

A Spotlight on Obstetric Anesthesia in the Developing World: Finally Getting the Attention It Deserves

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The population growth of the planet is almost entirely in the developing world and is accompanied by an unacceptably high number of maternal deaths. The World Health Organization Millennium Development Goal 5 to reduce maternal mortality by 75% between 1990 and 2015 provides a clear target; however, an effective strategy to deal with the ongoing epidemic of preventable maternal mortality, including direct anesthetic deaths, has yet to be implemented.¹ Both direct and indirect obstetric deaths remain excessively high such that Millennium Development Goal 5 will not be achieved.¹ Despite an overall 47% decrease in maternal deaths since 1990,² the actual number of maternal deaths remains unacceptably high at approximately 287,000 per year, mostly in low- and middle-income countries.³ Current data show that countries with lower birth and maternal mortality rates have managed to achieve a greater percentage reduction in their maternal mortality than regions and countries with higher rates.

Why discuss the maternal mortality rate in an editorial in an anesthesiology journal? The developing world warrants a light being shone on its obstetric anesthesia needs. Improving access to safe, emergency obstetric surgical services can potentially save a large proportion of the lives lost. Apart from hypertension, dominant causes of maternal death in the developing world are hemorrhage, sepsis, and uterine rupture. All can follow obstructed labor,^{1,4} often a result of great difficulty in accessing adequate obstetric and surgical services. These women often present extremely late and in extremis.²

The information reported in an article from the nonprofit humanitarian organization, Kybele, Inc. (Winston-Salem, NC), by Olufolabi et al.⁵ in the current issue of *Anesthesia & Analgesia* is consistent with other commentators who have suggested that improving obstetric anesthesia standards, especially in the low-income countries, will contribute to improving the general care and outcomes of parturients.^{4,6,7} Efforts to

improve obstetric services have included a focus on improving operating room functionality⁸ and anesthesia skills.^{4,9} For example, data from sub-Saharan Africa suggest that the immediate (within 72 hours) postcesarean maternal mortality is between 5 and 25 times higher than in the United Kingdom; 80% of these deaths occur on the postoperative ward.^{4,10} These data identify an opportunity to reduce maternal mortality by improving anesthesia and postanesthesia care.

Considering the magnitude of the preventable mortality in low-income countries, there is a relative paucity of literature on successful interventions to improve maternal anesthesia outcomes in these low-resource environments. There is no published evidence that attendance at didactic lectures, or even a single visit by an expert demonstrating practical skills, has resulted in a significant change in anesthetic techniques or practice standards. However, both the Kybele^{5,6,11} and Cooperative for Assistance and Relief Everywhere (CARE) (another humanitarian organization)^{8,9,12} groups describe successful programs that start with the provision of infrastructure, staffing, and equipment, including consumables. The Kybele report⁵ progresses to a description of practice changes from which we can learn, including the following:

1. Technical training, followed by repeated assessment, advocacy, and improvement of data acquisition;
2. Carefully planned implementation in cooperation with local administrators and clinicians; and
3. Sustained efforts to overcome impediments and to develop a critical mass of trained health professionals to create a lasting change.

The Kybele group has described their experience in eastern Europe, the Baltic States, and Africa and have already identified the difficulties that anesthesiologists encounter in establishing new services, including neuraxial anesthesia for cesarean delivery and/or a labor neuraxial analgesia service.^{6,13} They acknowledge that it is easier to establish a new service when the change is initiated either by patients or by administrators who drive a policy intervention than by anesthesiologists. A recent review describes the challenges facing anesthesiologists who attempt to initiate a labor epidural service in an area with limited resources.⁶

The Kybele group has extensive experience in the area of obstetric anesthesia and analgesia change management and have identified key enablers and stumbling blocks so that others attempting to improve services in middle- and low-income countries would do well to note their path-finding work.^{2,5} The group initiates the process with observations and focus group discussions to better understand the service

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requirements, staffing complement, and necessary skills sets. This approach, followed by their cycle of repeated visits and assessments, is the key to their success. This process includes 2 components. First, an outreach model is used in which a team is sent to undertake a thorough needs assessment and change management process. Second, an “in-reach” model is put in place^{5,6} in which key clinical skills are identified and clinical staff are sent either to a local teaching facility or to high-income countries, where they are exposed to modern techniques and standards of care.

CARE, a nongovernmental organization dedicated to the reduction of poverty in 87 countries, also has a proven and well-described approach to strengthening emergency obstetric care. This approach specifically includes improving the quality of operating room services as well as improving mothers’ access to these strengthened services.^{8,9,12} In harmony with Kybele’s work, they clearly describe a comprehensive package of support. This ensures not only a transfer of clinical knowledge and skills, but also the adoption of a medium-term view to establish local champions. Local champions are critical for initiating local policy changes as well as ensuring that infrastructure, supply chains, and staffing needs are supported by local partners and the community. In particular, CARE identifies a well-designed and functional operating room as a key building block in implementing improved care¹² as well as the availability of specialist surgeons and anesthesiologists to increase the capacity for and improve outcomes from obstetric surgery.^{9,10,14}

CARE also ascribes many of the changes in care and improved outcomes to the development of protocols for the management of obstetric emergencies.⁹ Protocols are evidence-based, outline step-by-step management of obstetric problems and specify the competencies required of staff in each facility. A similar initiative is the South African national “Essential Steps in the Management of Obstetric Emergencies” program, which attempts to decrease maternal mortality, targeting the preventable causes identified in the South African triennial reports on maternal mortality.^{15,16} The program, directed at recently trained physicians, currently includes 13 detailed clinical management modules, one of which addresses obstetric anesthesia care.

Low-income countries are 2 to 3 decades behind in the transition from general to neuraxial anesthesia for cesarean delivery. There are many reasons, including availability of consumables, drugs, training, and patient expectations. The Kybele authors have published their experience in this regard in several sites.^{8,9,12,13}

The detailed causes of direct anesthesia-related deaths in low-income countries are generally not available because these constitute only a small percentage of the overall maternal mortality.¹ Olufolabi et al.⁵ quoted an institutional mortality rate of 492 per 100,000 during their final year of involvement with 41% of these patients dying in the operating room and postanesthesia recovery area. There were 3 direct anesthetic deaths (2 related to airway management and 1 to high spinal anesthesia), an anesthetic mortality rate of approximately 1:1000.

Some authors have suggested that spinal anesthesia may be safer than general anesthesia in low-resource settings,⁴ but others have expressed the view that there are no reliable

data for some countries and their unique health systems.¹³ Indeed, there are data suggesting that spinal anesthesia may be associated with a similar or even higher direct mortality rate than general anesthesia. Data from the South African National Committee for Confidential Enquiries into Maternal Deaths have documented a fairly static overall rate of direct maternal deaths resulting from anesthesia since 1998, when 46% of the direct anesthetic deaths were associated with general anesthesia.¹⁷ However, by the 2008 to 2010 triennium, this pattern had reversed and 79% of deaths were attributable to spinal anesthesia.¹⁶ Two-thirds of the spinal anesthesia deaths were attributable to poor management of spinal hypotension or a high motor block, and most were assessed as avoidable. These data emphasize the importance of case selection when choosing anesthesia modality and an understanding of the management of hemodynamic instability during spinal anesthesia for cesarean delivery. This knowledge and training are especially important when spinal anesthesia is performed by nonspecialist anesthesia providers.

While overwhelmed by the burden of preventable maternal mortality, it is understandable that planners and clinicians may neglect the provision of labor analgesia. Cost-effective and safe labor analgesia is virtually nonexistent in low-income countries. However, this key aspect of a quality obstetric anesthesia service should not be ignored. The Kybele authors describe a small pilot program to introduce single-shot spinal analgesia for labor. Challenges identified included adherence to protocol, including drug doses. Initiators of labor analgesia programs should ideally supervise such programs until it can be shown that these procedures, which may be associated with significant adverse effects, are reliably performed.

The Kybele investigators also performed a small survey on postpartum day 1 among women who had delivered vaginally.⁵ Almost half of these women described “provision of pain relief” as an aspect of childbirth that could be improved. An antenatal survey of nulliparous women’s expectations in a South African maternity hospital found that 50% of women felt that labor pain “was a good thing,” mainly because they believed it improved bonding; however, a large percentage of these women also expressed a wish for some analgesia because they did not want, or feel it necessary, to experience severe pain.¹⁸ A Nigerian antenatal survey showed that the overwhelming majority of women knew that labor was very painful. Only 20% were aware that epidural analgesia is an option, mostly those with a higher educational level (professional or health worker) and/or those who had experienced prior childbirth.¹⁹ By contrast, data from the United States (2008) suggest that up to 61% of women who have a singleton vaginal delivery receive advanced neuraxial analgesic options.²⁰ Thus, labor analgesia requires an alternative approach in most low-resource settings, because it is unlikely that staffing will allow for the technical performance and safe monitoring of epidural analgesia and other sophisticated methods such as combined spinal-epidural and patient-controlled epidural analgesia.⁶

The transfer of even minimal resources from the high-income countries, accompanied by motivated teams eager to assist government officials and clinicians from

low-income countries to improve their own services, could do much to improve the access to and quality of obstetric care experienced by mothers in low-resource settings and reduce mortality. Best use of resources should probably be guided by the project implementation plans already described by groups such as Kybele and CARE.^{6,8,11,12} These projects have shown that the starting point should be assessment and improvement of local infrastructure and resources to acceptable levels, before clinical training and building technical competence are initiated, while looking to establish partnerships with local centers of excellence and training departments. A 2009 editorial highlighted the benefits of the Kybele view that 2 weeks of hands-on training is superior to didactic lectures in obstetric anesthesia.²¹ This can be followed by training guidelines and protocols, building technical competence, and establishing local partnerships with surrounding centers of excellence or training departments. Both the Kybele and the CARE models of service improvement^{6,8,9,12} have been shown to be practicable and improve maternal outcomes, despite implementation while clinical workload is significantly increasing. We now have further evidence from the Kybele group, this time from Africa, which together with the work from CARE provides excellent advice on the way forward. Whereas these 2 experienced groups have established a working model that is quite resource-intensive, we now have the opportunity to better define the minimum human resource requirements for a successful and sustained quality improvement program in obstetric anesthesia. In this way, the benefits can be maximized, both for safe practice in emergencies and for patient safety and comfort during labor and elective cesarean delivery. ■■

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REFERENCES

- Say L, Chou D, Gemmill A, Tuncalp A, Daniels J, Gulmezoglu AM, Temmerman M, Alkema L. Global causes of maternal death: a WHO systemic analysis. *Lancet Global Health* 2014;2:e323–33
- Trends in Maternal Mortality: 1990–2010. World Health organization, World Bank, UNICEF, United Nations Population Fund. Available at: http://www.unfpa.org/sites/default/files/pub-pdf/Trends_in_maternal_mortality_A4-1.pdf. Accessed October 23, 2014
- Zureick-Brown S, Newby H, Chou D, Mizoguchi N, Say L, Suzuki E, Wilmoth J. Understanding global trends in maternal mortality. *Int Perspect Sex Reprod Health* 2013;39:32–41
- Fenton PM, Whitty CJ, Reynolds F. Caesarean section in Malawi: prospective study of early maternal and perinatal mortality. *BMJ* 2003;327:587
- Olufolabi AJ, Atito-Narh E, Eshun M, Ross VH, Muir HA, Owen MD. Teaching neuraxial anesthesia techniques for obstetric care in a Ghanaian referral hospital: achievements and obstacles. *Anesth Analg* 2015;120:1317–22
- Kodali BS, Jagannathan DK, Owen MD. Establishing an obstetric neuraxial service in low-resource areas. *Int J Obstet Anesth* 2014;23:267–73
- Centre for Maternal and Child Enquiries (CMACE). *Br J Obstet Gynaecol* 2011;118(Suppl 1):e12–21
- Kayongo M, Rubardt M, Butera J, Abdullah M, Mboninyibuka D, Madili M. Making EmOC a reality—CARE's experiences in high maternal mortality in Africa. *Int J Gynecol Obstet* 2006;192:308–19
- Kayongo M, Esquiche E, Luna MR, Frias G, Vega-Centeno L, Bailey P. Strengthening emergency obstetric care in Ayacucho, Peru. *Int J Gynaecol Obstet* 2006;92:299–307
- McKenzie AG. Operative obstetric mortality at Harare Central Hospital 1992–1994: an anaesthetic view. *Int J Obstet Anesth* 1998;7:237–41
- Srofenyoh E, Ivester T, Engmann C, Olufolabi A, Bookman L, Owen M. Advancing obstetric and neonatal care in a regional hospital in Ghana via continuous quality improvement. *Int J Gynaecol Obstet* 2012;116:17–21
- Kayongo M, Butera J, Mboninyibuka D, Nyiransabimana B, Ntezimana A, Mukangamujje V. Improving availability of EmOC services in Rwanda—CARE's experiences and lessons learned at Kabgayi Referral Hospital. *Int J Gynaecol Obstet* 2006;92:291–8
- Kopic D, Sedensky M, Owen M. The impact of a teaching program on obstetric anesthesia practices in Croatia. *Int J Obstet Anesth* 2009;18:4–9
- Okafor UV, Aniebue U. Anaesthesia for uterine rupture in a Nigerian teaching hospital: maternal and fetal outcome. *Int J Obstet Anesth* 2006;15:124–8
- Saving Mothers report 2010–2012. Available at: <http://www.rmchsa.org/wp-content/uploads/2013/05/Tenth-Interim-Report-Maternal-Deaths-2011-and-2012.pdf>. Accessed October 23, 2014
- Rout CC, Farina Z. Anaesthesia-related maternal deaths in South Africa. *South Afr J Anaesth Analg* 2012;18:279–301
- Rout C. Maternal mortality and anaesthesia in Africa: a South African perspective. *Int J Obstet Anesth* 2002;11:77–80
- Ibach F, Dyer RA, Fawcus S, Dyer SJ. Knowledge and expectations of labour among primigravid women in the public sector. *S Afr Med J* 2007;97:461–4
- Oladokun A, Eyelade O, Morhason-Bello I, Fadare O, Akinyemi J, Adedokun B. Awareness and desirability of labor epidural analgesia: a survey of Nigerian women. *Int J Obstet Anesth* 2009;18:38–42
- Osterman MJK, Martin JA. Epidural and spinal anesthesia use during labor: 27-state reporting area, 2008. *Natl Vital Stat Rep* 2011;59:1–13, 16
- Howell PR. Supporting the evolution of obstetric anaesthesia through outreach programs. *Int J Obstet Anesth* 2009;18:1–3