

Lessons from the Field

Facility-based maternal death reviews: effects on maternal mortality in a district hospital in Senegal

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Objective The improvement of obstetric services is one of the key components of the Safe Motherhood Programme. Reviewing maternal deaths and complications is one method that may make pregnancy safer, but there is no evidence about the effectiveness of this strategy. The objective of our before and after study is to assess the effect of facility-based maternal deaths reviews (MDR) on maternal mortality rates in a district hospital in Senegal that provides primary and referral maternity services.

Methods We included all women who were admitted to the maternity unit for childbirth, or within 24 hours of delivery. We recorded maternal mortality during a 1-year baseline period from January to December 1997, and during a 3-year period from January 1998 to December 2000 after MDR had been implemented. Effects of MDR on organization of care were qualitatively evaluated.

Findings The MDR strategy led to changes in organizational structure that improved life-saving interventions with a relatively large financial contribution from the community. Overall mortality significantly decreased from 0.83 (95% CI (confidence interval) = 0.60–1.06) in baseline period to 0.41 (95% CI = 0.25–0.56) per 100 women 3 years later.

Conclusion MDR had a marked effect on resources, management and maternal outcomes in this facility. However, given the design of our study and the local specific context, further research is needed to confirm the feasibility of MDR in other settings and to confirm the benefits of this approach for maternal health in developing countries.

Keywords Maternal mortality; Maternal health services; Evaluation studies; Senegal (source: MeSH, NLM).

Mots clés Mortalité maternelle; Service santé maternelle; Etude évaluation; Sénégal (source: MeSH, INSERM).

Palabras clave Mortalidad materna; Servicios de salud materna; Estudios de evaluación; Senegal (fuente: DeCS, BIREME).

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Voir page 223 le résumé en français. En la página 223 figura un resumen en español.

Introduction

Maternal mortality is one of the most important challenges faced by international health organizations, especially in West Africa where maternal mortality remains very high.¹ A large proportion of maternal deaths result from poorly managed deliveries, in particular when obstetrical complications occur.² Treatments for these complications are well established and appropriate emergency obstetric care can prevent most maternal deaths.³ Results of situation analyses conducted in various health-care facilities in West

Africa showed that emergency obstetric care was compromised by problems related to health-services management and staff attitudes.⁴ The main factors contributing to poor quality care were failure to offer 24-hour services, a lack of drugs and supplies, and the low competence of birth attendants.

In developing countries, the audit approach is one of the most effective methods to improve the performance of health workers⁵ and could bring about changes to reduce maternal and perinatal deaths in health-care facilities.⁶ WHO

is promoting three main facility-based audit methods: (1) a review of maternal deaths; (2) a review of near-misses; and (3) clinical audit.⁷ In resource-poor settings, a facility-based maternal deaths review (MDR), defined as a “qualitative, in-depth investigation of the causes of and circumstances surrounding maternal deaths occurring at health facilities”⁷ is one of the oldest and the most documented methods that can be effective in improving emergency obstetric care and maternal outcomes.^{8–11} This type of review is easy to implement and does

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Alexandre Dumont et al.

not require external expertise. However, there is no scientific evidence about the effectiveness of MDR in resource-poor settings.¹²

In this before and after study, we aim to assess the effect of a facility-based MDR on maternal mortality in a district hospital in Senegal.

Methods

Study design

We conducted an observational study with a 12-month baseline period and a 3-year intervention period. During the baseline period 1 January–31 December 1997, we recorded maternal mortality and devised our strategy for the implementation of MDR, which included planning data collection tools, organizing education meetings and identifying local opinion leaders.

We then measured maternal mortality after the implementation of MDR. For analysis, we divided the intervention stage into three equal time periods: year 1 (1 January–31 December 1998); year 2 (1 January–31 December 1999); and year 3 (1 January–31 December 2000).

Study site and population

We included all pregnant women who were admitted to the Roi Baudouin district hospital, Dakar, Senegal, for childbirth during the study period. Women who were referred from other health facilities were included in the study if the admission was within 24 hours of delivery. We also included patients who were transferred from the study site to other hospitals and we obtained information by telephone within 6 weeks of the transfer.

The Roi Baudouin hospital is a 72-bed academic-affiliated health-care facility located in a densely populated district of Dakar, the capital of Senegal. Built in 1997, the 46-bed obstetric unit provides care for low- and high-risk pregnancies (routine, basic and comprehensive essential obstetric and neonatal care) but not intensive care for patients who need artificial ventilation, dialysis or other invasive interventions. This surgical maternity facility is the first point of referral for many of the primary maternity services in the district. If necessary, mothers (1%) or babies (5%) were referred to the university hospital located 15 km from the study centre.

During the study periods, the maternity unit was run under a comprehensive essential obstetric-care model. There

was one on-site senior obstetrician, but midwives and physician residents (students in the gynaecology–obstetric programme) were directly responsible for obstetric and neonatal care. There was about the same number of midwives as doctors on duty at any given time. Midwife (or doctor)-to-patient ratio ranged from 1:6 to 1:9 according to the hour of the day during both the baseline and the intervention periods. All patients' charts were computerized by a trained administrative assistant using Epi Info 6.01 software (Centers for Disease Control, Atlanta, Georgia, USA) after patients had been discharged. A senior obstetrician did monthly checks on these computerized data for accuracy. The head of this maternity unit is also the manager of the district hospital and the manager of the district health service during the entire 4 years of the study. Senegal uses the cost-recovery mechanism to help fund health interventions and facilities are allowed to include user fees in their budget.

Intervention

The MDR is based on the audit cycle shown in Fig. 1 (web version only, available at: <http://www.who.int/bulletin>). Midwives were responsible for identifying maternal deaths in the facility and they reported each case via a specific maternal deaths register. A senior gynaecologist–obstetrician reviewed all patients' charts and partographs on a daily basis, including the maternal death cases, to ensure quality of care, to provide continuous staff education and to assist with data collection. In the case of maternal death, the same gynaecologist–obstetrician interviewed the staff and the patient's family to collect information about the circumstances surrounding the death and completed a chart to capture this information.

Next steps included: (1) once a year, review of the charts by two senior obstetricians to classify the cause of death, and to identify any factors that contributed to the death that could have been avoided; (2) the obstetricians prepared a detailed report with their main findings and recommendations; (3) these findings were presented to the audit committee (composed of staff, local and national health authorities, and community representatives) and to representatives of international agencies and donors who supported the Roi Baudouin hospital; (4) agreed recommendations were implemented by the executive coordination team (composed of doctors, mid-

wives and nurses), under the supervision of the district health manager; and (5) the following year, the manager of the district health service evaluated how well each recommendation had been implemented.

Data analysis

Data on maternal morbidity and mortality, organizational structure and costs were collected using the Prevention of Maternal Mortality Network (PMMN) questionnaires.¹³ These data collection instruments have already been tested in several West African countries.^{4,14–18} We obtained information by interviewing members of the executive coordination team, midwives, health-centre supervisors and district health managers, and by researching and analysing all relevant documents including annual reports, administrative notes, facility registers and log books from the operating room, pharmacy and blood bank. A member of the study team (AD) extracted data from computerized patients' charts for maternal characteristics, care factors, diagnosed morbidity and maternal mortality.

Organizational data

To assess how well the recommendations of the audit committee were being implemented, we qualitatively measured the changes in organizational structure once a year. Recommendations were classified into four key resources for emergency obstetric-care services (infrastructure, equipment, personnel, and essential drugs and supplies) and management. We judged that the recommended interventions had been implemented if the resources had been made available, were regularly used and were appropriately managed.

For the specific area of emergency obstetric care, we used national guidelines to establish norms for the different components of the organization of care. We calculated the marginal cost required to improve emergency obstetric-care services at the hospital level during the study period and the respective government, hospital and community contributions that would be required.

Clinical data

A descriptive analysis was performed on maternal characteristics, care factors and maternal outcomes. The primary outcome measure was the maternal mortality rate at the facility. We calculated the maternal mortality rate by dividing the number of women who died in the

hospital by the number of patients included in the study. We did subanalysis for women with and without obstetric complications. In women with complications, the maternal mortality rate is similar to the case–fatality rate, an indicator that is widely accepted as a measure of quality of care.⁴

We compared maternal characteristics and care factors between study periods using χ^2 tests for dichotomous variables. We calculated 95% confidence intervals (95% CI) for maternal mortality rates using Fisher's exact method. The contribution of every cause of death to changes in the overall maternal mortality rate between baseline and year 3 of the intervention period was quantified with use of the attributable percent (absolute change in maternal mortality rate for a cause expressed as a proportion of the total absolute change in maternal mortality rate). Differences in maternal mortality rate between time periods were measured using crude odds ratios (OR) with 95% CI. Then, we calculated corresponding adjusted ORs to control for possible changes in maternal characteristics.

Results

Patients' characteristics and care factors

We included 6017 patients during the baseline period, 6377 in year 1, 6922 in year 2, and 6638 in year 3. We excluded 259 patients because they were admitted 24 hours or more after delivery. Patients' characteristics and care factors are shown in Table 1. Groups from the different intervention periods were similar with respect to age, but differed with respect to parity, previous caesarean section, antenatal care, referral for delivery, mode of delivery and transfusion. Differences were particularly marked for transfusion rates, rising from 1% in year 2 of the intervention to 2.1% in year 3. These changes occurred at the same time as improvements in the availability and management of blood products. The proportion of women who had not received any antenatal care dropped from around 11% in baseline period and year 1, to 4.2% in year 3 when supervision of primary care units began. Diagnosed morbidity changed across study periods. Haemorrhagic and hypertensive complications significantly increased from the baseline period to year 3, while obstructed labour progressively

Table 1. Maternal characteristics and care factors

Characteristics and care factors	Percentage				P
	Baseline (n = 6017)	Year 1 (n = 6377)	Year 2 (n = 6922)	Year 3 (n = 6638)	
Age (years)					
>16	2.9	2.5	2.6	2.1	
17–34	83.3	83.6	84.1	84.4	0.33
>35	13.9	13.9	14.0	13.5	
Parity					
0	28.1	30.5	28.9	30.4	
1–5	58.3	55.9	57.6	56.4	0.05
>6	13.6	13.6	13.5	13.5	
Previous Caesarean section	2.5	2.2	1.8	2.2	0.02
Obstetric complications					
Haemorrhage	3.1	4.6	4.7	5.7	<0.01
Hypertension	1.4	2.5	3.0	4.1	<0.01
Obstructed labour	7.8	5.8	4.0	3.7	<0.01
Puerperal sepsis	0.1	0.2	0.1	0.1	0.14
Prenatal visits					
0	10.8	10.9	3.8	4.2	
1–2	35.3	32.4	33.9	33.0	<0.01
>3	54.0	56.8	62.3	62.8	
Referral for delivery (from other health facilities)	15.7	16.5	12.5	10.7	<0.01
Mode of delivery					
Normal vaginal	91.9	91.5	92.9	91.8	
Forceps	1.9	1.7	1.1	1.5	<0.01
Caesarean section	6.2	6.8	6.0	6.7	
Transfusion	0.9	1.3	1.0	2.1	<0.01

decreased during the study. Puerperal sepsis remained a rare complication throughout the study period.

Maternal outcomes

153 maternal deaths were recorded between 1 January 1997 and 31 December 2000. Of these deaths, 139 (91%) were associated with avoidable factors. This proportion did not change significantly during the study: 85% in 1997, 85% in 1998, 95% in 1999 and 98% in 2000 ($P = 0.28$ (χ^2 with 3 degrees of freedom)). The number of deaths for the baseline period, year 1, year 2 and year 3 was 50, 43, 33 and 27, respectively, showing a progressive decrease in overall maternal mortality rate, from 0.83% (95% CI = 0.60%–1.06%) in the baseline period to 0.41% (95% CI = 0.25%–0.56%) in year 3, $P = 0.02$ (Table 2).

Most of the decrease in the overall maternal mortality rate between the baseline period and year 3 was due to a decrease in deaths related to haemorrhage and

hypertensive disorders; the attributable percent is 50.1% and 26.3%, respectively (Table 3). When we controlled for confounding factors, maternal mortality decreased from baseline by 12% (non-significant) in year 1, by 36% (non-significant) in year 2 and by 55% (significant) in year 3 (Table 4). Analysis restricted to women with obstetric complications and adjusted for maternal characteristics and care factors shows a significant decrease of maternal mortality in year 2 and year 3 compared with that during baseline. Fig. 2 shows the decrease in case–fatality rates during the study.

Organization of emergency obstetric care

During the intervention period we noted marked changes in the allocation of resources and management in the study hospital. Thirteen specific interventions were recommended by

the audit committee and implemented (Table 5). These interventions focused on the 24-hour availability of life-saving services, essential drugs and blood products; and on the availability of basic emergency obstetric care at both hospitals and primary-care facilities. Several agreed recommendations were not implemented during the study periods: expansion of the delivery unit, recruitment of one paediatrician and one gynaecologist–obstetrician, improvement of standardized emergency kits, dissemination of guidelines, and mobilization of blood donors.

Marginal costs

Total additional costs to upgrade and expand emergency obstetric-care services were US\$ 325 256: US\$ 1250 for infrastructure and equipment, US\$ 191 511 for additional staff, and US\$ 193 496 for essential drugs and supplies including blood bags. Except for the salaries of pre-existing personnel, the contribution of the government to the running costs of the facility was low (9%). International agencies and donors contributed 11%, mainly to upgrade the surgical equipment in the operating theatre (US\$ 4697) and the maternity ward (US\$ 5101) Finally, patients and their families made the largest contribution (80%). The rate of cost recovery from patients for drugs and supplies used during obstetric emergencies reached 91%. The payment was made after emergency care had been given, but while patients were still hospitalized. A social worker assessed the financial situation of patients who were unable to pay and re-evaluated their contribution. During the study period, the proportion of very poor patients who could not make any payments ranged from 3% to 5%.

Table 2. Trends in maternal mortality rates^a

Study period	Total (95% confidence interval)	Women with complications ^b	Women without complications
Baseline	0.83 (0.60–1.06)	5.25 (3.65–6.85)	0.21 (0.09–0.33)
Year 1	0.67 (0.47–0.88)	4.58 (3.16–6.01)	0.09 (0.01–0.17)
Year 2	0.47 (0.31–0.64)	2.97 (1.80–4.14)	0.15 (0.05–0.24)
Year 3	0.41 (0.25–0.56)	2.51 (1.45–3.57)	0.10 (0.02–0.19)

^a Data are rates per 100 women.

^b Major obstetric complications: haemorrhage, obstructed labour, hypertension and puerperal sepsis.

Discussion

When applied to qualified professionals of a district maternity hospital in Senegal, especially physicians, midwives, and managers, MDR helped to improve the organization of care, with a marked effect on the availability of life-saving interventions. Data on clinical outcomes showed a significant decrease in maternal mortality within a 3-year intervention period, in particular for deaths related to haemorrhage and hypertensive disorders. Payment for the costs of interventions recommended by the audit committee came from community contributions (user fees and cost recovery for essential drugs and supplies). The hospital established an equitable cost-recovery system by instituting relatively low user-fees, requesting payment after care had been given, and allowing exemptions for patients unable to pay.

In this study, we did not include maternal deaths that occurred at home after patients had left the maternity unit, leading to a possible underestimation of maternal mortality. However, results from a population-based survey in seven cities of West Africa show that most maternal deaths occur in health-care facilities.² Most patients in our study lived in the urban district of Guediawaye

and near the hospital. We think that underestimation of the maternal mortality rate was low and did not change greatly during the study.

Compared with data from the United Nations, national estimates of maternal mortality in Senegal for 1995 and 2000 were 1198 (range of uncertainty 842–1565) and 690 (180–1300) deaths per 100 000 live births, respectively.^{1,19} Because of the wide margins of uncertainty associated with the estimates, these data cannot be used to analyse trends in Senegal. However, we cannot exclude the possibility that there was an overall drop in maternal mortality in Senegal during the study period.

This before and after, non-controlled, study design does not allow us to conclude a causative relationship between the audit practice and the decrease in maternal mortality. Because maternal death audits result in several subinterventions being implemented, it is difficult to assess the effects of each “active ingredient” of this complex intervention.

However, there are several findings which support the idea that MDR contributed to a reduction in maternal mortality in this facility. First, the differences in maternal mortality rate remained after

Table 3. Trends in maternal mortality rates by cause of death

Cause of death	Baseline n (%)	Year 3 n (%)	Baseline vs year 3		
			Absolute change, %	Attributable ^a %	Crude odds ratio (95% confidence interval)
Haemorrhage	19 (0.32)	7 (0.11)	–0.21	50.1	0.33 (0.13–0.84)
Hypertension	13 (0.22)	7 (0.11)	–0.11	26.3	0.49 (0.18–1.31)
Obstructed labour	6 (0.10)	6 (0.09)	–0.01	2.2	0.91 (0.26–3.16)
Puerperal sepsis	1 (0.02)	1 (0.02)	0.00	0.4	0.91 (0.02–33.07)
Other	11 (0.18)	6 (0.09)	–0.09	22.0	0.49 (0.16–1.44)
Total	50 (0.83)	27 (0.41)	–0.42	100.0	0.49 (0.30–0.80)

^a Attributable percent is absolute change in maternal mortality for a specific cause (e.g., –1.21 for haemorrhage) expressed as a proportion of the total absolute change in maternal mortality rates (–0.21/–0.42 = 50.1).

multivariate analysis, demonstrating that the decrease in mortality was not related to changes in patients' characteristics. Further, MDR was the only strategy employed to reduce maternal mortality during the study period, allowing us to cautiously assume that changes in maternal outcomes are associated with the implementation of specific recommendations from the audit committee.

There is no quantitative or qualitative evidence that the problems with care identified in year 1 did not repeat themselves in years 2 and 3, but these problems may have occurred less often because of the recommended interventions. For example, the renovation of the laboratory, the recruitment of one biologist and two laboratory assistants and the training of staff for blood bank management enhanced the capacity of the health facility to provide blood transfusions, which in turn contributed to a reduction in maternal deaths due to haemorrhage. Finally, it is important to note that user-fees established in agreement with community representatives allowed the facility to cover an important part of the cost of the audit-based recommended interventions. Audit process and annual written feedback contributed to make community representatives aware of maternal mortality issues and helped managers to make decisions about appropriate allocation of funds. The key point is that results of the MDR have been used to guide decisions about changes to work procedures and organizational structure that will improve patients' quality of care.

Table 4. Trends in maternal mortality rates

Study period comparison	Adjusted odds ratio ^a (95% confidence interval)	P	Restricted odds ratios ^{a,b} (95% confidence interval)	P
Year 1 vs baseline	0.82 (0.53–1.27)	0.401	0.87 (0.54–1.40)	0.571
Year 2 vs baseline	0.64 (0.40–1.02)	0.074	0.53 (0.31–0.92)	0.021
Year 3 vs baseline	0.55 (0.33–0.90)	0.022	0.42 (0.24–0.74)	0.003

^a Adjusted for maternal age, parity, prenatal visits, referral for delivery, Caesarean section and transfusion.

^b Analysis restricted to women with obstetric complications (haemorrhage, hypertension, obstructed labour and puerperal sepsis). Adjusted for maternal age, parity, prenatal visits, referral for delivery, Caesarean section and transfusion.

This study took place in a health facility that, despite being located in a poor area and having to rely on community contributions to cover costs, does focus on quality of care and data collection. In this hospital, staff decided to conduct audits to gather information that could lead to an improvement in maternal outcomes. Here, we describe some of the important elements to be considered if audit projects are to be successfully implemented in resource-poor settings. However, not all features of this study site are generalizable to other sub-Saharan health facilities, and implementation of MDR might require some adaptations to suit different organizations and settings.

There are a number of documented experiences in developing countries of facility-based audits of maternal deaths.^{8–11} Only two suggest that MDR implementation has led to improved resources and management for emergency obstetric-care services.^{10,11} In these two reports, there was

a 50% drop in maternal mortality within a 3-year intervention period, which is similar to the pattern noted in our study. There are also several studies of facility-based audits of perinatal deaths,²⁰ uterine rupture,²¹ near-misses^{22–24} or criterion-based audit.^{25,26} However, controlled evaluation studies of audit interventions are rare and the absolute or relative effects of these approaches on professional practices and outcomes are generally only small to moderate.

Our findings suggest that MDR is feasible in resource-poor settings and can be effective in reducing maternal mortality in health facilities. Several factors have contributed to the successful implementation of MDR in our experience. The most important factors are: quality-controlled data collection and computerized patient records, a strong commitment to the project from the head of the maternity unit, a strong executive-coordination team and provision of annual written feedback to staff, support from health authorities and community representatives, and an equitable and successful cost-recovery system. However, in view of our study design and that there were many advantages specific to our study setting, further research is needed to confirm the feasibility of MDR in other settings and to confirm the benefits of this approach for maternal health in developing countries. ■

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Fig. 2. Trends in case-fatality rates

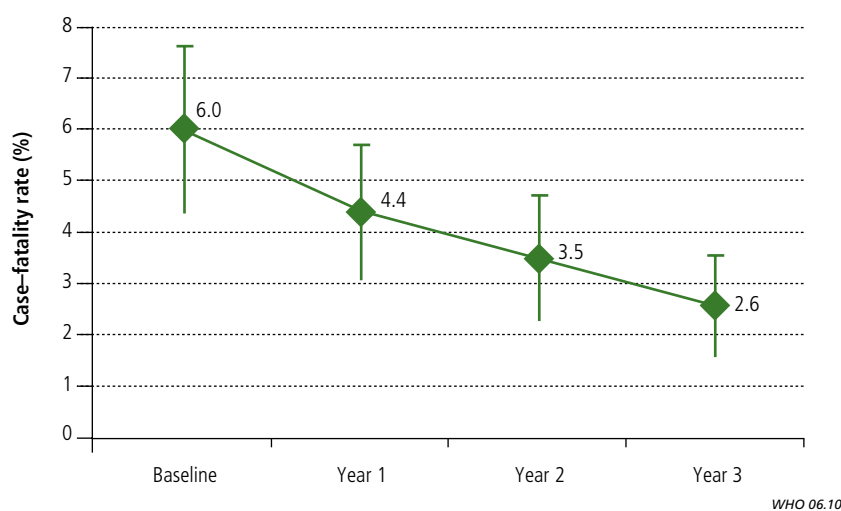


Table 5. Qualitative evaluation of recommendations

Resource and management category	Recommendations agreed and implemented	Recommendations agreed but not implemented
Infrastructure	Renovation of the laboratory building	Expand the maternity ward
Trained staff	Assign three midwives from primary health centres to the hospital Recruit four anaesthetist-nurses Recruit one biologist and two laboratory assistants	Recruit one full-time paediatrician Recruit two full-time gynaecologists–obstetricians Train staff in primary care health facilities for emergency obstetric care
Equipment	Buy blood-bank refrigerator Equip the post-surgery unit Upgrade surgical equipment	Equip a second operating room
Drugs and supplies	Ensure the 24-hour availability of drugs and supplies Make intravenous magnesium sulfate available	Elaborate standardized kits for normal delivery Improve standardized kits for Caesarean section
Management	Train staff for blood-bank management Ensure the 24-hour availability for haemoglobin and coagulation tests Supervise staff in the maternity ward Supervise staff in primary health care facilities	Elaborate and disseminate clinical practice guidelines for emergency obstetric care Encourage blood donation at the district level

Résumé

Analyse des décès maternels dans les établissements de soins : effets sur la mortalité maternelle dans un hôpital de district au Sénégal

Objectif L'amélioration des services obstétricaux est un aspect fondamental du programme pour une maternité sans risque. L'analyse des décès maternels et des complications offre un moyen de réduire les risques liés à la grossesse, mais on ne dispose d'aucunes données sur l'efficacité de cette stratégie. L'objectif de cette étude examinant la situation avant et après l'introduction des analyses des décès maternels est d'évaluer l'effet des analyses sur les taux de mortalité maternelle dans un hôpital de district au Sénégal offrant des services obstétricaux primaires et un dispositif d'orientation-recours.

Méthodes On a pris en considération toutes les femmes admises au service de maternité pour un accouchement ou dans les 24 heures suivant l'accouchement. La mortalité maternelle a été enregistrée sur une période de référence d'une année, de janvier à décembre 1997, et sur une période de trois ans, de janvier 1998 à décembre 2000, après la mise en place des analyses des décès maternels en établissement. Les effets de ces analyses

sur l'organisation des soins ont fait l'objet d'une évaluation qualitative.

Résultats L'introduction des analyses a entraîné des modifications de nature organisationnelle qui ont amélioré les interventions permettant de sauver des vies, grâce à une contribution financière relativement importante de la communauté. Le taux de mortalité global a baissé sensiblement de 0,83 (IC (intervalle de confiance) 95 % = 0,60-1,06) au cours de la période de référence à 0,41 (IC 95 % = 0,25-0,56) pour 100 femmes trois ans plus tard.

Conclusion L'analyse des décès maternels en établissement a eu un effet marqué sur les ressources, la prise en charge et l'issue des grossesses dans l'hôpital considéré. Toutefois, vu la conception de l'étude et le contexte local spécifique, des recherches plus approfondies sont nécessaires pour confirmer la faisabilité des analyses dans d'autres cadres et les avantages de cette approche pour la santé maternelle dans les pays en développement.

Resumen

Análisis de las defunciones maternas basados en centros de salud: efectos en la mortalidad materna en un hospital de distrito del Senegal

Objetivo La mejora de los servicios obstétricos es un componente clave del Programa Maternidad sin Riesgo. El análisis de las defunciones maternas y de las complicaciones asociadas es un método para reducir los riesgos del embarazo, pero no hay indicios sobre la eficacia de esa estrategia. El objetivo de nuestro estudio comparativo antes-después consistió en evaluar el efecto de los análisis de las defunciones maternas (ADM) en centros de salud sobre las tasas de mortalidad materna en un hospital de distrito del Senegal que ofrece servicios de maternidad primarios y de derivación.

Métodos Incluimos a todas las mujeres ingresadas en el servicio

de maternidad para dar a luz o en las primeras 24 horas tras el parto. Registramos la mortalidad materna durante un periodo basal de un año, de enero a diciembre de 1997, y luego durante tres años, de enero de 1998 a diciembre de 2000, tras aplicar los ADM. Los efectos de estos análisis en la organización de la atención fueron evaluados cualitativamente.

Resultados La estrategia basada en los ADM provocó en la estructura orgánica una serie de cambios que mejoraron diversas intervenciones salvavidas, con una contribución financiera relativamente importante de la comunidad. La mortalidad general

disminuyó significativamente, de 0,83 (IC (intervalo de confianza) del 95% = 0,60-1,06) en el periodo basal a 0,41 (IC95% = 0,25-0,56) por 100 mujeres 3 años más tarde.

Conclusión Los ADM tuvieron un efecto marcado en los recursos, la gestión y los resultados maternos en el centro estudiado.

Sin embargo, dado el diseño de nuestro estudio y el contexto específico local, habrá que llevar a cabo nuevas investigaciones para confirmar la viabilidad de los ADM en otros entornos, así como las ventajas de este sistema para la salud materna en los países en desarrollo.

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Fig. 1. Facility-based maternal deaths review cycle

