QUALITY OF MATERNITY CARE

SILVER BULLET OR RED HERRING?

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Acknowledgements

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OBJECTIVES OF THIS BOOKLET

This booklet targets researchers interested in measuring quality of maternal and perinatal health care. After reading this booklet the reader should be able to:

- apply a comprehensive definition of quality of health care to the context of maternal and perinatal care in developing countries;
- review definitions of Quality of Care (QoC) and propose and justify a definition of quality of maternity care;
- discuss concepts of QoC and develop a framework to assess quality of maternal and perinatal care in developing countries;
- identify areas for future research to improve the quality of maternal and perinatal care in developing countries.

PART I   Introduction

Ten years after the launch of the Safe Motherhood Initiative, pregnancy-related mortality and morbidity remains a serious health, social and economic problem in developing countries. Experience in developed and developing countries that have achieved low maternal mortality suggests that access to good quality care is a critical factor. Hence access to good quality obstetric care for all women is one of the key demands of the 1987 International Safe Motherhood Initiative (Nairobi), the 1994 International Conference for Population and Development (Cairo) and the 1995 Fourth World Conference on Women (Beijing). The 1993 World Development Report goes as far as to suggest that poor countries should invest over half of their clinical health-care budget in antenatal and delivery care (World Bank, 1993).

Understanding what good quality care is and how to evaluate improvements in quality should be a prerequisite to investing considerable resources in improving the quality of maternity care. Yet despite the enormous interest in providing access to good quality care, the lack of clarity surrounding the concepts of Quality of Care (QoC) acts as a barrier to progress.

The next three parts of this booklet:

- review definitions of QoC and propose and justify a definition of quality of maternity care;
- discuss concepts of QoC and develop a framework for assessing quality of maternal and perinatal care in developing countries; and
- identify areas for future research to improve the quality of maternal and perinatal care in developing countries.

PART II   What is Quality of Care?

'To improve quality one must first measure it. To measure it one must first define it' (Wilson & Goldsmith, 1995).

A)   *There is no single universally accepted definition of quality of health-care*

Quality of care (QoC) means many things to different people and there is no single universally accepted definition. Table 1 lists some of the definitions of QoC found in the literature. All definitions of QoC accept that biomedical outcomes are important, but agree on little else. Over time, definitions of quality of health-care have become more inclusive and now address user and provider satisfaction, social, emotional, medical and financial outcomes as well as aspects of equity and performance according to standards and guidelines. Yet, depending on the definition used, high quality care can be provided without satisfying the users or providers, without adhering to set standards or guidelines and without obtaining adequate financial, social and emotional outcomes. The definition chosen affects how QoC is measured and which aspect is targeted for improvement.

TABLE 1

Definitions of quality of health-care	
Early and medically orientated	Quality of Care is 'the application of medical science and technology in a manner that maximises its benefit to health without correspondingly increasing the risk' (Donabedian, 1980).
"	Quality of Care is 'the production of improved health and satisfaction of the population within the constraints of existing technology, resources and consumer circumstances' (Palmer, 1981).
"	Quality of Care is 'proper performance (according to standards) of interventions that are known to be safe, that are affordable to the society and that have the ability to produce an impact on mortality, morbidity and disability' (Roemer & Montoya-Aguilla, 1988).
"	Quality of Care is 'doing the right things right, obtaining the best possible clinical outcome, satisfying all customers, retaining talented staff and maintaining sound financial performance' (Leebov, 1991).
Recent and more comprehensive	Quality of Care is 'the sum of its four components parts: *technical quality* (measured by patients' health status improvement), *resource consumption* (measured by the costs of care), *patient satisfaction* (measured by patient perception of the subjective or interpersonal aspects of care), *values* (measured by the acceptability of any trade-offs that must be made among the previous three outcomes)' (Wilson & Goldsmith, 1995).

B) *Quality of maternity care requires a modified definition of QoC*

Maternity care differs from other areas of health care in the following ways:

- Most users of maternity services are well. Maternity services need to be wary of over-treating and over-medicalising pregnancy and childbirth, as well as of wasting resources.
- Some users of maternity services will develop conditions requiring a higher level of maternity care. Many of these conditions are unpredictable and life threatening. Maternity services therefore need to be wary of under-treating some women.
- Maternity care is aimed at least two recipients, the mother and the baby. Outcomes for both are important, so advantages and disadvantages for each need to be counterbalanced.
- Maternity services deal with the culturally and emotionally sensitive area of childbirth. Non-biomedical outcomes may be more important for childbirth than for other areas of health-care.

These aspects of maternity care have been incorporated in a comprehensive description of the conditions required to achieve high quality maternity care (see text box).

Proposed Definition: Quality of Care in Maternity Services

High QoC maternity services involve providing a minimum level of care to all pregnant women and their newborn babies and a higher level of care to those who need it. This should be done while obtaining the best possible medical outcome, and while providing care that satisfies women and their families and their care-providers. Such care should maintain sound managerial and financial performance and develop existing services in order to raise the standards of care provided to all women.

Not achieving one or more of the above conditions of high quality care leads to low quality care. Using a transparent managerial system (standards or guidelines) is believed to be necessary for achieving high quality care.

However, this definition is too comprehensive to be 'user-friendly'. In the sections below, the individual components of the definition are examined to clarify the relevant issues.

C) *The elements of high quality maternity care in more detail*

C.1 *'Providing a minimum level of care to <u>all</u> pregnant women and their newborn babies.'*

Minimum care is care that achieves the best outcomes on a population level if provided to all pregnant women and their newborn babies. Since most pregnancies are 'normal', such care should be evidence-based (the potential for harm must be known and it must be low) and cost-effective. Minimum care typically consists of preventative measures and of screening and cost-effective management of women who screen positive.

Example: Screening for syphilis and treating identified cases (Jenniskens et al, 1995; Cameron et al, 1997); delivering hygienically; vaccinating in pregnancy for tetanus where anti-tetanus protection is not achieved earlier; and supplementing with iodine in pregnancy in iodine-deficient areas (Mahomed & Gülmezoglu, 1998).

Equity, reaching all women, is particularly important. Maternity services are often most needed by those least likely to use them. A service is of low quality at a population level if it is not available to rural, illiterate, very poor, young, unsupported and/or minority ethnic-group women (Fawcus et al, 1996; Friedman, 1994).

C.2 *'Providing a higher level of care to those who need it.'*

Higher level of care is care that achieves the best outcomes if provided to some, but not all, women.

Example: Blood transfusions can save some women's lives but are harmful to women who don't need them. Similarly, delivering a woman with severe pre-eclampsia at 38 weeks is beneficial but routinely inducting labour at 38 weeks gestation for all women is not.

It has been proposed that 9-15% of pregnant women require medical care in pregnancy above the level of minimum care (Maine et al, 1992; Koblinsky et al, 1995; WHO, 1994), although the empirical basis for this assumption is weak. In the National Birth Center study in the US, 8% of the mothers or infants had serious complications in pregnancy; 12% were transferred to higher level care in labour and 4% after delivery (Rooks et al, 1992). In a Stockholm trial, 14% of low risk mothers assigned to birthing centre care were transferred antenatally, 23% of the remaining women were transferred in labour and 3% during the

postpartum (Waldenstrom et al, 1997), bringing the total requiring higher level care to nearly 40%. There are few comparable data published for developing countries; one of the studies, the MOMA study from seven urban sites in West Africa, shows that 3-9% of pregnant women experienced severe obstetric morbidities (Bouvier Colle et al, 1998). It is now widely accepted that it is not possible to accurately predict who these women with complications will be.

Minimum and higher level care have to be context specific: Interventions vary in how culturally acceptable they are, how easy they are to introduce, how trained the person providing them needs to be, and how much they cost per adverse outcome prevented. Populations have different priority needs, different health systems and different resources with which to deliver maternity care packages. Consequently, minimum care packages will differ between countries (see Table 2), as will higher level care. In poor countries, the correct management of obstructed labour where the foetus has died is often a destructive operation (which destroys parts of the foetus's body to reduce its size) followed by vaginal delivery. In affluent countries these cases are usually managed by Caesarean section.

TABLE 2

Examples of routine interventions recommended for all women as part of the minimum care package	**Nepal**	**UK**
Tetanus toxoid immunisation	✓	
Routine iodine supplementation	✓	
Syphilis screening	✓	✓
External cephalic version in breech presentation after 36 weeks	✓	✓
Screening for congenital abnormalities		✓

National Maternity Care Guidelines, Nepal. Ministry of Health, Nepal, UNICEF, Nepal, 1996.

Also, providing higher level care for some should generally not interfere with providing minimum care to the entire population. For example, we would judge that antenatal screening for congenital abnormalities should not be performed at the expense of iodine supplementation where iodine deficiency and cretinism were endemic. However, there are instances where this is not the case: life-saving care for a few women may be prioritised over a less efficacious preventive measure for all women.

C.3 *'Obtaining the best possible medical outcome for mother and baby.'*

The final medical outcome of any health problem depends on the nature of the problem and the efficacy of the available interventions, as well as on the quality of care. Some adverse medical outcomes occur despite good quality of care.

Example: In the UK between 1985 to 1993 (HMSO, 1996), 55% of maternal deaths occurred despite being judged to have received high quality medical care.

Furthermore, a single condition or intervention can result in one outcome for the mother and another for the baby. Interventions that maximise the benefit for one individual may reduce benefits for the other.

Example: A very low birth-weight baby in breech presentation may benefit from elective Caesarean section (Gorbe et al, 1997). However this may lead to more maternal morbidity than a vaginal delivery (van-Ham et al, 1997).

C.4 *'Providing care which satisfies users and providers.'*

User satisfaction is yet another care outcome that may be independent of other outcomes (see Table 3 for examples). In particular, satisfaction depends on the value given to specific medical outcomes, which varies between cultures and individuals.

Example: Many mothers in Brazil request delivery by Caesarean section (Barros et al, 1991). Caesarean sections that are not medically indicated may thus be accepted because they are seen to be a "modern" way of delivering. By contrast, many women in sub-Saharan Africa try to avoid Caesarean sections as they can be viewed as an indicator of infidelity (Kamara, 1990; Betts, 1993).

Users may feel satisfied with the care they receive despite poor biomedical outcomes. Alternatively, the value given to good biomedical outcomes may override other aspects of care deemed to be poor.

Example: 'I waited a long time to be seen by a doctor and when he came he was not very nice to me, but then he saved my baby and that is all that counts.'

Different aspects of care may satisfy health service users and various cadres of providers; care which is desirable for one may be undesirable for the other. For example, the majority of Lebanese women in the capital, Beirut, wanted their husbands to accompany them during delivery, while women in a rural area, the Beqaa, preferred to be cared for by medical providers alone (Kabakian-Khasholian et al, 2000). Similarly, doctors may enjoy practising what they perceive to be state-of-the-art obstetrics involving unnecessary interventions; midwives may get satisfaction from not needing to involve doctors; and mothers may value being treated nicely and having a healthy baby (see Table 3 for examples).

TABLE 3

Issue	Example
High levels of satisfaction with service despite poor outcomes	Women who have had a stillbirth can have a high degree of satisfaction with care they received (Kuse-Isingschulte et al, 1996).
Low levels of satisfaction despite good biomedical and emotional outcomes	Women who received reduced antenatal care were less happy than those who received standard antenatal care despite having similar biomedical outcomes were (Sikorski et al, 1996).
Anticipating low levels of satisfaction and quality leads to poor outcomes	Anticipated level of satisfaction by both users and providers can determine the use and provision of services (Reerink et al, 1996; Dennis, 1995). Qualitative research in Haiti (Barnes-Josiah et al, 1998) found that women expected poor QoC and so delayed seeking care. This delay often contributed to the poor outcome. The poor outcome again reinforces the expectation of poor QoC for future users.
Health-care providers and users derive satisfaction from different outcomes.	Provider-induced demand may lead to high rates of Caesarean section among private patients (King, 1993; Keeler & Brodie, 1993).
Similar groups of users may be satisfied with high or low intervention rates.	Low-risk women show higher levels of satisfaction if delivered in midwife-led, rather than obstetrician-led, units (Hundley et al, 1994, 1995; Hodnett, 1999). However, given the choice, some low-risk women would prefer an elective Caesarean to a normal vaginal delivery (Mould et al, 1996).

C.5 *'Maintaining sound managerial and financial performance and developing existing services to raise the standards of care provided to all women.'*

Providing a sustainable service to a population requires maintaining a sound financial performance and investing in the service's future. Using resources to create future benefits means denying those resources to women using the service at present. Investing in future quality and sustainability of the health service could thus reduce the current QoC.

Examples: Sending the single midwife of a health centre on a training course means that she is not available to deliver babies. Rationing antibiotics for use later during a year means denying them to some patients who may benefit from them.

The content of care depends on available resources. Where resources change (e.g. new interventions become available or established ones become unaffordable) the content of care has to change as well. This is easier to do with a transparent system. A transparent system makes it obvious who does what, when, where and under which conditions, and why and how resources are used. One way of achieving transparency is to use standards (which must be adhered to) and guidelines (which should be adhered to). Most research on the effect of standards and guidelines has been conducted in developed countries. In a systematic review, Grimshaw and Russell (1993) found that guidelines led to <u>variable</u> improvements in clinical practice and outcomes, and that the introduction of guidelines did not always accelerate change (also see Table 4).

TABLE 4

Examples for the effect of guidelines on maternity care	
positive effect	Introduction of guidelines reduced Caesarean sections in Zimbabwe and Jordan by around 50% without adversely affecting perinatal outcomes (Ziadeh & Sunna, 1995; De-Muylder &Thiery, 1990).
no effect	In 1992, Florida state law introduced of practice guidelines regarding Caesarean section deliveries. This initiative did not change Caesarean delivery trends, which were already decreasing (Studnicki et al, 1997).
negative effect	In the former Soviet Union, detailed and often out-of-date standards have to be adhered to, even if clinical common sense or evidence-based medicine suggests a different action.

D)   *The need for trade-offs or values*

What becomes apparent as soon as the components of quality of maternity care are looked at in detail is the need for trade-offs between outcomes. Indeed Wilson and Goldsmith (1995) incorporate the concept of *values* in their definition of QoC in recognition of the fact that it is not always possible to maximise all outcomes for all individuals. In the case of maternity care, there may be a need to balance minimal versus

higher level care; biomedical outcomes for the mother versus the infant; biomedical outcomes versus satisfaction and emotional outcomes; provider versus user satisfaction; and benefits to current versus future users. These trade-offs will be context specific and will change over time. They also need to be negotiated within the context of other priorities in health and other sectors.

Summary:

Over the last two decades, the generic definition of Quality of Care has broadened beyond exclusively biomedical outcomes, and will undoubtedly evolve further. There is no general agreement as to what constitutes high quality care. We propose a comprehensive definition of high quality maternity care which includes: (i) the provision of a minimum level of care to all pregnant women and their newborn babies and (ii) a higher level of care to those who need it; (iii) obtaining the best possible medical outcome; (iv) providing care that satisfies women, their families and care providers, and (v) maintaining sound financial performance and developing existing services to raise the standards of care provided to all women.

Achieving the highest level of QoC necessitates trade-offs between the needs of the individual and the population, mother and baby, user and provider, and between current and future benefits.

PART III Concepts and issues in measuring Quality of Care

A) Introduction

' Only with reliable measurement can we ascertain if improvement (...in quality...) has occurred and consumers can choose between providers based on their performance' (Wilson & Goldsmith, 1995).

Irrespective of whether the interest in Quality of Care (QoC) stems from the desire of providers to improve or maintain their own services or from a need for external groups to assess the service, measurement is an essential requirement. Moreover, current management ideas follow an 'improvement cycle', so that measurement needs to be repeated. For example, the UNICEF/Management Science for Health website of 'Managing for Quality' (http://erc.msh.org/quality) suggests the following steps to improve QoC:

- Identifying the problem - Which problem should I address? If there are several, how do I choose the most important one?
- Describing the problem - How do I accurately and completely describe the problem?
- Analysing the problem - What are the different causes of the problem, and which causes are most important to solve right away?
- Planning the solutions - What are the different alternative solutions for solving the problem?
- Implementing the solutions - How do I make sure the solutions are implemented correctly and effectively?
- Monitoring/evaluating the solutions - How did the solutions work? What needs to be changed?

These steps involve identifying, describing and analysing the situation (i.e. measuring the QoC), planning and implementing changes and monitoring / evaluating their effect (i.e. measuring QoC again) as crucial steps of this cycle. This approach assumes that removing obstacles to high quality care will improve QoC and works reasonably well for problem solving.

B)   *Measuring QoC outcomes*

Our definition of QoC has the following five components: minimum level of care for all; higher level of care for some; obtaining the best possible outcomes for mothers and babies; providing care which satisfies users and providers; and maintaining good managerial and financial performance, developing existing services for women. This section discusses the state-of-the-art in measuring the first four aspects of QoC. The last aspect is alluded to in Section III.C but discussion of financial performance and development of health services is beyond the scope of this paper.

B.1   *Assessing the minimum level of care to pregnant women and their newborn babies.*

Determining if all women and babies receive adequate minimum care requires knowing:

- the content of the minimum care package;
- the coverage of the minimum care package;
- the effectiveness of the service in delivering the package.

Knowing the <u>content</u> of the minimum package of care is essential to any systematic assessment of quality. In theory this is straightforward but in practice it can be difficult and time-consuming to identify what is supposed to be done in a country or a facility.

Although all aspects of minimum care are equally important, <u>coverage</u> is the aspect of quality most commonly covered. Thus, for example, international institutions like UNICEF and WHO promote the collection of data that quantify the proportion of pregnant women who have one antenatal care visit, receiving 4+ antenatal care visits, or having a visit in the first trimester. Other commonly collected indicators measure the proportion of pregnant women receiving tetanus toxoid immunisations, attended by skilled providers, or receiving 60+ or 90+ iron supplementation tablets (see Table 6). It is possible but much less common for countries to assess coverage of other aspects of minimum care that are meant to be universally provided, such as syphilis screening, taking a pregnancy history, measuring blood pressure, collecting and

testing of urine specimens, discussing where delivery will take place. Coverage is usually measured using health service records or via questions put to women in household surveys such as the DHS.

TABLE 6

Indicators proposed by various agencies to monitor minimum level care			
	USAID(1)	**WHO (2)**	**UNFPA(3)**
Proportion of women with prenatal care by trained personnel	✓	✓	✓
Percentage of pregnant women with tetanus toxoid immunisation	✓		✓
Proportion of births attended by trained health personnel	✓	✓	✓
Proportion of women with a postnatal care visit after delivery			✓
Percentage of adults knowing about maternal complications	✓		
Iron supplementation		✓	✓
Syphilis screening		✓	✓

Note: (1) based on shortlist of suggested indicators; (2) based on minimal monitoring list; (3) based on core list of suggested indicators; and (4) based on suggested process indicators.
Source: 1: Koblinsky et al, 1995; 2: WHO, 1994; 3: UNFPA, 1996.

Effectiveness of the minimum care is also often neglected. This can be problematic as the gap between efficacy and effectiveness can be considerable (for examples see Table 7). Coverage indicators such as 'proportion of mothers who received tetanus toxoid during pregnancy' and 'percentage of women delivered by a trained birth attendant' are only useful if the effectiveness of the intervention is known or can be assumed/measured via other indicators. For example by knowing: (i) percentage of cold chains maintained, and (ii) percentage of 'skilled providers' who are competent in life saving procedures.

Often what is needed is more site specific and in-depth information about the processes taking place and the resulting outcomes. For instance, while it is easy to determine reference population (all pregnant women) and the intervention for the 'minimum care package', it is often difficult to be certain that the intervention is used as intended. This may require observation of health care providers. Some of these issues are discussed below in Section III.C.

Example: Oxytocics earmarked for the prevention or treatment of postpartum haemorrhage may be used to 'accelerate labour' and may contribute to an 'epidemic' of ruptured uterus; a simple review of the drug flow to obstetric units may not reveal this.

TABLE 7

Examples for a large gap between efficacy and effectiveness among components of the minimum package		
Maternal tetanus vaccination to prevent neonatal tetanus	Efficacy	Very high (Newell et al, 1966).
	Effectiveness	May be low: in one programme nearly half the tested vaccine samples were of inadequate potency (Dietz et al, 1996).
Hand washing training to prevent infection	Efficacy	High (Semmelweiss, 1983).
	Effectiveness	Low: In Bangladesh, only 54% of trained TBAs washed their hands with soap before delivery (Goodburn et al, 1994). In the USA (Watanakunakorn et al, 1998) only 39% of health workers in medical intensive care units washed their hands as required.

A final point is that routinely providing a higher level of care does not improve biomedical outcomes for low risk women. It is therefore necessary to distinguish those who received higher level care without needing it. This is rarely done explicitly because it implies rationing and can be interpreted as interfering with the professional autonomy of the providers. However, using higher level care when it is not needed wastes resources (which may be in the individual woman's interest) and carries risks associated with unnecessary interventions (such as HIV transmission through a blood transfusion that is not indicated) and may reduce user and provider satisfaction (Hodnett, 1998). It is impossible to assess quality of care without describing care in relation to need.

B.2 *Assessing the higher level of care*

Assessing higher level care can be accomplished either at the population level or at the facility level where we expect to see women identified as needing higher level care.

Determining if women and babies who should receive higher level care actually receive adequate care requires knowing:

- the availability of higher level care;
- correctly assessing the need for care;
- the effectiveness of care.

Some indicators that assess availability of higher level care are given in Table 8.

TABLE 8

Essential Obstetric Care (EOC)	USAID(1)	WHO(2)	UNFPA(3)	UNICEF(4)
Number of EOC facilities per 500,000 population	✓	✓		✓
Percentage of population within 1 hour travel time of EOC / Geographic distribution of EOC facilities		✓		✓
C-sections as a proportion of all births in the population	✓	✓	✓	✓
Proportion of expected complicated cases managed at EOC facilities (Met need for EOC)	✓	✓	✓	✓

Source: 1: Koblinsky et al, 1995; 2: UNFPA, 1996; 3: WHO, 1994; 4: UNICEF, WHO, UNFPA, 1997.

It is possible to measure coverage or use by counting the women with complications who use health facilities. By making some assumptions this number can be translated into a potentially useful indicator. All options assume that the potential for positive outcomes is much greater when care for obstetric complications is provided at the appropriate, higher level of care. Women with specific complications who are not treated at a district hospital (or a similar institution) are considered to have received inadequate care. The number of complications observed in health facilities (usually the district hospital) is recorded. This is interpreted against an expected number of complications derived using one of four possible options:

1)   A standard 'guesstimate' of 15% of all deliveries in a geographic catchment area (sometimes termed a 'met-need' indicator) (Koblinsky et al, 1995; WHO, 1994);

2)   The percentage of births with major obstetrical interventions for maternal indications (Ronsmans et al, 1999; De Brouwere et al, 1996);

3)   A specific prevalence of specific complications based on the literature (Pittrof, 1997); or

4)   A figure based on women's reported prevalence of complications in the population under study.

The first approach, promoted by UNICEF, has been tried in India (Nirupam & Yuster, 1995) and other countries (Table 9). Although it seems desirable to include the main direct causes of maternal death, there is little consensus of what constitutes a complication. Nirupam and Yuster incorporated the notion of interventions, and considered "any obstetric case during and following pregnancy requiring operative

intervention (excluding routine episiotomy), transfusion, antibiotics or management of hypertension, severe anaemia, unusual bleeding, obstructed labour or unusual presentation (including breech)".

A second approach has been to look at the absolute number of complications expressed as a percentage of births (De Brouwere et al, 1996; Ronsmans et al, 1999). These authors estimate service use among a subgroup with specific indications. For example, De Brouwere and colleagues (1996) define absolute maternal indications as severe antepartum haemorrhage due to placenta praevia or abruptio placentae, unremitting postpartum haemorrhage, major feto-pelvic disproportion (due to a small pelvis or hydrocephalus; including uterine pre-rupture and rupture), transverse lie and brow presentation. Ronsmans and colleagues (1999) compare this approach to the previous one of using 15% and argue that it performs somewhat better as an indicator.

The third approach, termed *O*bserved *V*ersus *E*xpected *R*atio (*OVER*), seeks to assess conditions that are distinct and obvious, easy to diagnose, and difficult to misclassify (Pittrof, 1997). The *OVER* method also requires that each chosen condition has a biologically determined incidence within a population of pregnant women which is largely independent of the knowledge, skills or management preferences of the health service providers. Breech presentation, twin pregnancy at delivery and, to a lesser extent, management of a pregnancy complicated by placenta praevia or placental abruption all fulfil these conditions. The *OVER* for placenta praevia and placental abruption assesses coverage for emergencies requiring rapid management (such as Caesarean section for antepartum haemorrhage) while the *OVER* for twins and breech assesses coverage for conditions which can be diagnosed antenatally or during early labour (i.e. before the emergency condition arises). These conditions are routinely recorded in delivery registers or even compiled in annual statistics of many institutions, thereby minimising the need for new data collection.

In the fourth approach, the number of women/ babies with a condition and the number with correct management of the condition are used to calculate the proportion 'expected versus provided management'. This proportion can only be calculated if the correct diagnosis can be ascertained. This has not proved easy to do using household surveys (Validation Task Force, 1997). The method provides misleading results if the diagnosis was wrong even if management was correct for the diagnosis. It is also problematic if the

diagnosis was wrong but the management was correct for her true condition.

Example: in a resource-poor setting, the appropriate management of cephalopelvic disproportion if the foetus is dead is to perform a destructive operation in labour. The diagnosis of intrauterine death may be wrong but once made the management will ensure that a dead baby is delivered and the original diagnosis cannot be verified.

In reality these approaches are limited to reviewing conditions which are difficult to miss. However, even if the data are available, great care has to be taken when using routine statistics to calculate these measures (see Table 9 for examples).

TABLE 9

Problems in calculating the proportion of expected versus provided management		
Using medical records or log books to evaluate higher level care	Encouraging results	In Zimbabwe, Pittrof (1997) was able to use labour ward registers, population size and estimated complication rates to calculate access to care for institutions capable of providing adequate care. He found that <25% and <45% of the breech and twin deliveries respectively, <10% of pregnancies complicated by placental abruptions and <5% of the pregnancies complicated by placenta praevia were managed in an appropriate institution.
		In Ghana review of record-keeping in ten facilities showed that data on obstetric complications were inconsistent, missing, or not collected at all. Danquah and colleagues (1997) were able to improve record keeping through staff training and monitoring visits.
	Discouraging Results	In USA, Chez and colleagues (1997) found that labour ward log books were a poor source of information and contained errors in up to 60% of entries when compared to case notes. In Assuit, Egypt, only 20% of primary medical recorded the presence or absence of problems in pregnancy and only 1% recorded birth-weight or an Apgar score (Abdullah et al, 1995).
Using care received in the appropriate place as a proxy for appropriate care	Encouraging results	Roth and colleagues (1995) found that in the USA survival among very low-birth-weight (<1500g) babies was better if they were born in a tertiary hospital. Sidhu and colleagues (1989) found that significantly improved survival among babies in Northern Ireland admitted to perinatal intensive care when compared to babies where admission was refused.
	Discouraging results	Krauss Silva (1997) evaluated the effect of quality of care on preventable perinatal mortality in Brazil and found no correlation between 'appropriate place of care and perinatal outcome'. In Puerto Rico, Becerra and colleagues (1989) found no significant differences in outcomes between different levels of neonatal care units.

B.3 *Measuring medical outcomes*

Which outcome should be investigated?

All definitions of QoC associate a low frequency of poor medical outcomes with high quality. Moreover, since preventing adverse medical outcomes is the main goal of most health services and clinical outcomes are often recorded routinely, such outcomes are a natural starting point for assessing QoC. The most useful outcomes for monitoring QoC are those which are:

- clearly defined;
- relevant;
- easy to measure;
- frequent; and
- sensitive to changes in the quality of maternity care provided.

Commonly measured medical outcomes include maternal mortality, perinatal mortality, intrapartum stillbirth, birth-weight, Apgar score, life-threatening maternal complications (near misses), Caesarean section and assisted delivery, episiotomy and perineal tear, manual removal of placenta, maternal or neonatal admission to intensive care units, blood transfusion, wound infection, breast feeding and maternal anaemia. Table 10 gives examples of some of the weaknesses and strengths of counting some of these outcomes.

TABLE 10

Outcome	Weaknesses and strengths	Comment/Example
Strength and weakness of some commonly assessed medical (obstetric) outcomes		
Maternal deaths	Deaths are unambiguous, easy to define and relevant. But maternal deaths are infrequent. Very large sample sizes are required to show a statistically significant impact of higher quality care and effective interventions. Even larger samples are required to calculate case-fatality rates, which by definition are a cause-specific sub-set of all maternal deaths	In a survey of 32,215 households in Addis Ababa, Kwast and colleagues (1985) found only 45 maternal deaths, though the maternal mortality ratio was 566 deaths/100,000 life births (95% confidence intervals 374-758). If, after an intervention halving this MMR a repeat survey was performed, no statistically significant improvement would have been detected (MMR 283 95% CI 175-391) as the confidence intervals of both surveys would overlap.
	Mortality is a threatening outcome to monitor.	Where maternal mortality reviews lead to dismissal or demotion of providers (such as in countries of the former Soviet Union) providers see them as a question of professional survival and not a tool to improve the QoC.
Near misses	Evens are more common than death but identification requires good record keeping	Filippi and colleagues (1997) used near miss cases to stimulate discussion within a hospital setting in Benin. Mantel and colleagues (1998) found that the pattern of near miss cases in South Africa reflects that of maternal deaths and that the investigation of near misses identified the same avoidable factors of poor quality care as the investigation of deaths.
Caesarean sections/ Episiotomy / Operative delivery/ Admissions to special care units	Interventions are clearly defined and often routinely recorded. But over- and under-use may cancel each other out and simulate high quality when the reverse is true.	UNICEF et al (1997) suggest that 5-15% of all deliveries should be conducted by Caesarean section to meet the needs of mothers and babies. Caesarean section rates have been proposed as an indicator of use/coverage of emergency services, and measure of unmet need (WHO, 1994; De Brouwere et al, 1996). Overall rates may be misleading, as overuse in socially advantaged women cannot compensate for under use in socially disadvantaged women (Hussein & Campbell, 1996). The ideal Caesarean section rate remains unknown and depends on the case mix and facilities available.
Birth-weight	These outcomes should be routinely recorded if they occur within the health service.	Easy to measure, low birth-weight is closely correlated to neonatal survival. A high rate of low birth-weight babies in referral centres may indicate poor health of the population, appropriate referral of high-risk pregnancies, a high number of inappropriate premature deliveries, failure to screen for and or prevent maternal or congenital infections.
Apgar Scores	If births occur outside the health service, the measures are often difficult to obtain.	Validity of routine recordings has to be checked as it is commonplace to write 8/10 and 10/10 on every occasion, leading to a poor positive predictive value of low Apgar scores (Wolf et al, 1998).
Stillbirth/ Perinatal deaths/ Neonatal deaths	The relationship to QoC is often not clear.	Perinatal deaths are easy to measure and low rates in facilities may indicate good antenatal and intrapartum care. However, perinatal deaths are more common in high-risk pregnancies and a pregnancy with an intrauterine death should be managed in a referral centre, making it appear that such facilities have poor QoC. A low number of stillbirths in a referral centre may also indicate a failure to refer women with intrauterine death. A low rate of neonatal deaths in the community may indicate inadequate registration of births and deaths not high QoC.

Things besides Quality of Care can influence the frequency of adverse medical outcomes

Unfortunately, the QoC provided by an institution is not the sole determinant of adverse medical outcomes. In addition to QoC, the frequency of adverse outcomes depends on:

- the definition of the outcome;
- the effort put into case finding;
- the number of cases, and hence statistical variation (chance);
- the prevalence of certain conditions in the population of service users (the case mix).

Example: differences in definition have reduced the validity of surgical wound infection as a clinical indicator of quality of care (McLaws et al, 1997);

Example: Throughout the life of the 'Confidential enquiries into maternal deaths in the United Kingdom', almost everything that influences outcomes has changed (HMSO 1996, 1998) (Tables 11, 12 and 13).

TABLE 11

Different Definitions of Maternities	
Until 1.10.1992	Mothers delivered of registrable live birth at any gestation or stillbirth of **28** weeks gestation or later
After 1.10.1992	Mothers delivered of registrable live birth at any gestation or stillbirth of **24** weeks gestation or later

TABLE 12

Different amount of effort put into case finding				
	Maternal deaths known			
Year	to 'Registrar General'			to 'Report on confidential enquiries into maternal deaths in the UK'	
	Number	MMR	% of deaths known to confidential enquiry	Number	MMR
1991-93	140	6	61	228	9.8
1994-96	163	7.4	61	268*	12.2

* Reflecting improved case finding. If the old case finding method was used, 218 cases would have been detected and the MMR would have been 9.9.

TABLE 13

Statistical (chance) variation				
Country (1985-93)	Number of deliveries	Number of direct and indirect maternal deaths	Maternal mortality rate (MMR)	Odds ratio (95% confidence intervals) showing no difference compared to N. Ireland
England	5,834,735	570	9.8	1.39 (0.84 - 2.33)
Wales	341,220	40	11.7	1.67 (0.95 - 2.94)
Scotland	593,758	62	10.4	1.49 (0.85 -2.64)
N. Ireland	242,067	17	7.0	1.0

However concerns over variations in the definition, the effort put into case finding and statistical variation can be controlled for, or at least assessed. By contrast, case mix is potentially the most important and problematic of the factors affecting the frequency of adverse outcomes. It depends on: the frequency of individual conditions; the disease stage or severity at presentation; and possibly the nutritional, social, economic and psychological conditions of patients presenting for care. Table 14 gives an example of how one aspect of case mix of pregnant women has changed over time in the UK. Since a woman's age at her first maternity affects the risk of an adverse outcome, some of the differences in MMR observed in the different years could be due to changes in case mix and not changes in QoC.

TABLE 14

Differences in case mix	
England and Wales	Proportion of women with an age at first maternity of <25 years
1985-87	38%
1988-90	35%
1991-93	31%
1994-96 (UK)	27%

A theoretically attractive approach for overcoming the effect of variations in case mix is adjustment (Wilson & Goldsmith, 1995; Leyland et al, 1991). In practice adjustment for case mix has only a limited place. Risk adjustment of mortality rates have been used by the US Health Care Financing Administration since 1986 to compare hospital QoC provided to Medicare programme beneficiaries. Although initial reports got a lot of attention, since 1993 these data have been released quietly as they are not deemed to contain much useful information (HCFA, 1993). Adopting a similar approach may more difficult in obstetric care where the

number of adverse events in any individual institution will be small (Clarke et al, 1993). Adjustment methods work best with large data sets (e.g. all deliveries during the last 10 years), making them difficult to use to monitor the effect of changes and to manage programmes (see Table 15 for examples).

TABLE 15

Examples of the need for, and the effects of adjusting for case mix		
Outcome	**Need for, and effect of, adjustment**	**Example**
Caesarean section rates	Adjustment can make a big difference in outlier status.	Aron and colleagues (1998) ranked 21 hospitals in northeast Ohio (USA) by observed and risk-adjusted Caesarean delivery rates. Unadjusted and adjusted hospital rankings correlated only modest and adjusting changed the outlier status for 5 hospitals (24%).
	Since social status can affect the frequency of intervention, the relationship between need intervention and social class may not be predictable.	Women in poor health need more obstetric interventions. Reviewing Caesarean section rates in Egypt, Hussein and Campbell (1996) found that women presumed to have the highest need (i.e. the poorest women) had a Caesarean section rates of <2%, while better off women experienced rates over 15%. Failing to adjust for social status would provide a false picture by hiding the fact that women with high social status receive poor QoC because they have too many interventions, while those of low social status receive poor QoC because they have too few interventions.
Foetal and neonatal mortality rates	Adjustment has potential to make a big difference.	In Illinois, USA, Dooley and colleagues (1997) found that maternal socio-behavioural risk factors explained 73% of the variation in hospital foetal death rates. This suggests the influence of QoC on foetal death rates is much smaller than that of socio-behavioural risk factors in the case mix of the population. Not adjusting for social status could create a false picture of QoC of an institution.
Frequency of outcomes	High quality preventive work may lead to worse disease-specific outcomes so good institutions receive poor assessments.	Current antenatal care schedules are better at preventing eclampsia in late than early pregnancy. Good antenatal care therefore leads to a higher proportion of early pre-eclampsia, which has worse perinatal outcomes than late pregnancy eclampsia. Units providing good care may thus have worse perinatal outcomes among their eclampsia cases than units providing poor antenatal care (though they should have fewer cases overall).
	Patient choices may lead to poor outcomes.	A patient may refuse indicated and effective treatment. Adverse outcomes in such patients may not be an indicator of poor quality care.
	'Dishonest' institutions receive high assessments.	Institutions may systematically misclassify the severity of cases (e.g. report uncomplicated hypertension as severe pre-eclampsia). There are many examples where the frequency of high-risk patients increased over time following the introduction of case mix monitoring (Greenland & Neutra, 1983; McKee, 1997). By 'inflating the case mix', such institutions improve their QoC assessments.
Quality of prenatal care	Adjustment may not be necessary.	In southeast Michigan, USA, Klinkman and colleagues (1997) found that no overall measurable difference in the quality of prenatal care provided to private, insured and uninsured patients.

The best method currently available for inter-facility comparison in maternity care excludes the majority of mother/baby pairs rather than adjusts for case mix. Cleary and colleagues (1996) analysed the care received by 15,463 **'standard primipara'** in London, UK. A standard primipara was defined as being white, aged 20 to 34 years, more than 155 cm tall, delivering a singleton cephalic foetus of 37+ completed weeks of gestation, in the unit where she originally booked. Women experiencing medical complications during pregnancy were excluded. This approach permits the comparison of complication and intervention rates between institutions, such as Caesarean section rates. However, over half of all primiparae and all multiparae are excluded, and no information on QoC is available for complicated pregnancies that are most at risk of adverse outcomes.

Provided it is possible to compare like-with-like (by using adjustment or exclusion methods to account for differences in case mix) and clear and easy to use definitions and standardised methods of measurement are available, QoC can be compared between facilities. However, these methods also require experience in data collection, processing and analysis (Table 15). Also, they do not identify where quality problems occurred and thus do not help institutions to address them. Successful measurement and case mix adjustment also leave the issue of which indicator to use. Measuring related but different outcomes can result in major changes in hospital QoC ranking. Silber and colleagues (1997) used hospital death, complications of procedures and deaths following complications of procedures (failure to rescue) to evaluate general surgical care in 142 USA hospitals. Hospital ranking based on complication rates did not correlate well with ranking based on death rates (r=0.208), or with those based on failure to rescue rates (r=-0.09). Until the best clinical indicator for hospital ranking is determined, it remains a relatively arbitrary procedure. In theory, however, potential health care users could avoid institutions with low QoC and use facilities with higher QoC. This would require the presence of more than one health care institution (traditional, public or private), a luxury frequently unavailable in poor countries.

B.4 *Measuring satisfaction of users and providers*

As discussed in Section II.C.4, satisfaction is partly dependent on clinical outcomes. Furthermore, satisfaction of users and care providers depends on interactions with others (provider-provider, provider-user, user-user) and on their expectations. While there are many reports on patient satisfaction (see Table 16), there are fewer on provider satisfaction. Moreover, there does not appear to be a gold standard method of assessing satisfaction. Large-scale quantitative surveys in developed countries include work by Brown and colleagues (1994), Kojo-Austin and colleagues (1993) and Garcia and colleagues (1998). In developed countries, postal surveys seem to be a preferred method (Cartwright, 1988; Oakley et al, 1998). In developing countries, researchers are often restricted to using exit interviews, focus group discussions, key informant interviews and mystery clients (Huntingdon et al, 1990).

TABLE 16

Patient satisfaction surveys	
Key finding	**Example**
Different response rates can lead to bias	In 1993 Brown and Lumley conducted a state-wide postal survey of 2224 women who gave birth in Victoria, Australia excepting women with a stillbirth or whose baby was known to have died. The survey questionnaire was mailed to women 6-7 months after the birth. The overall response rate was 62.5% (1336/2138). However the response rate for subgroups were lower (for example, non-English speaking women-39%; single women-17%; women under 20 years of age-49%).
Surveys are difficult to construct and evaluate	Summarising satisfaction results is not easy. Rating scales cannot be added up as satisfaction in one area should not cancel out dissatisfaction in another (Carr-Hill, 1992). Apparent satisfaction according to the rating scale is often accompanied by written comments suggesting less satisfaction (Brown & Lumley, 1997). Exit interviews in Kenya, Botswana and Tanzania found poor correlation between actual waiting time and satisfaction with the waiting time and actual clinic opening hours and satisfaction with clinic opening hours (Stein, 1998).
Structured surveys have been used in some developing countries	Researchers in Saudi Arabia (Al Nasser, 1994), Egypt (El Mouelhy, 1994), Liberia (Jackson & Jackson, 1987), and Mexico (Alcalay et al, 1993), among others, have used structures interviews to obtain women's views.
Postal surveys can be used in national studies of pregnancy and delivery in developed countries	A study of experiences and attitudes of 800 newly delivered mothers showed that postal surveys are cheaper, more easily repeatable, and minimise interviewer effects when compared to interviews (Cartwright, 1988). Response rates can be increased if two reminders are sent containing a survey form and self addressed pre-paid envelopes (Cartwright, 1986; Lelong et al, 1997). Postal surveys may provide better information about sensitive issues (Oakley et al, 1990).

Focus group discussion and informant interviews	Both MotherCare and the Prevention of Maternal Mortality Network among others have used focus groups to identify women's concerns over and satisfaction with maternity care services in developing countries. Mother Care and Kabakian-Khasholian et al (2000) have also used in-depth interviews to assess similar issues. These approaches have also been used in developed countries (e.g. Procter, 1998). Jewkes et al (1998) did interviews with staff in South Africa on why nurses abused women.

The literature suggests the following aspects have to be considered when assessing satisfaction:

- **Timing**: Literature on in-patient satisfaction with care suggests that satisfaction may have a 'U'-shaped curve. Ratings are likely to be high while people are still in facilities, fall within the weeks after discharge and rise again as memories of unpleasant events fade (Erb et al, 1983; Bennett, 1985; Westbrook, 1993).

- **Selection bias and representativeness**: Satisfaction surveys may exclude those would provide the most useful information. Ehnfors and Smedby (1993) found satisfaction surveys were unlikely to include patients who were old or confused, had language difficulties, were seriously ill, or who died during the care episode. The same is likely to apply to patients who sue an institution, who do not pay their fees, are illiterate, or give a wrong address or telephone number.

- **Validity and respondent bias:** Surveys of patient satisfaction often elicit too positive a response. This may be because patients believe that caregivers will have access to the survey information, or because of a general desire to please the interviewer (Locker & Dunt, 1978; Carr-Hill, 1992; Westbrook, 1993). Patients who agree to respond to a satisfaction survey are likely to differ from non-responders and those who do not respond may have the most important messages (Cartwright, 1986a; 1986b; 1988; Brown & Lumley, 1997).

Given the uncertainty involved in measuring and summarising satisfaction with services, assessment instruments must be pilot-tested and validated before they are introduced on a larger scale.

Summary:

Measuring most of the individual components of quality of maternity care is possible. In particular, it seems feasible to measure the content, coverage and effectiveness of the minimum level of care. It also seems feasible to measure the availability of higher level care. However, assessing the need for, and effectiveness of, higher level care is more problematic due to the lack of clarity of definition of need and the rarity of severe complications. There are effective methods for measuring user satisfaction and there is little reason why these methods could not be used to look at provider satisfaction. However, even the former is rarely measured in developing countries.

There are no pragmatic methods to compare QoC between different institutions. Case mix adjustment and standard primipara methods theoretically permit comparisons but are of limited use in developing countries because of the high data collection and processing requirements and the lack of information on where problems in quality occurred.

C) *If satisfaction and health outcomes are problematic to measure, can we measure processes or inputs instead?*

Sections III.B.3 and III.B.4 present some of the difficulties in measuring QoC by assessing outcomes. An alternative to measuring outcomes is to step back and assess the pathways leading to these outcomes. This approach is modified from the manufacturing and service industry where the **structure ➔ process ➔ outcome** approach (Donabedian, 1988) is often applied. Within health care, the word "structure"[1] refers to resources, equipment, and people who provide health-care, "process" refers to the way in which health-care is delivered and "outcome" refers to the beneficial or adverse events, short and long term results of a procedure, as well as the patients' health, functional status and satisfaction. The structure → process → outcome approach assumes that the availability of appropriate structures (*example: oxytocin and provider with midwifery skills*) and processes (*example: five units of intramuscular oxytocin given during the third stage of labour according to a protocol*) will lead to better outcomes (*example: a reduced rate of postpartum haemorrhage*). Substituting the measurement of outcomes with measurement of inputs and processes leads to valid results only if strong or quantifiable links exist between the inputs the processes and the outcome, and if inputs and processes are measurable. The next sections (III.C.1 and III.C.2) explore processes, as these are closer to outcomes than inputs, while Sections III.C.3 and III.C.4 explore inputs.

C.1 *Can processes be measured as an alternative to outcomes?*

Establishing the link between processes and outcomes

A basic assumption in medical care is that the processes used affect the outcome. Thus users seek health care because they assume a link between health care processes and the desired outcome. Providers also use processes that they expect to lead to the desired outcome. If 'process A' leads to good outcomes but 'process B' leads to bad outcomes, then using 'process A' should lead to better QoC. The purpose of health worker training is to increase the probability of using the right processes.

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[1] The term 'structure' should not be confused with infrastructure. We use the word 'input' instead for greater clarity.

Measuring processes instead of outcomes is attractive for several reasons:

1) Many processes have confirmed links with outcome. Many randomised controlled trials (RCT) of interventions (which also are processes) show that certain harmful outcomes can be prevented at a predictable rate *(example: for every 8 to 12 women who receive oxytocic prophylaxis for the management of the third stage of labour, one case of postpartum haemorrhage is prevented)*. Excellent meta-analyses quantifying the effect of many obstetric interventions can be obtained through the Cochrane Library (2000).

2) Concentrating on processes ties in with training traditions.

3) Efforts to improve unfavourable outcomes aim to change the processes leading to these outcomes.

4) Many women do not have complications and most complications do not lead to serious health outcomes (e.g. most mothers do not die of a postpartum haemorrhage). Processes are therefore much more frequent than serious adverse outcomes, and may be more common than complications since all women may be eligible for a procedure. Comparisons of process data are often easier to interpret and more sensitive to small differences than comparisons of outcomes data (Palmer, 1998).

The first issue is critical to ensure before processes can be measures as a substitute for outcomes. In practice, however, it is not possible to design services using RCTs. Typically, processes known to lead to better outcomes (*example: using antibiotics with every Caesarean section*) are combined with processes assumed to lead to better outcomes (*example: Caesarean section for foetal distress - there are no trials confirming that Caesarean section improves this outcome*). Unless all aspects of maternity care can be fully investigated, packages of care will combine interventions of known and assumed effectiveness. As most research linking process to outcome is conducted in rich countries, it reflects the care environment and case mix in rich countries and may not apply to poor countries. In poor countries care will continue to contain interventions of assumed effectiveness for the foreseeable future.

The difficulties of designing packages of care with known effectiveness can be illustrated by taking a hypothetical basket of processes all known to be effective. Adding a further process of known effectiveness will only improve the overall outcome providing the positive effect of interaction between all

processes plus the positive effect of the new process is bigger than the negative effect of interaction between all processes. This is particularly the case if interventions act on the same outcome using the same biomedical pathway.

Example: The use of oxytocin or ergometrine as part of routine active management of the third stage of labour reduces the risk of postpartum haemorrhage. Although using a combination preparation syntometrine (oxytocin and ergometrine) reduces the risk of postpartum haemorrhage even further. The total benefit of syntometrine is less than the sum of the benefits of the component drugs. This is because both drugs use the same biomedical pathway (i.e. making the uterus contract). On the other hand the side effects of the component drugs also add up (McDonald et al, 1998).

Table 17 gives further examples illustrating this concept.

TABLE 17

Combining single processes of known effectiveness into one basket may have unpredictable effects		
Intervention	**Effect**	**Presumed mechanism of action**
Skilled support in labour (Hodnett, 1998)	Reduced Caesarean section rate	Support reduces the likelihood of maternal stress → reduces likelihood of dysfunctional labour → reduced likelihood of Caesarean section.
Using a partograph (WHO, 1994)	Reduced Caesarean section rate	1) Increases likelihood of early diagnosis of dysfunctional labour → increases early intervention → reduces likelihood of dysfunctional labour → reduced likelihood of Caesarean section. 2) Reduces likelihood of over diagnosis of dysfunctional labour → reduces likelihood of Caesarean section for dysfunctional labour.
Basket	**Content of basket**	**Effect**
Active management of labour as implemented at the National Maternity Hospital in Dublin.	Skilled support in labour; using a partograph; aggressive management of dysfunctional labour	The basket combines interventions known to be effective (skilled support in labour and the use of the partograph) with interventions assumed to be effective (the use of formal guidelines and the early and aggressive management of dysfunctional labour). Controlled trials by Rogers et al (1997), Frigoletto et al (1995) and Cohen et al (1987) found that the basket did not reduce the Caesarean section rates, while Serman et al (1995) and Lopez-Zeno et al (1992) found the opposite.

Adding further processes without assessing medical and satisfaction outcomes also carries a risk of over-medicalisation. With hindsight, many 'apparently appropriate processes' have produced undesirable results[3], and there are few RCTs investigating the overall benefit of packages of maternity care. Furthermore, even where packages of care have been assessed, some of the results are conflicting or difficult to interpret (Table 17 and 18).

TABLE 18

RCTs of packages of care	
Alternative delivery settings to standard hospital care are safe and may be more satisfying.	Waldenstrom and Nilsson (1997, 1997) evaluated birth centre and standard care among women in Stockholm. They found that birth centre care effectively identifies maternal complications and is as safe for women as standard maternity care.
	MacVicar and colleagues (1993) investigated simulated home delivery in hospital in Liverpool and found few differences in antepartum, intrapartum and postpartum events compared to normal care. However, simulated home delivery led to higher levels of maternal satisfaction.
Results of different packages of antenatal care lead to different results which may be setting specific	In Harare, reduced antenatal care is safe (Munjanja et al, 1996) and makes no difference to maternal satisfaction (Murira et al, 1997). In London, reduced antenatal care is safe, but less satisfying for mothers than standard care (Sikorski et al, 1996). In Tamil Nadu, India, high risk women given 'high risk care' as compared to standard antenatal care had better pregnancy outcomes. Also women who received standard care from the study team had less preventable maternal and perinatal morbidity compared to those with care by the routine health services (Srinivasan et al, 1995). In Dundee, Tucker and colleagues (1996) found that midwife/GP antenatal care and made no difference in pregnancy outcomes in low risk women compared to obstetrician care.

Before processes shown to be effective in rich countries can be used as standards for assessing the QoC in poor countries the following questions should be answered:

- How strong is the evidence that the process increases good outcomes[2]?
- How big is the effect of the process on the likelihood of a good outcome?
- Is the process one that is likely to be affected by variation in ethnicity, culture or resources?
- Are there reasons (e.g. differences in case mix, interactions with other processes which do not occur in rich countries) why this effect may not occur or be less strong in the country/setting where the QoC is being assessed?

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[3] The relationship between desired outcome and 'appropriate' process may be negative. The use of diethyl-stilbestrol to prevent abortion considered appropriate treatment in the 1960s. In fact it did not prevent abortions and caused disease in some children exposed in utero (Mittendorf, 1995).

Assuming a good link can be made between processes and outcomes, there is every reason to measure processes.

C.2 *Measuring processes*

There are two principle methods for obtaining information about a process: either observing it directly, and/or reviewing evidence that it occurred.

Observing the process

Observing processes provides the most direct and valid information. However, there are several reasons why processes may be difficult to observe or interpret.

- Common processes that can be observed frequently lead to common (and usually normal) outcomes. Observing normal processes (such as caring for a woman in normal labour) does not provide information about processes dealing with complications, such as the use of life-saving skills. The latter are difficult to observe and chance variations will occur.

  Example: Number of deliveries required to observe one case:

Breech delivery	*>30*
Massive obstetric haemorrhage	*> 60*
Twin delivery	*> 80*
Placenta praevia or placental abruption	*> 100*

  It may also be difficult to have observations at all times (i.e. weekend or nights).

- Observers trained to identify good and bad practice would have an ethical obligation to interfere with 'bad process'.

- Persons observed may alter their behaviour (*example: health workers may wash their hands just because they know they are observed*).

- Processes may be misinterpreted (*example: in some Western European culture direct eye contact is required for good communication. In Shona culture it can be perceived as discourteous*).

Reviewing the evidence that process happened

Evidence of processes can come from different sources (see Table 19); the most common being medical records and registers (Wilkinson, 1995). A particularly useful record for delivery care is the partograph (WHO, 1994). Examining records is the traditional way of reviewing processes associated with adverse outcomes (*example: case reviews and litigation*).

Reviewing records depends on the quality of medical record keeping. Since some problems cannot be prevented despite high quality care, a provider of high quality care may detect, manage, and record problems while a provider of poor quality care may not even detect a problem in the first place. Paradoxically, high quality care may thus appear to produce more complications, while inadequate measurement or recording of outcomes can produce 'favourable results'.

Example: A study of postpartum haemorrhage in Zimbabwe reported an implausibly low rate of postpartum haemorrhage (PPH) (lower than any country) despite the fact that many patients were at high risk for PPH (Tsu, 1993).

Reconstructing processes from records can also be time consuming, and even excellent record keeping will not provide all information required.

TABLE 19

Reviewing evidence that the process happened			
Source	**Advantages**	**Disadvantages**	**Example**
Patients records	A readily available source and thus a commonly used procedure. Good record keeping contributes to good management and is a worthwhile aim in itself.	Good quality care can co-exist with poor record keeping. Where reviews are expected records may not reflect what actually happened. Not all complications are recognised, not all recognised complications are recorded, as not all complications lead to harmful outcomes. It is possible to overlook serious mismanagement if complications are not recorded in the first place. The most interesting records are sometimes not accessible.	"I was too busy saving lives to write detailed records" A mother has a postpartum haemorrhage (PPH) but it is not noticed and she recovers without intervention. As postpartum haemoglobin levels are rarely available there will be no recorded evidence of her PPH. Quality may even appear to be high, as the PPH rate according to the records is low. No record would ever provide details about hand washing behaviour.
Review of aggregate records or logbooks	Faster than individual record reviews. Commonly used procedure.	As above. Inference can be difficult.	Oxytocin can be used appropriately to prevent PPH or inappropriately to accelerate labour. The pharmacy records provide the total number of doses dispensed to labour wards but not their indication.
Special QoC records or registers	Limited sets of indicators can be collected through improved record keeping. They are useful to focusing attention on key aspects of QoC.	Additional workload may interfere with routine care. Data quality may be inversely related to data quantity.	In the USA, Silberman (1990) uses a system of 73 data fields and 490 diagnoses to monitor quality. The Maryland Hospital Quality Indicator (QI) Project involves >1000 hospitals in North America and the UK (Thomson et al, 1997) and collects information on 15 indicators. This appears to have lead to hospital professionals who are ' better able to quantify, evaluate, and improve health care quality' (Kazandjian et al, 1993). A similar project focussing on Quality Development in Perinatal Care, OBSQID, involves WHO EURO region countries (Johansen, 1994). OBSQID uses 50 process and outcome indicators (EUR, 1997). It has not yet been evaluated for its impact on quality. In Ghana, the PMM Team (Danquah et al, 1997) argue that modified routine registers with 40 data fields provide good quality data at low cost for monitoring maternal mortality prevention programmes. In Moldova, Russia and Ukraine a project set standards and then collected data to monitor progress on these goals (MotherCare Matters, 1998).
Provider interviews	Commonly used procedure. Talking to providers is necessary in any case.	Self reported behaviour is sometimes very different from observed behaviour.	In England, a far greater number of doctors report washing their hands before examining patients than suggested by actual observation (BMJ-editorial, 1999).

Reviewing evidence that the process happened			
Source	**Advantages**	**Disadvantages**	**Example**
User Interviews	Provides an alternative perspective and source of information on procedures	Users may not be aware what constitutes high quality of care and may mistake unnecessary interventions for high quality care.	Some hospitals require mothers to buy shower caps to wear on the postpartum ward. This generates some income for the nurses but is mistaken as good quality care by the users (personal communication, V. Filippi). Women in Lebanon had little information about technical content of delivery care and felt unable to judge quality (Kabakian-Khasolian et al, 2000).

In summary, measuring process is possible. It is easiest and most traditionally done through registers and record reviews, but more could be done with user and provider interviews. Reviewing processes should also be a routine part of training, supervision and management and so is desirable for these reasons too.

C.3   *Can inputs be measured as an alternative to outcomes?*

The previous section looked at measuring processes as an alternative to medical and satisfaction outcomes. It is also possible to step further back and assess determinants of processes, i.e. inputs, as an alternative to observing or reviewing processes. Once again, the crucial assumption is that having sufficient inputs will result in using them in appropriate processes that in turn lead to the desired health or satisfaction outcomes. This can add a further layer of uncertainty to the link between appropriate processes and desired outcomes. Unlike processes where there is considerable evidence that some processes improve outcomes, there is scanty evidence that the availability of inputs can substitute for measuring processes or outcomes. For example, Campbell and Pittrof (1998) found no relationship between supplies in stock and use of services in Upper Egypt, suggesting that supplies were independent of need. However, while the presence of inputs does not guarantee high QoC, their absence is often an easy indicator of poor or non-existent care (Table 20).

TABLE 20

The input ® process ® outcome concept may or may not work in medical care	
Key Finding	**Example**
The use of the right inputs does not always improve outcomes.	In an analysis of 36,000 deliveries of babies without congenital abnormalities in Rio de Janeiro, Krauss Silva (1997) found that management in an institution with an appropriate level of care did not lead to better outcomes. Likewise, Chaska and colleagues (1988) found no correlation between place of delivery and perinatal outcome in North America.
The absence of certain inputs is likely to lead to poor outcomes.	A variety of needs assessment and situational analysis tools (WHO, 1998; MotherCare; Prevention of Maternal Mortality Network, Campbell & Pittrof, 1998) have been used in developing countries to identify the presence or absence of needed inputs.

Measuring most inputs is easy compared to measuring processes and outcomes. This is particularly the case for countable physical items such infrastructure, staffing levels, and supplies of equipment and consumable items. While there is nothing wrong with asking the simple questions first, there are other inputs that may also be important for the quality of care provided. These involve less easily countable management, clinical and non-clinical inputs: appropriate **knowledge and skills**; appropriate **attitudes** and work ethic; and policies. Methods for summarising inputs are discussed below.

C.4 *Measuring inputs*

Information on **physical inputs** can be obtained from routinely collected statistics (e.g. drug use and supply). This information may be misleading (Table 21) and may have to be validated through direct observation. For example, staffing levels according to payrolls may not be related to actual staffing levels, particularly where providers often have to generate their income through private practice. In another example, in one hospital in Egypt, drugs appeared to be in stock in the pharmacy. However the hospital pharmacy closed at 12 noon and all drugs excluding ward stocks and a very limited number of emergency drugs were inaccessible until the next morning (Campbell & Pittrof, 1998).

Many tools have been developed in order to specifically measure and observe inputs. UNICEF and WHO developed useful checklists (1995, 1998) which count everything (literally) from the floor to the roof. For example, the WHO assessment tool enquires about the presence of over 20 drugs and items of equipment

that must be available in a hospital labour ward. In assessing 'easily countable inputs' with standardised checklists, there are several issues to bear in mind:

- Care must be taken not to over-interpret results of a single visit as diurnal, seasonal and annual variation in inputs may occur.
- In the context to limited resources, adequate stocks of consumables may reflect poor rather than good QoC: where users vote with their feet and don't use institutions providing poor QoC, supplies may accumulate in poor QoC institutions.
- Inputs may be interdependent. Having soap but no water is not much use.
- Summarising data on availability of inputs can be problematic.

As experience grows, the existing tools may well be modified. For example, the WHO needs assessment tool does not prioritise which items or drugs are most important. Nor does it give much consideration to the location and quantities of these items (*example: according to a survey a provincial hospital in Upper Egypt had only 1 pair of scissors on the labour ward (Campbell & Pittrof, 1998)*). As checking quantities and locations is time consuming, it may be preferable to have a list of 4-5 indicator drugs (ideally those that are in short supply) to identify the weak points in stocking and re-supply of essential drugs. Also, the present checklists only work well within the context they were designed for. Applying "western" checklist assessments to "non-western" medical systems may not generate meaningful results. For example doctors in the former Soviet Union (FSU) routinely used nitric oxide donors for treating pre-eclampsia and anti-hypertensive drugs recommended by WHO were not in stock. They also cool babies to avoid perinatal brain damage, a practice classified as dangerous by Western paediatricians. Both the role of nitric oxide donors and cerebral hypothermia are now hotly debated in contemporary 'western' obstetrics and may be a good substitute; clinical trials are now in progress in the 'West'. A recent RCT suggested that the traditional Chinese medical practice of moxibustion [burning of herbs to stimulate acupuncture points of the mother] may be as good as the "western" equivalent of external cephalic version (Cardini & Weixin, 1998).

Assessing management as an input is also necessary, particularly since the purpose of health system management at ward and higher level is to ensure availability of appropriate inputs. We know of no method to comprehensively assess the effectiveness of a managerial system. This is not surprising, as the

effectiveness of managerial knowledge is not subjected to the same scrutiny as medical knowledge (*example: the Cochrane lists no RCTs assessing different methods of managing medical facilities*). Current understanding of managerial systems suggests that a good system is one that is accountable, which in turn requires transparency (Wilson & Goldsmith, 1995: 17). Transparency describes the degree at which outsiders can understand activities within a system. Accountability and transparency are highest if activities are standardised (what is done and how) and the context is clearly defined (why, when, by whom, for whom, and where things are done). This usually requires written guidelines or standards. However, conclusive evidence that guidelines and standards improve patient outcomes is so far lacking (Thomson O'Brien, 2000). Equally, using transparency of management as prerequisite of QoC reflects current practice in the service and manufacturing industry rather than current knowledge in medical care. Methods for assessing the transparency of a managerial system revolve around checking the availability of job descriptions and protocols and guidelines in facilities and central level.

There have been efforts made to measure policy inputs using expert ratings. There have been used most widely for family planning (Ross & Mauldin, 1996). More recently, these approaches have been modified to look at HIV/AIDS (Stover et al, 1999) and maternal health (Bulatao & Ross, forthcoming) but results for the latter are not yet available.

Methods for assessing **knowledge and skills** of health workers include exams of knowledge or skills and observation of actual practice. The issues raised by observation have been discussed before in the section on observing processes (III.C.2). Issues raised by exams are given in Table 21. They include:

1) Good exams are difficult to develop:
    - they may indicate the provider's ability to answer (multiple choice) questions rather than on his/her ability to apply the knowledge in real life situations.
    - indisputable, clinically relevant knowledge is often trivial .
    - other indisputable, clinically relevant knowledge is complex and thus difficult to assess.
2) Getting trivial questions wrong may lead to disgrace. Senior providers may therefore be especially reluctant to take part in knowledge assessment exercises.
3) Exams give control to outsiders which may also be threatening.

4) The link between knowledge and performance (process) may be very weak (see Table 19: hand washing).

The issues described for exams also apply to assessment of skills, however the assessment of skills requires a situation where skills can be applied. As the need for specific skills does not arise often enough to allow planned observation, skills assessment often relies on quasi-clinical situations. **Objective Structural Clinical Examination (OSCE)** is rapidly being accepted as the new gold standard of clinical skills assessment (McFaul et al, 1993; Sloan et al, 1995). They involve the acting out scenarios but do not include the treatment of actual patients. As no one gets treated, OSCEs are best suited to assessing skills such as surgery that do not require intervention. The OSCE concept been applied to testing obstetric skills in an Advanced Life Support in Obstetrics (ALSO) course (Beasley et al, 1993). Models (dummies) can also be used for checking procedures, for example, intubation, suturing and assisted vaginal delivery.

Informal assessment of knowledge and skills outside an exam context may be less threatening to providers. In the Former Soviet Union we obtained some insights on senior providers by observing them teaching practical procedures to their junior colleagues (Pittrof, unpublished data). When obstetric emergencies arise, the appropriate processes require close collaboration between different members of the obstetric team. Individually assessing knowledge and skills of team members will not provide sufficient information about team performance. Played emergencies (drills) can be used to improve the performance of a team during real emergencies (Lewis & Dodd, 1997). Conceptually they are similar to team OSCEs and provide opportunities to assess team performance. We know of no formal studies where OSCEs or drills have been used to score the quality of medical care.

Assessing attitude and work ethic. It may be possible to use qualitative methods applied to a small number of providers to assess attitude and work ethic. It may also be possible to obtain information reflecting real life clinical practice using a mystery client approach for some aspects of antenatal and postnatal care. Perceived attitudes and work ethic may vary according to the setting and the observer. Currently we do not believe it is possible to develop standardised methods for assessing attitudes and work

ethic in an OSCE type setting. We know of no studies where attitudes and work ethic have in maternity care have been formally scored.

TABLE 21

Assessing knowledge and skills	
Key finding	**Example**
Providers may not reflect their true knowledge but instead the 'expected answer'	An MCQ tool developed to assess basic medical knowledge relevant to QoC was tested in the Middle East and the FSU: Many participants agreed with the statement: "Among the first 5 things I would do for an unconscious patient with eclampsia is to take a good medical history". This would be impossible in an unconscious patient (Pittrof, unpublished data).
Assessing knowledge can provide information about group rather than individual knowledge	To reduce the risk to individual providers in the FSU, groups of 3 to 5 senior obstetricians discussed questions and agreed anonymous group answers. Agreement with our answers ranged from 55% to 82%. This suggests strong differences in knowledge even among the same grade of providers in one province (Pittrof, unpublished data).
Training may not make a difference to performance	Studies in Kenya, Tanzania, Botswana and Nigeria showed no apparent linkage between training of family planning providers and the quality of the service as assessed by women (Stein, 1998; Kim et al, 1992).
OSCEs improve confidence	Within the context the ALSO course, an OSCE improved providers' confidence to manage emergencies (Taylor & Kiser, 1998).
Group-type OSCE assessment is possible for reducing threats to individuals	When working with senior providers in the FSU, an informal assessment using obstetric models and an OSCE-type situation was conducted half way through the third workshop with the same providers. We believe that it would not have been possible earlier.

Summary:

Health outcomes strongly related to QoC are either easy to record but infrequent, or difficult to define and measure consistently. Other health outcomes may not be related to the QoC received. As an alternative to medical outcomes, many attempts have been made to judge QoC by assessing the inputs into, and processes of the care provided. These attempts assume that good inputs lead to better processes, and that better processes lead to a better QoC and better medical and satisfaction outcomes. These assumptions are not based on strong evidence.

Assessment of processes is problematic: the processes most closely related to the QoC are often difficult to observe and / or too poorly documented to make assessment of processes a suitable alternative for the assessment of QoC. However, some processes have been quantifiably linked to outcomes. Moreover, observing or reviewing processes also coincides with training, supervision and management goals.

A comprehensive assessment of inputs should address infrastructure, supplies (personnel/ consumable items), management (clinical and non-clinical), knowledge and skills, and attitudes and work ethic. Ready-to-use tools exist for infrastructure and supplies. Some aspects of knowledge are easily assessed but these are the least relevant to complex real-life situations. Also, testing knowledge and skills of practising providers is threatening and thus difficult. Assessment of life-saving skills is further hampered by the rarity of opportunities for testing such skills. Attitude assessment is rarely done and has not been linked to QoC. We know of no comprehensive method for assessing the management of a facility.

PART IV Conclusion

Quality improvement has assumed a central place in the current health care discussions. This interest in QoC is driven by different motives. Much simplified, in a privileged health care setting such as the United States, health care providers need to demonstrate high quality care in order to compete in an oversupplied health care market. In some publicly funded systems such as the United Kingdom, health care providers need to improve quality to make scarce resources stretch further. In developing countries, improving quality of care for family planning services as a way of attracting more clients has generated considerable interest. There is also recognition that some health services in developing countries are appalling and there is little accountability for failure to provide acceptable levels of quality of care. Economists also argue that patients would be more likely to accept charges for high quality care.

Quality of Care definitions reflect the different needs of specific health care systems and no generic definition of QoC has universally been accepted. We developed a comprehensive definition, which takes processes and user and provider perspectives into account in addition to medical outcomes. Such a definition should be applicable to all situations but is particularly important in developing countries where health services often achieve less then ideal outcomes (for a given level of resources), are unaccountable, and unresponsive to user and provider needs.

The current literature suggests that QoC can only be improved if it is assessed. Hence an inability to assess QoC may interfere with our ability to improve it. There is a wide variation in out ability to assess these individual aspects of quality. For some aspects, appropriate measurement tools are frequently used, for others, tools exists or would be easy to develop but are rarely used, while for yet others it is difficult to envisage developing appropriate tools or tools that do not require considerable resources to apply. The status of various tools is summarised in Table 22.

TABLE 22

Aspect of QoC	Tool	Comment
Input	Physical infrastructure, staffing and supplies check lists	Ready-to-use tools exist. It should be possible to adapt them to specific settings with moderate inputs.
	Medical knowledge assessment tests

Managerial knowledge and skills | Ready-to use MCQs exist. They may however have low validity in specific settings.
Such tools could be designed locally but may require considerable inputs |
	Attitudes assessment tool	Tools developed for other aspects of reproductive health care (e.g. the mystery client in family planning) could be adapted to assess specific aspects of maternity care (such as antenatal care). However, for most aspects of "attitudes" (such as attitudes between providers) little work has been done. Development of valid assessment tools will probably need to be context specific and is likely to require considerable resources.
	Policies	Tools for measuring maternal health policies are presently being developed, modelled on family planning
Process	Medical skills observation	It is highly impractical to observe life saving skills in real life. OSCE can be adapted to local sensitivities but require considerable work. Testing senior providers may be culturally unacceptable. Played emergencies (i.e. drills) represent a useful possible tool that may be culturally acceptable. It deserves further research.
	Managerial skills observation	It may be possible to observe critical managerial skills in real life. As with doctors, testing senior managers may be culturally unacceptable.
	Reviews of medical practice	Ready-to-use tools exist for reviewing registers and records, though they may have low validity in specific settings. It should be possible to adapt these health information systems with moderate inputs. Audits are the traditional mechanism for reviewing process. These are done for maternal and neonatal deaths, but have also been done for near misses and for other procedures and outcomes.
Medical and satisfaction outcomes	Maternal and neonatal outcomes	Tools for assessing mortality exist and are ready to use. Where death is rare, mortality data will be insensitive to changes in the QoC provided.
Morbidity assessment tools are difficult to develop, and will have to be locally adapted to be useful. Collecting valid morbidity data generally requires considerable resources.
	User satisfaction assessment tools	There have been many efforts to measure user satisfaction, particularly in developed countries. The time is ripe for a review of these approaches to draw out the main lessons. Some tools may be ready to use with minimal local adaptation. Exit surveys and focus group discussions require only limited resources. Their validity is however uncertain.
	Provider satisfaction assessment tools	Much more work needs to be done on the relevance of provider satisfaction and how to measure it.

Gaps in the development and assessment of tools need to be addressed through further research. However, it seems unreasonable to expect a single measure of quality of care to emerge or a single tool to be developed. This is because achieving the highest level of care necessitates trade-offs between the needs of the individual and the population, mother and baby, user and provider, and between current and future benefits. Tools that are currently available for measuring QoC do not allow for a comprehensive, rapid or cheap assessment but there is considerable scope for improvement.

A) *Quality of Care assessment - market share or patient care?*

Despite or because of this lack of a quick fix, QoC assessment has developed into a multimillion-dollar industry, particularly in the USA (Angell & Kassirer, 1996).

This experience suggests that initiatives where QoC assessment leads to improved patient care appear to share several characteristics:

1) The initiative was owned by the institution and developed (at least partially) from within it (Thomson et al, 1997).

2) The initiative kept confidentiality and focussed on problems and their solutions (*example: bottlenecks identified to QoC*) rather than finding information to market the institution. (Kazandjian et al, 1993; Thomson et al, 1997).

3) The initiative had a local champion and someone within the initiative devoted considerable time and effort to making the QoC assessment work.

This USA/European scenario does not apply to most other countries. In many poor countries, health care facilities are often over- rather than under-used and marketing of health care has no priority. This applies even to the case in the private sector since improving the QoC requires an initial investment and may not lead to improved returns. In a fee-for-service system, improved QoC could reduce provider income by preventing complications requiring interventions and by reducing unnecessary interventions. In poor countries the aim of QoC assessment cannot be to improve market share or provider income but should be

to improve patient care and make more efficient use of health care resources. Without competition there is little justification for developing of indicators to compare the QoC between institutions.

B) Assessment of QoC in maternal and perinatal health in developing countries - silver bullet or red herring?

One of the most serious shortcomings of the whole QoC debate is the absence of studies showing convincingly that assessing the QoC benefits anyone but those assessing the quality or producing the tools to do so (McKee & Hunter, 1995). There are many studies showing that improving a particular aspect of QoC is associated with the desired improvements. This in itself is not sufficient proof that such initiatives actually improve QoC as all aspects of QoC and not just the target of the individual intervention should be assessed.

Example: A facility might choose to invest resources to improve staff accommodation which could improve staff satisfaction, leading to reduced staff fluctuation and better care, but not necessarily to a reduced Caesarean section rate.

QoC means many things to many people. Whichever definition of QoC is applied, trade-offs between various aspects of care are necessary. Even programmes aiming to reduce unnecessary resource consumption will have initial start-up costs that could be invested differently. Valid adjustments methods for these trade-offs and problems associated with case mix may be impossible to develop. At present, QoC assessment cannot be used to rank institutions in league tables. If used for inter-unit comparison, QoC assessment is likely to be a red herring rather than a silver bullet.

Within institutions, QoC assessment can identify bottlenecks where small investments are likely to lead to large improvements. Process improvement will often do more to improve outcomes than improvements in infrastructure. In Mexico, Salinas and colleagues (1997) used QoC assessment as a problem-solving tool. They found that structural deficiencies increased the risk of an avoidable perinatal death eleven-fold and

process deficiencies eighty-eight-fold. In such a context the focus of QoC assessment is on "using QoC assessment to help solve the problem" and not on "using QoC assessment to lead to a valid and comprehensive description of the QoC". Given competition and the resources available to health care institutions in USA, we expect QoC assessment methods will be developed which will accurately reflect the QoC provided by these institutions. We do not, however, expect these methods will be cheap, or transferable to poor countries. In poor countries it may be better to invest health care resources into prevention, direct care and problem solving rather than on conducting comparative assessments of QoC. While this paper only reviews the current situation for maternity care, this may well be true for other aspects of medical care.

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