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Review article

# Ensuring effective Essential Obstetric Care in resource poor settings

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Although Emergency Obstetric Care (EOC) is globally accepted as a key strategy to improve maternal health and reduce maternal mortality, there is still a lot of debate surrounding its use – What is EOC? Is it evidence-based? How can we measure it? How can we improve access to EOC? This paper attempts to answer these questions. Although there are no randomized controlled trials, there is strong evidence from quasi-experimental, observational and ecological studies that EOC should be a critical component of any programme to reduce maternal mortality. This paper also identifies the barriers to accessing EOC and proposes strategies to overcome them which could contribute to achieving Millennium Development Goal 5.

**Keywords** Emergency Obstetric Care, Essential Obstetric Care, EOC, EmOC.

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## Introduction

Worldwide more than half a million women die each year from pregnancy related causes, and the vast majority of these deaths are due to direct obstetric complications: haemorrhage, sepsis, complications of abortion, hypertensive disorders of pregnancy, ruptured uterus and ectopic pregnancy.[1] In addition, 4 million neonatal deaths occur each year, accounting for an estimated 40% of deaths among children below 5 years.[2]

The eight Millennium Development Goals (MDGs) were agreed by world leaders to help prioritise global development efforts towards poverty eradication and are linked to agreed specified indicators which measure progress of nations towards these goals between 1990 and 2015. MDG 4 is to reduce under-five mortality by two-thirds and MDG 5 is to reduce maternal mortality by three-quarters between 1990 and 2015.[3] Despite the progress made so far in some countries, maternal and neonatal mortality and morbidity remain unacceptably high in many areas of the world.[4]

The vast majority of maternal and neonatal deaths can be prevented by ensuring access to Skilled Attendance at Birth, Essential (Emergency) Obstetric Care (EOC) and Newborn Care. [5–7] EOC refers to a 'package' of clinical interventions or 'signal functions' needed to prevent deaths from the main direct obstetric complications. Most of these complications cannot be predicted or even prevented, and may occur unexpectedly in otherwise healthy women who have received good antenatal and/or intrapartum care.[8] However, almost all these maternal deaths are preventable with appropriate and timely recognition and treatment.

Essential (Emergency) Obstetric Care is divided into two levels of care: Basic EOC (BEOC) and Comprehensive EOC (CEOC). A BEOC facility is one which provides six signal functions: parenteral antibiotics, parenteral oxytocics, parenteral anticonvulsants, manual removal of placenta, assisted vaginal delivery (usually ventouse extraction) and removal of retained products of conception (often via manual vacuum aspiration [MVA]). A CEOC facility is one which provides all the six signal functions of a BEOC facility and in addition is able to offer two further signal functions: Blood Transfusion and Caesarean Section when these are needed (Table 1).

## The need for Essential Obstetric Care

The effectiveness of the individual components of EOC for the treatment of each of the key complications of pregnancy and childbirth that is addressed is well documented.

 

**Table 1.** Signal functions for Essential (or Emergency) Obstetric Care

| Basic EOC services | Comprehensive EOC services |
|---|---|
| Parenteral antibiotics | All included in Basic EOC (1–6) plus: |
| Parenteral oxytocic drugs | Caesarean Section |
| Parenteral anticonvulsants | Blood Transfusion |
| Manual removal of placenta | |
| Removal of retained products (e.g. by manual vacuum aspiration) | |
| Assisted vaginal delivery (usually ventouse delivery) | |

In addition, the importance and effectiveness of EOC as a 'package' is supported by variety of studies which indicate that EOC should be a critical component of any health care programme aiming to reduce maternal mortality.[9]

These studies include an assessment of the association between availability of EOC and maternal mortality through the use of ecological design,[10,11] analysis of maternal mortality trends,[12,13] observational studies[14–16] and quasi-experimental design. [17,18] In Matlab, Bangladesh, a quasi-experimental study was conducted comparing models of obstetric care service provision.[17,18] The results of this study showed that improving access to EOC was vital in reducing maternal mortality.

## Measuring Essential Obstetric Care

There are six process indicators (also called United Nations process indicators) that can be used to measure the availability, utilisation and quality of EOC.[19] Two of these indicators measure availability, three measure utilisation and one is a measure of quality of care (Table 1).

### Availability of EOC

Availability of EOC is measured by assessment of the availability of the EOC signal functions, the number of facilities providing EOC signal functions per 500 000 population as well as the geographical distribution of these facilities. United Nations agencies recommend a minimum of four facilities functioning at BEOC level and one facility functioning at CEOC level per population of 500 000.[19] In surveys, a facility is generally designated as an EOC facility (BEOC or CEOC) if it has provided the relevant signal functions over a period of at least the previous 3 months. The indicator 'availability of EOC' has been used extensively throughout the world and it has been proposed that this indicator should be included in the monitoring of progress towards MDG 5.[20] Despite its importance, there are clearly chal-

**Table 2.** United Nations process indicators

| Indicator | Definition | Numerator | Denominator | Recommended level |
|---|---|---|---|---|
| Availability of EOC | Number of BEOC and CEOC facilities per 500 000 population | Number of BEOC and CEOC facilities | Total population | At least 4 BEOC and 1 CEOC facility per 500 000 people |
| Geographical distribution of EOC facilities | Ratio of EOC facilities to population for each subnational geographical area | Number of BEOC and CEOC facilities | Subnational population | 100% of all subnational areas have the minimum acceptable numbers of BEOC and CEOC |
| Proportion of all births in EOC facilities | Proportion of expected birth delivering in EOC facilities | Number of deliveries in EOC facilities | Total number of expected births | ≥15% |
| Met need for EOC | Proportion of pregnant women expected to have complications who are admitted for treatment in EOC facilities | Number of women with direct obstetric complications admitted in EOC facilities | Total number of expected complications | 100% |
| Population-based Caesarean Section Rate | Caesarean deliveries as a proportion of all births | Number of Caesarean sections | Total number of expected births | 5–15% |
| Case Fatality Rate | Proportion of women with direct obstetric complications admitted to EOC facilities who die | Number of maternal deaths from direct obstetric complications in EOC facilities | Total number of direct obstetric complications admitted in EOC facilities | ≤1% |

lenges with regard to using this indicator in practice – at BEOC level health facilities which provide only four or five (of the six) required signal functions are easily designated as 'non-EOC' and their services might be considered negligible. Also it can be argued that, especially in rural areas, some fully functional BEOC facilities with low participant attendance might simply not have had enough people requiring application of one of the signal functions per 3-month time period. They would be certified as 'non-EOC' if the assessment is done on a strictly 3-monthly basis. It is also of critical importance that the signal functions of either a BEOC or CEOC facility are available 24 hours a day and 7 days a week. In practice it can be hard to establish this with certainty.

One of the signal functions that are least well carried out is that of assisted vaginal delivery.[21] This may be because this skill is no longer or rarely taught[22] or because the cadre of staff allowed to carry out assisted delivery is not available at the facility. Many health centres provide many of the BEOC signal functions but are not staffed by medical doctors, who are the 'lowest' cadre of staff allowed to carry out assisted deliveries in many countries. However, in other countries it has been shown that this task, as well as manual removal of the placenta and MVA, can be effectively delegated to clinical officers or midwives trained in life saving skills for EOC.[23,24]

Similarly the problem with the CEOC signal function 'Blood Transfusion' is that blood transfusions may have been given using immediate family donors even though there is in fact no functional blood bank in place at the facility for emergencies.[25]

The geographical distribution of facilities assesses whether there is an equitable coverage (in a country or sub region). A geographical region may have the minimum acceptable number of BEOC and CEOC facilities for its population size but this may conceal the fact that such facilities are concentrated in the urban areas with a marked lack of coverage in rural populations. It is therefore good practice to map the facilities providing CEOC and BEOC. Increasingly, Geographic Information Systems are being used for creating such maps.

It must be noted that for many countries the stipulated minimum coverage with functioning BEOC and CEOC facilities, i.e. four BEOC and one CEOC facilities for 500 000 people is not currently attained. Particularly, coverage of BEOC is low in many countries with high maternal mortality, while adequate coverage of CEOC facilities does not guarantee minimum acceptable population-based Caesarean Section rates.[26]

## Utilisation of EOC

Utilisation of EOC is measured by the proportion of births in EOC facilities, met need for EOC and population-based Caesarean Section rate. The target for the proportion of births in EOC facilities has been set at 15%, based on the assumption that approximately 15% of pregnancies in any population will develop obstetric complications.[19,27]

The challenge with this indicator is that even if 15% of all expected deliveries take place in EOC facilities this usually includes many normal deliveries. Therefore, this indicator must be interpreted in relation to the met need for EOC, which is the proportion of pregnant women expected to have complications who are managed in EOC facilities. The target for the met need for EOC is set at 100% because the aim is to treat all obstetric complications in EOC facilities. The main problem with the measurement of the indicator 'met need for EOC' is that tracing emergency obstetric people from medical records is very difficult in practice. Delivery registers often do not have a column documenting which participant had a complication requiring EOC, participants requiring EOC may be admitted after delivering elsewhere and are not recorded in the maternity register and certain complications may be dealt with on wards other than the maternity ward (e.g. complications of abortion) and not reported. Thus for any facility to be able to provide accurate data on the number of participants requiring or given EOC requires a pretty good system for documentation of participant data to be in place and this is rarely the case.

The indicator Caesarean Section as a proportion of all births in the population examines whether women who need Caesarean Section actually get it. It could be argued that it also assesses whether women are having 'unnecessary' Caesarean Sections. The quality of data for this indicator is generally good as the number of Caesarean Sections performed is generally recorded in theatre registers in most countries. The problem can be the denominator in the absence of birth registration systems. The total number of births in the population is often not known and is usually estimated from the national crude birth rate. Very often subnational birth rates are unknown. Many reports and papers discussing the Caesarean Section rate still report facility based rates which are not a reflection of met need for Caesarean Section. Comparison of such data is not meaningful on its own, for example, it could be argued that an isolated rural CEOC should have a high section rate (as percentage of total deliveries in that facility) if it is meeting the population need and able to identify and manage most of the women requiring this signal function.

## Quality of EOC

It can be argued that the indicator 'Case Fatality Rate' (the proportion of women with direct obstetric complications admitted to EOC facilities who die) is a measure of the quality of care offered to women with obstetric complica-

tions. This is a very useful indicator, although there has been debate about whether complications should be aggregated across health facilities and across complication types.[28] The main challenge with this indicator is the lack of good quality data on obstetric complications treated in health facilities. Furthermore, the indicator measures technical professional quality of care, but not necessarily the participant's perspective of quality of care, e.g. the degree of woman-friendliness of services. Also in cases where access to health care is difficult and/or health care is expensive it has been noted that many participants come to the facility only when they are very seriously ill. Despite the best efforts of staff in the facility, it may not be possible to save the woman's life in such cases.

## Access to Essential Obstetric Care

It is recognised that availability of EOC facilities does not mean these will be utilised by all women who need EOC. Geographical, financial and cultural barriers may affect actual utilisation.

Such barriers or 'bottlenecks' may occur at three different levels: at the policy and programmes level, at the level of service provision and at the level of the community itself (failure to seek care). These echo the well known 3-delay model.[29]

### Policy and programmes

Maternal health is not (yet) a priority in many countries, especially where it has to compete for scarce resources with more high profile health programmes. Continued advocacy is needed to ensure adequate resource allocation to maternal health services, including EOC. A good maternal health policy is important because it creates a platform for the removal of barriers to accessing EOC. Where countries have developed a 'Road Map to Maternal Health' this has helped in identifying the specific need for programmes to address the problem of high maternal and newborn mortality and morbidity. Human resource policies are also of great importance to improve the availability and uptake of EOC, for example, where nurse-midwives have been enabled to provide the key BEOC functions this has led to the increased availability of these signal functions.

### Barriers to service provision

Barriers to service provision include poor availability of EOC services in terms of geographical access and at the level of health facilities inadequate physical infrastructure. There may be no functioning theatre, clean water, electricity or adequate waste disposal. Facilities may lack equipment, drugs and sufficient numbers of professional staff able to provide EOC.[30] Many developing countries are facing a severe shortage of health staff. There are many reasons for this including poor planning and management of human resources, lack of incentives to work in rural areas and external migration. The quality of services provided is often substandard due to lack of knowledge, skills of staff who are often unsupervised and poorly motivated.

### Barriers to seeking care

Women themselves often lack adequate information about danger signs in pregnancy and are not aware of the need for services provided at a health facility level.[30] In addition, lack of transport, long distances to health facilities, the cost of health care and emergency transport (and lack of any form of health insurance) make it difficult for them to access care. Sometimes cultural barriers also prevent women from seeking care, e.g. in some countries a woman cannot be taken to a health facility without permission from her husband or family-in-law even in the case of an emergency.

## Improving the availability of and access to Essential Obstetric Care

It is often said that the provision (or not) of maternal and newborn health services is a 'litmus test' of the health system as a whole. For a facility to fully function as a BEOC or CEOC facility, the health system as a whole must function. In particular, this includes the health policy for maternal health, physical infrastructure of facilities, human resources, procurement and distribution of equipment, drugs and supplies, referral systems, the health information system (HIS) and health care financing. In addition, it is important that any delays in seeking health care as a result of factors in the community (type 1 delay) are addressed.

### Health policy

Health policies supportive to maternal health can facilitate access to quality EOC. These include a policy of free maternal health services (including EOC), free or subsidised emergency transport and having a national minimum service package that includes the key components of maternal and newborn health services.

### Infrastructure

A needs assessment might be necessary to determine what specific infrastructure improvements are needed to upgrade health facilities to functional EOC facilities. This may include refurbishment of buildings, upgrading of operating theatres, labour and delivery rooms, maternity wards, laboratories, as well as provision of clean water, reliable electricity (e.g. a stand-by generator) and adequate waste disposal (e.g. a placenta pit).[31]


 

## Equipment and supplies

Additional equipment, such as a vacuum extractors, MVA sets, resuscitation equipment and basic medical instruments and delivery beds, may have to be supplied to facilities, which are to be upgraded to an EOC facility. It is important that management systems for maintenance of equipment, furniture as well as buildings and for continued supplies of drugs and consumables are put in place.

## The referral system

An effective referral system is crucial to ensure that women with life-threatening obstetric complications have timely access to EOC. This includes emergency transport and communication. For a health district to manage obstetric emergencies adequately, there should be a good transport and communication system between health centres or BEOC facilities and the CEOC facility. There are good case examples of where countries have successfully established communication links between facilities through telephone landlines, mobile phones or short-wave radios.[31,32] Novel ways to ensure a good transport system between health facilities include means of transport other than the 'traditional' ambulance such as motor-cycle and bicycle ambulances which may be owned and managed by the community or the health centre.[33] In general, maternity waiting homes have not been found helpful because they initially depended on identification of an 'at risk' patient. In some areas however, they are used to improve access to EOC by women who live far away from a health facility and come and wait for childbirth in such maternity waiting homes (built within or near to the hospital premises).[34,35]

## Human resources

There are several human resource issues that need to be addressed to improve the availability of EOC. These include building human resources planning and management capacity both at the level of central government and within a facility, improving supervision, strengthening pre-service and in-service training and supervision, and developing health staff retention initiatives. To ensure long-term sustainability of EOC, there is a need to build the capacity of district health management teams to plan and manage maternal health programmes – this might involve training or hands-on transfer of knowledge and skills.[32] In addition, there is a need to train health staff in post particularly with regard to improving practical skills.[36,37] Follow-up and supportive supervision are important to ensure that new knowledge and skills are put into practice, and to maintain standards of performance. In addition (or instead of) the traditional checklist, there should be an increased emphasis on mentoring, joint problem solving and a process of two-way communication between the supervisor and the supervised. This can help identify problems that affect service delivery, identify solutions and provide useful feedback to hospital managers for improving service quality.[26] Health staff retention initiatives such as giving incentives to staff to work in rural areas and asking medical graduates to work for the government for some years (e.g. 2 years) before full registration have been used successfully in some settings.[38]

## Health information system

Attempts should be made to strengthen the existing HIS to capture data for monitoring and evaluation of EOC. This might require training of healthcare providers and HIS staff to improve their data recording and reporting skills. It might also include training on perceptions and understanding of the importance of data recording, reporting, analysis and use of information for decision making. In particular, efforts should be made to ensure that the term 'emergency obstetric complication' is clear, and that such complications are clearly defined and recorded. Emphasis should be on the use of information to improve management decisions. Maternity registers should be reviewed (and if necessary revised) to ensure that they capture the necessary information for monitoring of EOC.

## Removing financial barriers

Financial barriers are a recognised major barrier to accessing EOC services. Having to pay for emergency health care does not only prevent women form receiving this care but may exacerbate poverty and long-term indebtedness. It may also challenge social expectations and patterns of reciprocity between husbands, wives and wider social networks.[39] EOC is a relatively cost-effective intervention that can prevent about half of maternal deaths and costs just 24% of the WHO Mother Baby Package.[40] Evidence suggests that fees for maternal health care do not contribute significantly to revenue and should be discouraged.[41] In almost all countries with low levels of maternal mortality, people do not pay for health services at the delivery point as the services are either free or are covered by a good health insurance system.[8] Financial barriers to EOC services can be overcome by making maternal health services free of charge or by adopting creative and effective financing mechanisms such as community-based health insurance schemes, voucher systems, micro-credit schemes and community-based emergency transport funds.[42–46]

## Improving the quality of EOC

Even where EOC services are available and accessible, women may die of obstetric complications if the services are of poor quality. It is therefore vital that women receive the best standard of care that the country can afford based on local resources. There are many ways of improving the

quality of EOC services, including clinical obstetric audit, setting service delivery standards, providing guidelines and protocols for standardised care and continued in-service training.[30] Evidence supports the use of maternal death audit, review of near-miss and criterion-based audit to improve the quality and utilisation of maternity care.[7–49] Quality of care should be improved from both the providers' perspective (technical clinical aspects, health outcomes) and women's viewpoint (participant satisfaction). Professional associations should be strengthened to establish quality assurance systems that ensure high standards of care, and to dialogue with governments, community leaders and faith-based organisations to remove cultural, religious and financial barriers.[30]

### Improving health seeking behaviour

Health education is important to improve health seeking behaviour. This is necessary to raise awareness of the danger signs in pregnancy and the importance of urgent medical treatment when complications occur and availability of EOC. Community participation and mobilisation are also important to create a supportive environment to enable women to access EOC. Men's participation is particularly important in addressing gender issues. These affect access to care in cultures where men are the main decision makers with regard to seeking health care. Special approaches are required to cater for the needs of refugees and displaced populations to ensure respect of human rights.[30]

## Conclusions

Availability of and access to EOC is a critical component of any maternal health care programme that aims to reduce maternal and newborn mortality and morbidity. In many settings, agreed minimum coverage with EOC is not met. In most cases, specific 'bottlenecks' or barriers to achieving improved coverage can easily be identified and must be addressed as a matter of urgency. ■

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