuous surveillance of maternal and perinatal mortality and quality assurance

of obstetric services under the domain of the district health system (Supratikto *et al.* 2001). While no formal evaluation yet exists, the perceived success of the maternal and perinatal audit has led the Indonesian Government to commit to a country-wide expansion of these activities.

There are also a number of documented experiences of facility-based audits involving cases of maternal deaths (Crichton 1973, Barford & Barkes 1977), perinatal deaths (Bugalho & Bergström 1993), uterine rupture (Zanconato *et al.* 1994), near-misses (Mantel *et al.* 1998, Ronsmans & Filippi 2000) or processes such as vacuum extractions (Bergström & Bugalho 1992). Methods of audit vary, but most audits involve detailed case reviews, sometimes with a compilation of aggregate data on risk factors (Zanconato *et al.* 1994), avoidability (Mantel *et al.* 1998, Crichton 1973, Barford & Barkes 1977) or other contributing factors (Zanconato *et al.* 1994, Bergström & Bugalho 1992). Even though the event occurred in a health facility, it may be worthwhile to identify the factors that contributed to the death at the facility and in the community (Bullough & Graham 2000). The need for a detailed discussion of every individual case with all those involved in the care has been emphasised (Crichton 1973) and it has even been suggested that non-confidentiality may be necessary for a successful audit strategy (Bergström & Bugalho 1992).

Two ongoing research projects may shed some light on the feasibility and effectiveness of audits of obstetric care in health facilities in developing countries. Interestingly, the two studies use quite different methods of audit. In one study, individual cases of near miss are reviewed in detail during monthly meetings with midwives, doctors, social workers and administrators. A limited number of explicit treatment guidelines were established at an initial workshop, and the process of arriving at a subset of standard treatment criteria continues as the case reviews are ongoing. Over time, we hope that the case review itself will induce a shift from implicit rules of best practice to more explicit verifiable standards of obstetric care (Ronsmans & Filippi 2000). This approach is being tested in 12 hospitals in Benin, Morocco, Ivory Coast and Ghana, and the results will be available by mid-2001. In another study in Ghana and Jamaica, a criterion-based audit for the management of severe obstetric complications is being used to assess and improve the quality of obstetric care in four district hospitals (Graham *et al.* 2000). Audit criteria were selected on the basis of research evidence and local expert opinion. The findings will be published shortly.

Conclusion

Audit of obstetric care has become routine practice in many Western countries and the concept of audit is slowly taking hold in a number of developing countries. Although audit is clearly about improvements in care, the issue of whether any of it actually results in change is still unresolved and will probably remain so. The lack of evidence that medical audit can be effective should not necessarily be taken to prove that audit does not work however. Audit can never be the sole stimulus to change as it acts alongside other educational initiatives. Ongoing critical enquiries into the quality of care of maternity services are important, as they are an expression of a commitment to the continuous improvement of such services. This is particularly relevant for obstetric facilities in developing countries, where there is increasing evidence that the services offered fall short of acceptable standards.

References

- Barford DA, Barks JR (1977). Maternal mortality. A survey of 118 maternal deaths and the avoidable factors involved. *S Afr Med J* **51**,101-5.
- Barrett JF, Jarvis GJ, Macdonald HN, Buchan PC, Tyrell SN, Lilford RJ (1990). Inconsistencies in clinical decisions in obstetrics. *Lancet* **336**,549.
- Baskett TF and Sternadel J (1998). Maternal intensive care and near miss mortality in obstetrics. *British Journal of Obstetrics and Gynaecology* **05**,981-984.
- Benbow A, Maresh M (1998). Reducing maternal mortality: reaudit of recommendations in reports of confidential enquiries into maternal deaths. *BMJ* **317**,1431-32.
- Benbow A, Semple D, Maresh M (1997). *Effective procedures in maternity care suitable for audit*. UK: Royal College of Obstetricians and Gynaecologists. Clinical audit unit.
- Bergström S, Bugalho A (1992). Perinatal audit of one hundred consecutive vacuum extractions in Maputo. *Gynecol Obstet Invest* **34**,171-174.
- Biswas A, Johnstone MJ (1993). Term breech delivery: does X-ray pelvimetry help? *Aust N Z J Obstet Gynaecol* **33**,150-153.
- Bouvier-Colle MH, Varnoux N, Breart G (1995). Maternal deaths and substandard care: the results of a confidential enquiry in France. Medical experts Committee. *Eur J Obstet Reprod Biol* **58**,3-7.
- Bugalho A, Bergström S (1993). Value of perinatal audit in obstetric care in the developing world: a ten-year experience of the Maputo model. *Gynecol Obstet Invest* **36**,239-43.
- Bullough C, Graham W (2000). Criterion-based audit of maternal deaths and life-threatening complications. In: *Qualitative approaches for investigating maternal deaths*. Geneva: World Health Organisation (In press).
- Bullough C, Graham W (2000). Maternal death case reviews. In: *Qualitative approaches for investigating maternal deaths*. Geneva: World Health Organisation (In press).
- Chalmers I, Enkin M, Keirse MJN eds. (1989). *Effective care in pregnancy and childbirth*. Vol 1. Pregnancy. Oxford, England: Oxford University Press.
- Cochrane Collaboration (1997). *Pregnancy and Childbirth Database*. BMJ Publishing group: London.
- Crichton D (1973). The principles of prevention of avoidable maternal death. A study of 538 consecutive maternal deaths in the obstetric unit, King Edward VIII hospital, Durban 1953-1971. *S Afr Med J* **47**,2005-2010.
- Crombie IK, Davies HTO, Abraham SCS, Florey C du V (eds). (1997) *The audit handbook. Improving health care through audit*. New York: John Wiley & Sons.
- De Caunes F, Alexander GR, Berchel C, Guengant JP, Papiernik E (1990). The Guadeloupean perinatal mortality audit: process, results, and implications. *Am J Prev Med* **6**,339-45.
- De Muylder X (1990). Maternal mortality audit in a Zimbabwean province. *Arch Gynecol Obstet* **247**,131-138.

De Reu PA, Nijhuis JG, Oosterbaan HP, Eskes TK (2000). Perinatal audit on avoidable mortality in a Dutch rural region: a prospective study. *Eur J Obstet Gynecol Reprod Biol* **88**,65-9.

Department of Health (2000). *An organisation with a memory. Report of an expert group on learning from adverse events in the NHS chaired by the Chief Medical Officer*. The Stationary Office, London.

Department of Health and Social Security (1982). *Report on Health and Social Subjects 26. Report on confidential enquiries into maternal deaths in England and Wales 1976-1978*. London: Her Majesty's Stationary Office.

Department of Health and Social Security (1986). *Report on Health and Social Subjects 29. Report on confidential enquiries into maternal deaths in England and Wales 1979-1981*. London: Her Majesty's Stationary Office.

Department of Health, South Africa (1998). *First interim report on confidential enquiries into maternal deaths in South Africa*. National Committee on Confidential Enquiries into Maternal Deaths. April 1998.

Egypt Ministry of Health (1994). *National maternal mortality study: Egypt 1992-1993. Findings and conclusions*. Cairo: Child Survival Project.

Fawcus S, Mbizvo M, Lindmark G, Nystrom L (1996). A community-based investigation of avoidable factors for maternal mortality in Zimbabwe. *Studies in Family Planning* **27**,319-327.

Filippi V, Gandaho T, Ronsmans C, Graham W, Alihonou E (1996). The 'near-misses': are life-threatening complications practical indicators for Safe Motherhood programmes? Paper presented in IUSSP seminar on innovative approaches to the assessment of reproductive health, Manila, Philippines, September 24-27,1996

Ghandi M, Barnard A, West P, Siderfin C, Welz T, Martineau A, Dalrymple A (1999). Audit of perinatal mortality and acute maternal morbidity in Northern Kwazulu Natal. Durban: Health Systems Trust.

Graham W, Wagaarachchi P, Penney G, McCaw-Binns A, Yeboah Antwi K, Hall MH (2000). Criteria for clinical audit of the quality of hospital-based obstetric care in developing countries. *Bull WHO* **78**,614-620.

Halligan AWF, Taylor DJ, Naftalin NJ, Homa PM, Crump BJ (1997). Achieving best practice in maternity care [commentary]. *British Journal of Obstetrics and Gynaecology* **104**,873-875.

Healey M, Porter R, Galimberti A (1997). Introducing external cephalic version at 36 weeks or more in a district general hospital: a review and an audit. *British Journal of Obstetrics and Gynaecology* **104**,1073-9.

Joffe M, Chapple J, Paterson C, Beard RW (1994). What is the optimal caesarean section rate? An outcome based study of existing variation. *J Epidemiol Community Health* **48**,406-11.

Kwast BE, Bekele M, Yoseph S, Gossa A, Mehari L, Frost O (1989). Confidential enquiries into maternal deaths in Addis Ababa, Ethiopia 1981-1983. *Journal of Obstetrics and Gynaecology in East and Central Africa* **8**,75-82.

Langer A, Hernandez B, Garcia-Barrios C, Saldana-Uranga GL, and the National Safe Motherhood Committee of Mexico (1999). Identifying interventions to prevent maternal mortality in Mexico: a verbal autopsy study. In: Berer M, Ravindran TKS (eds). *Safe Motherhood Initiatives: Critical Issues*. Reproductive Health Matters. London: Blackwell Science.

- Lawrence M, Schofield T (ed) (1993). *Medical audit in primary health care*. Oxford: Oxford University Press.
- Lomas J, Enkin M, Anderson GM, Hannah WJ, Vayda E, Singer J (1991). Opinion leaders vs audit and feedback to implement practice guidelines: delivery after previous caesarean section. *JAMA* **265**,2202-7.
- Lord J, Littlejohns P (1997). Evaluating healthcare policies: the case of clinical audit. *BMJ* **315**,668-671.
- Mancey-Jones M, Brugha R (1997). Using perinatal audit to promote change: a review. *Health Policy and Planning* **12**,183-192.
- Mantel GD, Buchmann E, Rees H and Pattinson RC (1998). Severe acute maternal morbidity: a pilot study of a definition of a near miss. *British Journal of Obstetrics and Gynaecology* **105**,985-990.
- Maynard A (1991). Case for auditing audit. *Health Services Journal* **18**,26.
- McIlwaine G (2000). Confidential enquiries into maternal death. In: *Qualitative approaches for investigating maternal deaths*. Geneva: World Health Organisation (In press)
- O'Brien T, Oxman AD, Davis DA, Haynes RB, Freemantle N, Harvey EL (1997). *Audit and feedback: effects on professional practice and health care outcomes*. The Cochrane Library.
- Opit LJ, Selwood TS (1979). Caesarean section rates in Australia: a population-based audit. *Med J Aust* **2**,706-9.
- Penney GC, Glasier A, Templeton A (1994). Multicentre criterion-based audit of the management of induced abortion in Scotland. *BMJ* **309**,15-18.
- Richardus JH, Graafmans WC, van der Pal-de Bruin KM, Amelink-Verburg MP, Verlove-Vanhorick SP, Mackenbach JP (1997). A European concerted action investigating the validity of perinatal mortality as an outcome indicator for the quality of antenatal and perinatal care. *Journal of Perinatal Medicine* **25**,313-24.
- Ronsmans C, Filippi V. Case study: Improving obstetric care through near miss case reviews. A feasibility study in Benin, Ghana, Ivory Coast and Morocco. In: *Qualitative approaches for investigating maternal deaths*. Geneva: World Health Organisation (In press).
- Ronsmans C, Filippi V (2000). Severe obstetric morbidity. In: *Qualitative approaches for investigating maternal deaths*. Geneva: World Health Organisation (In press).
- Ronsmans C, Filippi V (2000). Improving obstetric care through near-miss audit. *Child Health Dialogue* **18**,9.
- Ronsmans C, Walraven G, Etard JF. Verbal autopsies. In: *Qualitative approaches for investigating maternal deaths*. Geneva: World Health Organisation (In press).
- Rosenberg K, Hepburn M, McIlwaine G (1982). An audit of caesarean section in a maternity district. *British Journal of Obstetrics and Gynaecology* **89**,787-92.
- Smith R (ed). *Audit in action* (1992). London: *British Medical Journal*.
- Somerset DA, Das Munshi T, Godman B, Swain I, Dooley MM (1995). Induction of labour using prostaglandin E2 gel: the effect of changing the time of first insertion. *J R Soc Med* **88**,105P-107P.
- Stones W, Lim W, Al-Azzawi F, Kelly M (1991). An investigation of maternal morbidity with identification of life-threatening 'near miss' episodes. *Health Trends* **23**,13-15.

Suleiman AB, Mathews A, Jegasothy R, Ali Roslinah, Kandiah N (1999). A strategy for reducing maternal mortality. *Bulletin of the World Health Organization* **77**,190-193.

Supratikto G, Wirth ME, Achadi E, Cohen S, Ronsmans C (2001). A district-based audit into the causes and circumstances of maternal death in South Kalimantan, Indonesia. *Bulletin of the World Health Organization* (in press).

Taylor GM, McKenzie CA, Mires GJ (1998). The use of audit to improve clinical effectiveness in an infrequent obstetric therapy: magnesium sulphate in severe pre-eclampsia. *Scott Med J* **43**,151-3.

Walker GJ, Ashley DE, McGaw AM, Bernard GW (1986). Maternal mortality in Jamaica. *Lancet* **1**,486-8.

Walraven G, Telfer M, Rowley J, Ronsmans C (2000). Levels of maternal mortality, its causes and contributing factors in rural Gambia. *Bulletin of the World Health Organization* **78**,603-613.

Ward HR, Howarth GR, Jennings OJ, Pattison RC (1995). Audit incorporating avoidability and appropriate intervention can significantly decrease perinatal mortality. *South African Medical Journal* **85**,147-150.

Zanconato G, Machungo F, Soler A, Bergstrom S (1994). Audit of uterine rupture in Maputo: a tool for assessment of obstetric care. *Gynecol Obstet Invest* **38**,151-156.