

the total number of deaths (primary outcome) but they have not given desegregated deaths in the intervention and control groups. To provide for a clear denominator, they could have given the estimated number of children in subgroups at each stage.

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Reducing maternal deaths in India: Will good emergency obstetric care be useful?

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SUMMARY

Maternal mortality is high in West Africa. In many places, a large number of women die giving birth in hospitals. Hence, access to as well as quality of emergency obstetric care (EmOC) services in hospitals need to improve to reduce maternal deaths. This study assessed the effect of a multifaceted intervention by promoting maternity death reviews and onsite training in EmOC in referral hospitals with high maternal mortality rates in Senegal and Mali.

The study was a stratified, cluster-randomized controlled trial. Forty-six referral hospitals with more than 800 deliveries per year were enrolled in the study, stratified by country and hospital type. A system of data collection was set up in all hospitals in the intervention and control clusters. Baseline data collection was done for a period of 1 year followed by implementation of the intervention for the next 2 years and then, collection of post-intervention data for 1 year. The intervention consisted of an initial interactive workshop and quarterly educational outreach visits focused on maternal death reviews and implementation of best practices.

The primary outcome was reduction of risk of hospital-based mortality. Patients were the unit of analysis. More than 95 000 patients were included in the analysis in each of the intervention and control clusters. Analysis was by intention-to-treat using generalized

estimating equations extension of the logistic regression model to account for clustering of women within hospitals. Mortality reduction in intervention hospitals was significantly higher than that in control hospitals (odds ratio [OR] 0.85, 95% CI 0.73–0.98, $p=0.0299$), but this effect was limited to capital and district hospitals, which mainly acted as first-level referral hospitals in this trial. There was no effect in second-level referral (regional) hospitals outside the capitals (OR 1.02, 95% CI 0.79–1.31, $p=0.89$). The effect of intervention on three secondary outcomes was also assessed—resource availability in each hospital, medical practice for EmOC and perinatal mortality. A significant positive change was seen in all secondary outcomes. The trial confirmed that large-scale implementation of maternal death reviews and training in EmOC reduced hospital-based maternal mortality in low-income countries.

COMMENT

Maternal mortality remains a major challenge to health systems worldwide. Efforts are being made to reduce maternal mortality ratio (MMR), which is also emphasized in the Millennium Development Goal 5, the target for which is a 75% reduction in the MMR from 1990 to 2015.¹

Every two minutes, a woman dies of pregnancy-related complications. Almost 99% of maternal deaths occur in developing countries; most could have been prevented with proven interventions. Although MMR has declined globally by 47%, from 1990 to 2010, disparity exists within and across countries and regions. One-third of all maternal deaths occur in just two countries—India and Nigeria.² The complications leading to maternal deaths can often be managed with a health system that provides skilled personnel and facilities to handle emergencies and postpartum care.³ It is important that all births are attended by skilled health professionals, as timely management and treatment can make the difference between life and death.⁴ Hence, EmOC is critical for reducing maternal deaths.

Maternal mortality remains one of the most daunting health challenges for India. A key contributing factor to this situation is the lack of skills among rural general doctors and medical officers in the primary healthcare system to provide high-quality EmOC and medical termination of pregnancy services.⁵ Poor quality of EmOC services in India has also been reported in different studies.^{6,7} The Ministry of Health and Family Welfare has

emphasized the need to improve access to as well as quality of EmOC services.

The authors argue that, to achieve a reduction in maternal mortality, it is essential to update the skills of health professionals in providing EmOC. This cannot be done effectively just by disseminating written guidelines; multifaceted interventions are required. The present study assessed the effect of an intervention, comprising an initial interactive workshop for health professionals and quarterly educational outreach visits focused on maternal death reviews and best practice implementation, on reduction in hospital-based maternal mortality. The intervention led to a 15% decline in the number of hospital-based maternal deaths.

This is the first study which provides evidence regarding the effectiveness of maternal death reviews and educational outreach visits in improving maternal outcomes. There are very few studies which evaluated the effect of training on EmOC but they focused on process indicators such as increased knowledge and skills of health professionals but failed to show improved maternal outcomes which have been shown in this study.

The strengths of this study include a robust study design and appropriate methodology. This is one of the largest intervention trials on hospital-based maternal mortality in sub-Saharan Africa. The participant hospitals were representative of the existing health system in both countries and the intervention led to the development of local leadership. Quality control of data was ensured by regular monitoring by country-level study coordinators and double entry of data. Independent organizations undertook data collection and implementation of the intervention and they were not involved in the assessment of the outcome. This large database system was implemented uniformly in all hospitals which helped in obtaining reliable information. None of the hospitals were lost to follow-up and the proportion of missing data was also very low.

The intervention was well planned and efficiently implemented. Training of health professionals in EmOC was done using a standard international ALARM (Advances in Labour and Risk Management) course developed by the Society of Obstetricians and Gynaecologists of Canada.⁸ Each participant was evaluated at the end of training and was also required to attend two recertification sessions, once a year, to verify and update their knowledge and to confirm their capacity to provide leadership in their clinical settings.

A few limitations of the study should also be taken into account. The objective of this study was to assess the effect of intervention on maternal mortality but they excluded women who delivered at home or at another centre with post-natal transfer. Maternal mortality is not only limited to deaths during childbirth but also includes post-natal deaths as a complication of pregnancy or childbirth. Women who develop complications during delivery at home or at a lower centre are referred to be managed at a higher centre. As this study was done in referral hospitals, the exclusion of such women could lead to selection bias. Also, there are chances that some eligible women with no data available could have died before discharge.

The intervention and control groups were not similar with respect to certain baseline characteristics. The proportion of staff members specialized in anaesthesia available 24 hours a day was much higher in the control group. Also, the proportion of patients with residence outside the region and those undergoing emergency caesarean delivery was much higher in the intervention group. In addition, as this study included public sector hospitals, there are chances of transfer of health staff from one group to another during the 4-year study period, which could have influenced the results.

During the period of this trial, maternal death reviews and on-site training were implemented by national and international organizations in four of the seven regional hospitals in the control group. Probably, this could be the reason for no significant positive result of intervention in regional hospitals.

As a major proportion of global maternal deaths is contributed by India, it should be our priority to reduce MMR. The strategy adopted by the authors can be replicated in India. Maternal Death Review as a strategy has been spelt out clearly in the Reproductive and Child Health (RCH)-II National Programme Implementation Plan document. According to national guidelines, Facility-Based Maternal Deaths Reviews should be done at all government teaching hospitals, referral hospitals and other hospitals (district, subdistrict, CHCs) with more than 500 deliveries per year. All the maternal deaths in hospitals should be informed immediately by the medical officer on duty at the time of occurrence of death to the facility nodal officer who then informs the district nodal officer in order to investigate all deaths within 24 hours.⁹ However, practically, only a few states are performing satisfactorily in this regard. There is gross under-reporting and the quality of reviews is poor.¹⁰ The focus of reviews should not only be identification of medical causes of maternal deaths, but this information should also be used to implement corrective measures, as shown in this study. Verbal autopsies need to be conducted at the community level by the female health worker. As shown by the study, our focus should not only be on implementation of these interventions but also to institute a well-planned system for evaluation of their impact, which is lacking in India. The authors have shown us the way forward from being only planners and implementers to also being evaluators of the ultimate desired outcome.

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