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AVERTING MATERNAL DEATH AND DISABILITY

Quality cesarean delivery in Ouagadougou, Burkina Faso: A comprehensive approach

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Abstract

Objective: To assess the effects of a comprehensive intervention (staff training, equipment, internal clinical audits, cost sharing system, patients–providers meetings) in improving cesarean delivery access and quality in an urban district of Burkina Faso. **Methods:** We conducted a before–after study in the health district sector 30 in Ouagadougou between 2003 and 2006. We measured cesarean delivery quality (accessibility, diagnosis, procedure, postoperative follow-up) and maternal and neonatal health in 1371 sections. **Results:** The number of cesarean deliveries performed increased each year, from 42 in 2003 to 630 in 2006. This increase happened without increase in maternal and perinatal post-cesarean mortality (respectively 1.1% and 3.6% in 2006). The cesarean delivery rate for women of the district increased from 1.9% to 3.3% of expected births between 2003 and 2005. **Conclusion:** To improve access to quality cesarean delivery, we have shown that it was necessary to have a systemic approach combining technical, operational, sociocultural, and political factors.

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1. Introduction

Twenty years after the Nairobi conference where the first strategies of maternal mortality reduction were launched,

little progress has been made: 529 000 women die each year as a consequence of pregnancy or childbirth [1]. The highest maternal mortality is found in Sub-Saharan Africa: 920 deaths per 100 000 live births, almost twice that of south Asia, 4 times as high as in Latin America, and nearly 50 times higher than in industrialized countries [1]. In the early 1900s Sweden was able to stabilize its maternal mortality to between 250 and 300

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deaths per 100 000 births by professionalizing midwives, but that took until 1940 and access to cesarean delivery, antibiotics, and blood transfusions to bring maternal mortality below 100 deaths per 100 000 live births [2].

Cesarean delivery is an indispensable surgical intervention for saving mothers' lives and increasingly those of infants too [3]. This intervention, even in the most favorable conditions, carries a higher risk of maternal and perinatal mortality and morbidity in comparison with vaginal delivery [4-8]. Although cesarean delivery is crucial for saving lives, it must be both timely and for the correct indications, and it should be accessible and of optimal technical quality. This is what is meant by "quality" cesarean delivery [9]. In this article we will develop this concept by describing a comprehensive approach to improving cesarean delivery access and quality in an urban district of Burkina Faso.

2. Context

Burkina Faso was 175th of 177 countries in the human development index of 2003 [10]. The crude birth rate is estimated at 43% and life expectancy at birth is 54 years. Maternal mortality remains high with 484 deaths per 100 000 live births according to the 1998 DHS [11]. In Burkina, in 2003, the cesarean delivery rate was 3.2% of total expected births in Ouagadougou, the capital; 2.6% in the other cities and only 0.3% in rural areas [12]. The average observed cost for a cesarean delivery in 3 regional Burkina hospitals was US \$137.60 (direct cost to households, all expenditures included) with a maximum of US \$550 [13] whereas the yearly health expenditure averages US \$88.50 per family and US \$22.30 for the poorest quintile.

The health district of sector 30 is one of the 4 districts of the Central health region. It comprises 1 of the 5 agglomerations of Ouagadougou (the urban agglomeration of Bogodogo) and 3 rural or semi-rural departments (Saaba, Koubri, and Komsilga). The district population reached 425 000 in 2003 and 470 000 in 2005, of which 67% lived in urban areas. The sector 30 health district included 24 health centers, 3 medical centers, and 1 district hospital in 2003.

The district hospital of sector 30 has 57 beds for pediatrics, surgery, medicine, and maternity (24 beds), an outpatient clinic, laboratory, and a medical imaging unit (radiography and ultrasound). The operating theater opened on August 1 2003, but emergency obstetric surgery has been possible 24/7 only since October 1 2004. The maternity ward (functioning since November 2001) has rapidly increased its activities, with admissions doubling between 2002 and 2005 (from 2053 to 4182).

3. Description of the intervention

This intervention was supported by the AQUASOU project (Amélioration de la Qualité et de l'Accès aux Soins Obstétricaux d'Urgence). Several activities were collaboratively organized by the 3 support institutions (ITM, Institute of Tropical Medicine in Antwerp; IRD, Institute of Research for Development in Marseille; E&P, Equilibres & Populations in Paris) partnering with the district team and the district hospital maternity staff, as the global and multidisciplinary approach formed the basis of the project. It is therefore not possible to attribute an effect to any single activity because activities were carried out simultaneously.

3.1. Quality of cesarean delivery

3.1.1. Availability of protocols

WHO guidelines [14] were distributed individually to each midwife.

3.1.2. Standardization of the procedure

To ensure both quality of cesarean delivery and cost containment, the procedure, the surgical kit, and the post surgical care were standardized. Each surgeon was trained in the Misgav Ladach technique [15].

3.1.3. Training

Training was given in good clinical practice (emergency obstetric care [EmOC], active management of the third stage of labor, infection prevention, use of partograph). Doctors, nurses, and auxiliary staff were trained in post surgical care (nursing, drugs) during team meetings.

3.1.4. Equipment, drugs, blood

Equipment (delivery boxes, suture kit, cesarean delivery surgery kit, etc) were donated to the health centers and referral hospital. Emergency drugs were placed in the delivery room in June 2004 and a mini blood bank was organized in the hospital in January 2005. A standard surgical kit for cesarean delivery with generic drugs and consumables was available with no prepayment.

3.1.5. Audits

Monthly obstetric audits (case reviews) were implemented in February 2004 to promote discussion around clinical practice and medical error. Cesarean deliveries, referrals from health centers, severe complications, and fresh stillbirths' cases were reviewed. After analysis of dysfunctions, the team discussed possible solutions at the hospital level and one person was charged with follow-up of the recommendations.

3.1.6. 24/7 services

To decrease delays in management of emergencies, all obstetric functions became available 24/7 in October 2004.

3.1.7. Human resources management

The organizational chart of the service and function descriptions were updated, and regular staff meetings were organized.

3.1.8. Interpersonal communication

To improve the quality of interactions between patients and providers, home visits of women having a cesarean delivery were organized with the midwives and the IRD team from September 2003 to September 2004. Meetings with women's groups and meetings of users and providers were held.

3.2. Access to cesarean delivery

The second goal of the project was to improve access to EmOC.

3.2.1. Infrastructure

Ambulances (from the Central Health Region and the Italian Cooperation) improved the transfers from health centers to the referral hospital. Communication channels were

strengthened by mobile phone and radio network. Local authorities did road repairs.

3.2.2. Information systems

The referral information system was standardized by the introduction of reference and feedback forms common to all private and public facilities in the district.

3.2.3. Public education

Training sessions were organized by ASMADE, a national NGO, to inform and involve the population and to motivate the leaders in favor of maternal health. Radio campaigns were launched on the subject of danger signs, prenatal care, and delivery planning.

3.2.4. Cost containment

To lower financial barriers, a cost sharing system for obstetric emergencies began in January 2005, after more than 18 months of preparation and negotiation with different actors. Funds are collected from management committees of health centers, local authorities, and the district hospital and made available in obstetric emergencies. This has reduced by two-thirds the cost to women in the district (from US \$136 to US \$46).

4. Methodology

4.1. Analytic framework

The quality of a cesarean delivery is more than the quality of the procedure itself, and it is especially important in low-income countries to assess equity and the barriers to cesarean delivery (cultural, geographic, and financial). We used the following definition by Dujardin and Delvaux [9] of a quality cesarean delivery: "...an intervention which benefits all patients who really need it, with minimum risk to mother and child and at an affordable cost to the patient and to the health system."

It is accompanied by an analysis framework for a quality cesarean delivery (Fig. 1).

The model we followed includes classical quality criteria regarding diagnosis, procedure, and post surgical care which can be found in the clinical guides of the World Health Organization [14] or the National Institute for Clinical Excel-

lence in the UK [16], but also includes aspects of accessibility of services.

4.2. Data collection

We conducted a before and after study to evaluate the effect of a complex intervention including a number of activities (training of staff, equipment, audits, cost sharing system, meetings between users and providers) on the quality of cesarean delivery and the health of women and children. The "before" evaluation (baseline) was done from January 1 to June 30 2003, before the start of activities. The "after" evaluation took place from September 1 2005 to March 30 2006. Monitoring throughout the project gave us routine data for 3 years. Although the project ended on March 30 2006, continuing routine data collection in the district hospital enabled us to document most indicators for 2006. The study included all women with emergency or elective cesarean delivery in the district hospital from 2003 to 2006, regardless of residence (in or out of the district), and all women from the district who underwent a cesarean delivery in any facility in Ouagadougou. Variables measured were linked to the different parts of the analytical framework: (1) access (cesarean rate, direct costs of cesarean, acceptability of cesarean delivery to the population); (2) diagnosis (time and types of indication); (3) procedure (delay between indication and intervention); (4) post surgery care (adherence to protocols, complications, length of stay); and (5) maternal and perinatal outcomes.

4.3. Data sources

4.3.1. Qualitative data

- Semi-structured interviews with women who had a cesarean delivery and with their partners in the outpatient department (October 2005 to January 2006).
- Meeting (biweekly) reports of the executive committee which is the group implementing the cost sharing system at district hospital level (January 2005 to April 2006).
- Anthropological research reports (situation analysis 2003 and final report 2006 of AQUASOU project).

4.3.2. Quantitative data

- Routine data from the district hospital (admissions, deliveries, complications, referrals) (2003–2006).



Figure 1 Quality cesarean delivery criteria. Source: Dujardin and Delvaux [9].

- Cesarean delivery forms designed to record all major obstetric interventions performed for life-saving indications. Nonroutine data were collected from the main city hospitals, including the university hospital (2003–2005).
- Individual prescription cards for women having a cesarean delivery. This card shows all surgical procedures and treatment prescribed during each woman's hospital stay and the cost (2005).
- Referral and feedback forms (2004–2006).
- Criteria of quality grids for intrapartum and postpartum care (2003–2005).

4.4. Analysis

The interviews with patients and their families were analyzed with standard qualitative data analysis methods (thematic classification) [17]. Data on cesarean deliveries were analyzed with Epi Info 2002. Routine data from the district hospital maternity, the cost of cesarean delivery, and quality criteria were analyzed in Excel. Categorical variables were presented in absolute (N) and relative frequency (%) and compared by year with the Pearson χ^2 test ($P < 0.05$). For the study of decision-to-intervention time (in minutes) and length of hospital stay between the intervention and discharge (in days), we checked the distributions (skewed to the left) and summarized with median and quartiles ($Q_1 - Q_3$). The medians were compared from year to year with the non-parametric Kruskal-Wallis test ($P < 0.05$).

4.5. Ethical considerations

The AQUASOU project and its research components were the subject of an agreement between the Ministry of Health and the supporting institutions. Oral information regarding the goal of the study, anonymity of the data, and interview method was given individually to cesarean delivery patients. Patients were interviewed at home or in the outpatient department after their oral informed consent. None refused to participate. Patients' records were analyzed anonymously.

5. Results

A total of 1371 cesarean deliveries were performed in the hospital between 2003 and 2006 (Table 1). The number of cesareans performed rose each year, from 42 in 2003 to 630 in 2006. The facility based cesarean rate increased from 1.9% in 2003 to 24.5% in 2006. This district hospital also attracts patients from beyond the district, and each year 23%–29% of women who had a cesarean were from outside the district.

5.1. Access

5.1.1. Financial barriers

Socio-anthropological studies performed during the situation analysis found that families spent US \$112–672 for a cesarean in a public hospital (transport, intervention, postoperative treatment). After cost sharing began on January 1 2005, women of the district paid US \$46 for a "cesarean package" including transport and complete case management. Cost recovery reached 96% for district women and 91% for other women. The cost-sharing system has been described elsewhere [18].

5.1.2. Acceptability of services

Home visits to women who had a cesarean delivery made from September 2003 to September 2004 (before the start of this project) exposed common fears such as "once you have had a cesarean, you will always have to deliver by cesarean." The central and recurring theme in the interviews was communication between patients and providers: in the delivery room women are often not informed of the imminence of the operation. Information given by professionals is often neither explicit enough nor understood. Patients are given insufficient information about postoperative personal hygiene, diet, and resumption of sexual activities. At the end of 2005, we interviewed women who had a cesarean and their families on their perceptions of treatment and the cost sharing system. All interviewees found the payment and drug supply easy: "the nurses give you the prescription card, you go to the drug store and you are served without paying money." Furthermore, according to those interviewed, the

Table 1 Characteristics of cesarean deliveries performed at the sector 30 district hospital, 2003–2006^a

Characteristics	2003 (n=42)	2004 (n=193)	2005 (n=506)	2006 (n=630)	P value
Type of cesarean					
Programmed	3 (7.1)	39 (20.2)	57 (11.3)	66 (10.5)	<0.05
Emergency	39 (92.9)	154 (79.8)	449 (88.7)	564 (89.5)	
Mode of admission of emergency cesarean					
Referred from health center	14 (45.2)	58 (37.9)	212 (47.5)	375 (66.8)	<0.05
Direct admission	17 (54.8)	95 (62.1)	234 (52.5)	186 (33.2)	
Unknown	8	1	3	3	
Indication					
AMI	17 (40.5)	74 (38.3)	259 (51.2)	269 (43.0)	<0.05
Non-AMI	25 (59.5)	119 (61.7)	247 (48.8)	357 (57.0)	
Unknown	0	0	0	4	
Cesarean delivery rate					
Number of deliveries	2240	2731	3509	2476	
Facility-based rate	1.9%	7.1%	14.4%	25.4%	

^a Values are given as number (percentage) unless otherwise indicated.

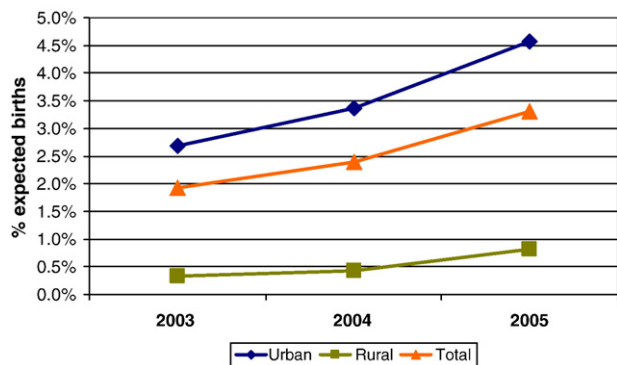


Figure 2 Evolution of cesarean delivery rate for district residents (% of expected births), sector 30 district, Ouagadougou, 2003–2005.

care at this district hospital is less costly than at the University hospital, the district hospital is cleaner, and is better than in other districts. Treatment is competent, people are respected: "even if you cannot afford it, you have access to care."

5.1.3. Services utilization

The district hospital began to serve as the referral hospital for the district, responsible for 54.6% of cesareans for district women in 2005 compared with 7.9% in 2003. The proportion of referrals among the women who underwent cesareans also continued to rise, showing improvement in referrals from health centers: in 2004, 37.9% of emergency cesareans were referred compared with 66.5% in 2006 ($P < 0.05$).

The population-based cesarean rate for women living in the sector 30 health district (all facilities included) increased from 1.92% in 2003 to 3.31% in 2005. This indicates a better coverage of obstetric needs. It should be noted however that even though cesarean rates increased both in urban and rural zones, the urban rate in 2005 was 5 times higher (4.58%) than in rural zones (0.81%) indicating that access continues to be limited for rural women (Fig. 2).

5.2. Decision to operate

5.2.1. Quality of admission examination and supervision of labor

Monitoring standards for women during labor and postpartum were measured for each 3-month period from 2003 onwards:

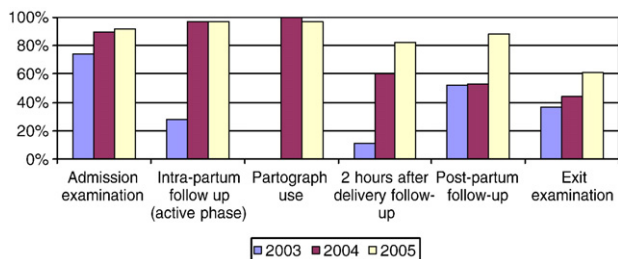


Figure 3 Quality criteria of intrapartum and postpartum follow-up, sector 30 district hospital, Ouagadougou, 2nd quarter 2003–2005.

30 case notes per quarter were picked randomly and assessed following a grid. Each phase (admission, active phase, etc) was broken down in measurable items (absent/present) according to WHO standards [19]. Fig. 3 shows the results for the 2nd quarters (April–June) of 2003, 2004, and 2005. Quality of admission and intrapartum monitoring has improved, permitting a faster diagnosis and management of complications. The follow-up within 2 hours of delivery and later postpartum is not yet optimal.

5.2.2. Indications for surgery

A reduction in elective cesarean compared with 2004 ($P < 0.05$) has been observed (Table 1). Absolute maternal indications (comprised of antepartum hemorrhage due to placenta previa or abruptio placenta, abnormal presentations [transverse lie or shoulder presentation, face with persistent mentoposterior position and brow presentation], major fetopelvic disproportion [e.g. mechanic CPD, small pelvis including pre-rupture and rupture of uterus], uncontrollable postpartum hemorrhage for which surgery is needed [20]) represented 51.1% of indications in 2005 but dropped to 43% in 2006. Cesarean deliveries for absolute maternal indications were more frequent for rural (60%) than for urban women (43%). We estimate that the district hospital has saved the lives of at least 269 women in 2006. District-wide, the cesarean rate for absolute maternal indication went from 0.75% of expected births in 2003 to 1.38% in 2005 over the whole district.

5.3. Procedure

5.3.1. Delay between decision and intervention

The median delay between the decision to perform an emergency cesarean and the start of the procedure was significantly reduced ($P < 0.05$) from 64 minutes in 2004 to 55 minutes in 2005 (Fig. 4). Stratified by place of residence and indication, the median, first and third quartiles go down regardless of the type of indication and place of residence.

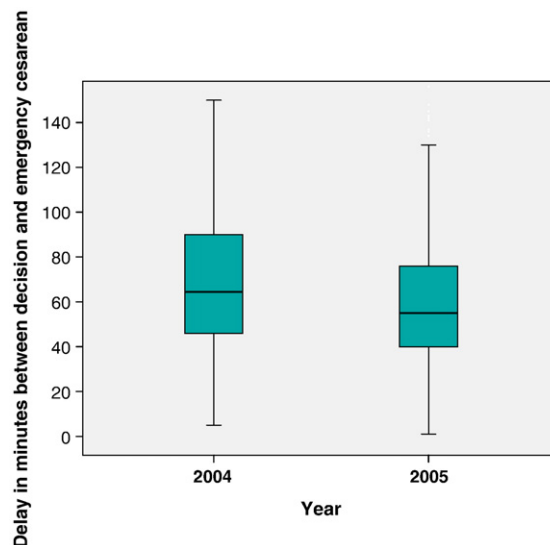


Figure 4 Delay between decision and emergency cesarean delivery, sector 30 district hospital, Ouagadougou, 2004–2005.

5.3.2. Quality of the procedure

All cesareans from 2005 onwards were performed using the Misgav Ladach technique [15]. There was only 1 surgical incident in 2004 (piercing of the uterine artery, the patient recovered). Spinal anesthesia was rarely used for cesarean until 2005 (2.6% in 2004 and 3.8% in 2005). Two accidents occurred in 2004 during spinal anesthesia – overdosing which caused a cardiac arrest resulting in 1 death. A blood transfusion accident occurred in 2005 during an elective cesarean – incompatible blood was used resulting in the death of the patient. These medical errors were analyzed during audit sessions with the anesthesia team of the hospital. As a result, nurse anesthetists received additional spinal anesthesia training from an anesthesia professor from the university hospital. In 2006, 18.1% of cesareans were done under spinal anesthesia in the district hospital without major incidents.

5.4. Postoperative care

5.4.1. Post surgery outcomes (infection, hemorrhage)

Post surgery complications were found in 10% of interventions (infections, hemorrhage, wound healing, hypertension, cardiovascular problems). Hemorrhage requiring blood transfusion occurred in 2%–3% of cesareans. Wound healing problems (wound infection, wound dehiscence) lessened from 2.6% in 2004 to 1.6% in 2005 and 0.3% in 2006 ($P < 0.05$).

5.4.2. Postoperative protocol

Nursing care recommended by the post surgery protocol (standing up early, removal of urinary catheter, and light alimentation on day 1) were implemented by adding nursing staff in the postoperative ward and by additional training. Consumables and medication (routine antibiotics) for postoperative care were provided to every woman irrespective of her resources through the “cesarean package” (which includes complete management of the patient until discharge from hospital). Monthly follow-up of prescriptions and postoperative care cost enabled us to monitor adherence to protocol and to give instructions to the care team in case the prescriptions did not match the protocol.

5.4.3. Length of stay

The median length of hospital stay was 5 days ($Q_1:4$, $Q_3:6$) in 2004 and 2005 and was significantly reduced to 4 days ($Q_1:4$, $Q_3:5$) in 2006 ($P < 0.05$).

5.5. Maternal outcomes

There were 2 post-cesarean deaths in 2004 (anesthesia accident, postoperative hemorrhage), 3 in 2005 (infection, transfusion accident, hemorrhage), and 7 in 2006 (2 eclampsia and 5 hemorrhages) corresponding to a case fatality rate fluctuating between 0.6% and 1.1%.

Hospital maternal deaths (for the women of sector 30 health district, all facilities included) remained stable: 18 deaths in 2004 and 20 in 2005 (many of which were due to indirect causes). We observed a transfer of maternal deaths from the Yalgado university hospital to the district hospital, as the proportion of complications treated at the district hospital increased. The data on mortality in the community remain difficult to obtain, we do not know the proportion of

maternal deaths occurring at home. Early perinatal mortality (<24 hours) per or post cesarean remained stable in the district hospital at around 3.6%.

6. Discussion

6.1. Limitations of the study

The first limitation concerns the validity of cesarean rates measured in the population. The numerator for the urban zone can be contaminated by women from rural zones. This can be explained by the existence of population movements between urban and rural zones of the district, of which the limits are not always clear-cut (urban developments toward the nearest villages of Ouagadougou) [20]. The second limitation is the before-after study design without a control group, which is a weak design. However, the observation of the number of cesareans in the other districts of Ouagadougou according to the annual statistics of the National Institute of Statistics and Demography (9 in 2003, 21 in 2004, and 34 in 2005 for the 3 other district hospitals in Ouagadougou) as well as the general evolution in cesarean rates in the country from demographic and health surveys (1.3% in 1993, 1.1% in 1999, and 0.7% in 2003) show that the results obtained in sector 30 can reasonably be attributed to the intervention.

6.2. Quality cesarean delivery: Conditions fulfilled?

6.2.1. Access

The rural cesarean rate, despite its increase, is still lower than the urban rate. Is cultural access still a barrier? Women from rural areas express their apprehension for cesareans and their fear of repeat cesareans. This can also lead to family problems if, for example, the husband does not want to pay the cost of future repeat cesarean [21]. Direct costs for the district residents have fallen by two-thirds since 2005. In spite of the users' great appreciation for the cost sharing system, the question remains whether it is sufficient for the poorest. In 2006, the government made an additional contribution by granting the hospitals and districts funding to lower the cost of a cesarean further to a national tariff of US \$24.70. Together with the cost sharing system which started early in 2005 with this project and continues, the district hospital charges US \$13.40 since October 1 2006 for a cesarean delivery (complete patient care from admission to discharge). It is important to learn if the gap between rural and urban areas was reduced in 2007 and if cost is the major barrier; isolation of some villages especially at night or during the rainy season also constitutes a barrier. A prospective study with more than 10 000 women in Guinea-Bissau showed that of 12 risk factors, the distance between home and hospital (6–25 km versus <5 km) had the strongest link with maternal mortality. No relationship was found with the distance between home and health center [22].

6.2.2. Diagnosis

Our study of quality showed a significant improvement in the care of women having a cesarean from admission to monitoring during labor and postpartum care. Obstetric emergencies require a timely diagnosis. As well as studying

the delay between decision to intervene and the intervention, it is equally interesting to study the delay in the decision to intervene. Decision to intervene sometimes comes too late; clinical signs of complication were present but not detected or neglected [23]. These data are more difficult to obtain routinely, but could be assessed during case review. The decision to operate is complex and depends on other factors besides the woman's condition, such as the experience of the medical team, the medico-legal pressures, the differing practice between public and private facilities, the patient's financial capacity, etc [24-26]. Absolute maternal indications were 43% of cesareans for the district hospital in 2006, compared with 43.8% for the university hospital Yalgado of Burkina Faso in 2000 [27], and 41% of the university hospital Le Dantec in Dakar in 2001 [28], which are urban hospitals. In rural hospitals where access is more difficult, the proportion of absolute maternal indications is higher [20].

6.2.3. The procedure

There were no problems with iatrogenic infections and the rate of postoperative complications (wound suppuration and dehiscence) remained low. Although clinical guidelines recommend a delay of 30 minutes between the decision and the intervention [16], several authors have questioned the evidence base for this recommendation. Audits of this criterion in British maternities have shown that this interval was practically impossible to reach [29-31] and that it is possible to exceed 30 minutes without consequences for the newborn. More important are the type of indication and the delay before the decision (which can be very long in Africa). A study of 17 780 births in England and Wales confirms this view and recommends a delay of no more than 75 minutes [32]. This study also suggests an increased morbidity and mortality risk for the fetus and the mother when the extraction is too rapid. In their cohort, MacKenzie and Cooke [29] had a median delay of 55 minutes for emergency cesarean, which is comparable to the district hospital in our study.

As to the quality of anesthesia, we can highlight 3 serious accidents resulting in 2 deaths. The risk related to the type of anesthesia is often underestimated by decision makers when implementing safe motherhood strategies [33].

6.2.4. Postoperative care

Evaluation of the quality of postoperative care is difficult because post-cesarean morbidity is strongly linked to the pre-existing condition [4,34]. A more comprehensive evaluation of cesarean quality could be made if we knew the outcome in the longer term for mother and child, but this kind of information is difficult to obtain. The risk of scar rupture during subsequent deliveries is higher in Africa (3.9%) than in Europe (0.8%), partly due to late arrival in hospital for women having their first cesarean [35].

7. Lessons learned

The district hospital went from 42 cesareans in 2003 to 630 in 2006, a significant increase in work volume and organization. The increase in activity was realized without increase in maternal or perinatal mortality (respectively 1.1% and 3.6%

in 2006). Success was possible because of good synergy among resources, standardization (procedure, kit, post-operative care) which allowed control of quality of care and reduction of hospital costs, and the leadership of a committed and motivated physician.

In terms of quality and practice changes, while each school of thought defends its own method and its own tools, we believe that one isolated action cannot lead to change [36]. To reach national coverage of quality cesarean delivery, a systemic and multidisciplinary approach is necessary. Four main factors are involved: technical, operational, socio-cultural, and political.

For technical factors, it is necessary to reach an agreement on protocols for the procedure, anesthesia, postoperative care, indications for cesarean, and the essential equipment and infrastructures. This is more than the dissemination of guidelines: it demands negotiation between the different operators, an internalization of the norms by the team, possibly through adaptation of international recommendations to local conditions. The consensus on procedures should be regularly reinforced and defended especially during the many staff turnovers.

Operational factors concern the conditions to be implemented to ensure that procedures are respected, that care is given without danger to the patient, with a better cost-efficacy ratio for the patient and the hospital. These factors will depend largely on the abilities of the district management team: management of staff and equipment to keep services functioning 24/7, implementation of a quality assurance system (audit, unit project), sanction or warning system in case of negligence or abandonment of post (accountability), financial arrangements for families (cost sharing, equity fund, community health insurance). Making quality cesarean delivery available 24/7 requires a consistent and significant effort which remains a challenge in low income countries.

Sociocultural factors are important in a community where cesarean is considered a failure [37,38]. The acceptance of cesarean is influenced by the quality of services (interpersonal communication and technical quality), by better information in the community (users-providers meetings, radio broadcasts, links with women's groups), and by a decrease in direct costs for cesarean.

Finally, we come to political factors (distribution of resources, payment for night and weekend duties, legislation about who is authorized to perform cesareans, support by health authorities for staff sanctions). While some district hospitals are able to give better quality care through the motivation of a charismatic leader and a better organization of services, only political commitment can make a difference at national level by providing the financial and human resources to achieve national coverage in emergency obstetric care [2,39]. The level of coverage of quality cesarean deliveries is an indicator of both the quality of the health system and political will.

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