A New Approach to Teaching Obstetric Anaesthesia in Low-Resource Areas

Angela Enright, MB, FRCPC,[1] Kate Grady, BSc, MB, BS, FRCA, FFPMRCA, FRCOG,[2] Faye Evans, MD[3]

[1]Department of Anesthesia, University of British Columbia, Royal Jubilee Hospital, Victoria BC

[2]University Hospital of South Manchester, University of Manchester, Manchester, UK

[3]Department of Anesthesiology, Perioperative Care and Pain Medicine, Boston Children's Hospital and Harvard Medical School, Boston MA

Abstract

Maternal mortality is high in many low- and middle-income countries. Unsafe anaesthesia contributes to this, especially for women requiring Caesarean section. Anaesthesia providers with limited skills and poor resources are often faced with complicated obstetric patients. A new course called SAFE-OB teaches a systematic approach to anticipating, preparing for, and dealing with obstetric anaesthetic emergencies. The course has now been taught in many African, Asian, and Latin countries. Initial follow-up suggests improvement in skills and knowledge, and effective translation of these to the workplace. Efforts are made to make the course locally owned and sustainable.

We feel that SAFE-OB is an effective method of improving obstetric anaesthesia care.

Résumé

La mortalité maternelle est élevée dans de nombreux pays à faible revenu et à revenu intermédiaire. La tenue d'une anesthésie dans des conditions peu sûres contribue à cette mortalité, particulièrement pour les femmes qui nécessitent une césarienne. Les fournisseurs d'anesthésie aux compétences limitées qui ne disposent que de faibles ressources font souvent face à des cas obstétricaux complexes. Un nouveau cours, intitulé SAFE-OB, enseigne une approche systématique envers l'anticipation des urgences anesthésiques en obstétrique, la façon de s'y préparer et la prise en charge de telles urgences. Ce cours a maintenant été offert dans de nombreux pays d'Afrique, d'Asie et d'Amérique latine. Le suivi initial semble indiquer des améliorations au niveau des compétences et des connaissances, ainsi que leur intégration efficace en milieu de travail. Des efforts sont déployés pour assurer la durabilité du cours et sa prise en charge par des intervenants locaux.

Nous sommes d'avis que le cours SAFE-OB constitue un moyen efficace d'améliorer les soins anesthésiques en obstétrique.

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INTRODUCTION

The death of a pregnant woman is a tragedy not only for her family but also for her community. The World Health Organization estimates worldwide maternal mortality to be approximately 289 000 per annum.[1] Most of these deaths occur in low- and middle-income countries (LMICs). Approximately four fifths of the world's maternal deaths occur in Sub-Saharan Africa and South Asia. Adolescents and poor women are most at risk.

In 2013, maternal mortality varied between 1/100 000 live births in Belarus and 1100/100 000 in Sierra Leone.[2] These numbers are significantly improved from 1990, when the rate in Sierra Leone was 2300/100 000 live births. The focus on maternal health in Millennium Development Goal 5, whereby countries committed to reducing maternal mortality by 2015, has probably contributed to this improvement.

Why do these women die? The most common causes are bleeding, infection, hypertensive disorders (preeclampsia and eclampsia), complications of delivery, and unsafe abortion.[2] These conditions are compounded by difficulty in accessing hospital care, which results in delays in treatment, and by inadequate care in the hospital setting. The medical problems are frequently complicated by pre-existing poor maternal health arising from anemia or malnutrition.

What is the role of anaesthesia in addressing these issues? Anaesthesia providers are essential in at least four areas of maternal health: optimizing maternal condition for obstetric intervention, providing safe anaesthesia for Caesarean section, resuscitation of the mother, and

resuscitation of the newborn. However, anaesthesia in LMICs is often given by non-medical providers or by junior physicians with little or no training in anaesthesia.[3] Fully trained anaesthesiologists are scarce and generally found only in major centres.[4]

There is a wide variety of nomenclature for the non-physicians who give anaesthesia: terms include clinical officers, nurse anaesthetists, anaesthesia technicians, and anaesthesia assistants among others. They may have between six months and three years of training in anaesthesia after high school, or may have some or complete nursing training prior to receiving basic training in anaesthesia; some may have just learned "on the job." What they all have in common is a lack of supervision by a qualified anaesthesiologist, a dearth of the resources required to deliver safe anaesthesia, and little or no ongoing continuing medical education.[5] Because of these factors, their ability to anticipate, prepare for, and effectively treat the complications of pregnancy is very limited. In addition, there is often little communication between the medically qualified surgeon (obstetrician) and the non-physician anaesthesia provider. When errors occur, it is common to blame the non-physician. Recognizing this, anaesthesiologists in the United Kingdom have developed a course (the SAFE-OB Course) with the objective of bringing participants to a level of practice whereby they can safely manage a sick mother for a Caesarean section. SAFE is an acronym for Safer Anaesthesia From Education.

CONCEPTS OF THE SAFE COURSE

The SAFE course concept was first presented at the International Relations Committee of the Association of Anaesthetists of Great Britain and Ireland (AAGBI) in 2010, when the global need for improvement in the standard of obstetric anaesthesia was identified. The challenge was how to meet that need. It is well accepted that anaesthesia for the pregnant patient is more complex than for the non-pregnant, with greater risk of anaesthetic morbidity and mortality. To meet this need, it was decided to develop additional obstetrical training for those individuals already practising anaesthesia but requiring improvement in the skills of *obstetric* anaesthesia.

The SAFE-OB course focuses on the specific anaesthetic needs of the obstetric anaesthesia providers by teaching a systematic approach to managing major life-threatening obstetric emergencies such as hemorrhage, sepsis, pre-eclampsia, and eclampsia.[6] These challenging obstetrical emergencies constitute over 50% of the causes of maternal death and, in many cases, could be easily treated. Optimal outcome depends on good teamwork, and the anaesthetist is an integral part of the obstetric emergency team.

It is recognized that approximately 15% of all deliveries result in complications. Access to safe anaesthesia is an essential requirement in the management of the complications of pregnancy;[7,8] unskilled anaesthesia can result in death.[9,10] This is rare in sophisticated environments with properly trained personnel, but is more frequent in less economically well-resourced countries. The SAFE-OB course attempts to remedy these deficiencies.

THE COURSE

SAFE-OB is designed as a three-day refresher course aimed at anaesthesia providers in the low-resource setting. It focuses on anticipation and prevention of common obstetrical problems while addressing the potential extended roles and the demands placed on the anaesthesia practitioner. It is based on the principles of adult learning. For many course participants, the language of course delivery will not be their mother tongue; therefore, lectures are short and supported by visual aids. There is a "no humiliation" culture, supported learning, no pass/fail and a system of mentoring to provide support outside the more formal course process.

The course is modular. Each module focuses on a central topic, with breakout sessions addressing particular aspects of that topic from the theoretical through to the more practical.

Topics include:

- physiology of pregnancy,
- basic and advanced airway management,
- general anaesthesia (including complications and an introduction to the Surgical Safety Checklist),
- spinal anaesthesia (including difficulties and complications),
- critical care,
- neonatal resuscitation,
- obstetrical hemorrhage,
- preeclampsia/eclampsia, and
- maternal sepsis.

Unlike traditional refresher courses, which are primarily didactic, the SAFE-OB program is intended to be interactive, with participants spending the majority of their time rotating through small group stations. A variety of educational strategies are employed, such as lectures,

small group teaching, hands-on practice, simulation of critical events, mentoring, discussions, contemplation for change, and post-course reflection utilizing a logbook. Not only does the course review the basics, but it also provides the learners with a systematic approach to dealing with obstetrical anaesthesia problems. Emphasis is placed on safety as well as on the importance of communication and non-technical skills in the operating room environment.

Course numbers are deliberately kept small. Participants are normally limited to 32, with up to 8 faculty. This faculty-to-student ratio is optimal since the majority of teaching is done in the small group sessions. The course package includes a facilitator manual, which contains all of the necessary teaching materials and standard operating procedures, a copy of the textbook *Obstetric Anaesthesia for Developing Countrie*s (Clyburn: Oxford University Press), and the eSAFE DVD, which is given to each delegate. While designed to be an "off the shelf" course, it is intended to be adaptable to local needs and solutions. The course is inexpensive to run; however, there is some basic equipment required for low-fidelity simulation, including adult and neonatal mannequins and basic anaesthesia supplies. These materials are typically left with the local faculty to assist in running future courses.

TRAINING OF TRAINERS

To promote sustainability, as well as to ensure local input, the course includes a Training-of-Trainers (TOT) workshop. A small group of individuals, who are identified as potential leaders, are invited to participate. The TOT course instructs participants on the principles of teaching adult learners. It includes directions on how to give a lecture, how to teach a skill, and how to run a scenario. The workshop either runs between two SAFE courses, or immediately precedes one, which allows the TOT participants the opportunity to practice their newly acquired teaching skills during the SAFE course, under the supervision of experienced preceptors. The goal of the TOT course is to build capacity for local anaesthesia providers as future teachers able to disseminate knowledge and skills for safe anaesthesia practice.

Monitoring and Evaluation

The SAFE-OB course is supported by a robust monitoring and evaluation system allowing for rigorous quality assurance. It includes pre- and post-course tests of knowledge and skills, as well as participant feedback. Once back in their home hospitals, participants are encouraged to keep logbooks to reflect on how learning through the course has had a direct impact on patient safety. This reflective practice helps to reinforce learning. Peer support is promoted. Practitioners who work in close geographic proximity are encouraged to discuss problems and find local solutions to improve care. Assessment of the participant's knowledge is an integral part of each course and is performed through the pre-/post-course Multiple Choice Question (MCQ) and skill tests. Consistently, anaesthesia providers who have participated on the SAFE-OB course have shown short-term improvement in obstetrical anaesthesia knowledge and skills. Such improvement has been consistent across all of the courses.

- To evaluate for longer-term knowledge retention and practice changes after the course, systematic follow-up has occurred in several countries such as Uganda, Rwanda, Bangladesh, and Zambia. Typically, the follow-up has involved site visits to the participant's workplace and has included:
  - interviews with course participants to assess for clinical impact of the course, changes in attitudes, impact on working relationships, and empowerment,
  - feedback on the course and suggestions for improvements,
  - review of case logbooks, highlighting changes in practice and patient outcomes, and
  - repeat of the MCQ test.

These site visits and interviews suggest that the course's unique structure, which focuses on active learning in small groups, was very well received. Interviews and interrogation of the logbooks offered clear evidence of positive changes in clinical practice as well as knowledge retention.[11] Consistent themes of practice improvement included management of spinal anaesthetics and their complications, systematic approach to the management of maternal and neonatal resuscitation, improved management of the patient with preeclampsia, and a systematic approach to the difficult airway. Follow-up of the Gulu and Mbale 2013 courses were specific in asking about lives saved. Participants from the Gulu course cited 38 case examples of lives saved. Follow-up from the Mbale course revealed that 27 of 34 delegates interviewed believed they had saved a life through the skills they acquired on the course.

Participants from several of the courses attributed their growing confidence and empowerment to the non-technical skills they learned on the course. It was apparent that many of the participants had never had this type of outside interest or support in their career development or care of their patients. During the follow-up, they consistently recommended more opportunities like the SAFE-OB course so they could continue to expand their knowledge and improve care for their patients.

Each course is expected to generate a written report which is reviewed by senior SAFE faculty and placed on the AAGBI website.

Dissemination of SAFE Courses

The initial SAFE project was held in Uganda in June to July 2011. This was a two-week initiative comprising delivery of a SAFE-OB course, followed by a training-of-trainers course and another SAFE course in which the newly trained faculty taught. Over 70 delegates attended. This constituted more than 20% of the anaesthetic workforce of Uganda. Ambition was kindled to train all Ugandan anaesthetists, and this took place over the ensuing three years: eight courses have been run and 366 anaesthesia providers have been trained, representing 143 hospitals, urban, rural and regional. In Rwanda, 196 anaesthesia providers have been trained, which represents approximately 60% of the anaesthetic workforce.

Subsequently, SAFE courses have spread to other parts of Africa through the work of anaesthesia societies, individuals, hospital departments, and other organizations. To date, courses have been run in Congo Brazzaville, Ethiopia, Ghana, Liberia, Madagascar, Rwanda, Uganda, and Zambia. SAFE-OB has been delivered twice in Bangladesh and also in Colombia, South America. Courses are planned for Papua New Guinea and Burkina Faso in 2015.

SAFE-OB course participants have included physician anaesthesiologists, non-physician anaesthesia providers, anaesthesia trainees, anaesthetic assistants, as well as (on a few courses) obstetricians. They have represented a variety of health settings, from the basic health centres to university tertiary referral centres.

Sustainability

Sustainability and independence are key features of the SAFE philosophy. The goal is for courses to become progressively more independent over time. Uganda has been a particularly effective model in this regard. Established relationships existed in Uganda through joint educational initiatives of the AAGBI and the Ugandan Society of Anaesthesia. Training a cohort of local faculty able to teach in subsequent courses has allowed progressive local ownership with reduction of input from overseas faculty. In addition, SAFE-OB is now incorporated into the training of the clinical officers in anaesthesia.

As a three-day intervention, the SAFE course is short and deliverable, avoiding lengthy periods away from the workplace. The expense of being away from home for attendees is minimized. Courses are often run back to back so that all of the workforce can participate sequentially, without leaving the workplace understaffed.

It offers advocacy for provision of drugs and equipment, and professional and educational support for non-medical and medical anaesthetists. It promotes the use of learned drills and algorithms in the workplace. In addition to training local leaders, equipment purchased for the course is left in-country for further teaching and future courses.

Developing local partnerships is another tenet of the SAFE philosophy. Through such partners, the course is made locally relevant. It builds on local practice and policies where that is possible and endeavours to be in keeping with national, in-country policies.

SAFE-OB has been funded by a number of organizations and institutions at national and international level. The initial courses were funded by the UK Department for International Development and the AAGBI. Subsequent courses have been funded by organizations such as Mercy Ships, the World Federation of Societies of Anaesthesiologists and its member societies such as the Canadian Anesthesiologists' Society and the Colombian Society of Anesthesiologists. Once local teachers are trained, and necessary equipment donated, then the costs of running in-country courses diminish enormously. Local financial support is still required but becomes manageable.

CONCLUSION

The rapid spread of the SAFE-OB course has been encouraging. While it would take many years of data collection to demonstrate improvement in maternal mortality, follow-up in Rwanda and Uganda has demonstrated significant retention of the knowledge and skills taught on the SAFE- OB course and translation of these into practice. Despite the fact that improvement in anaesthesia care plays only a small, though important, role in overall maternal mortality, anaesthesia organizations can play a vital part in reducing this by promoting and teaching the SAFE-OB course. One of the keys to success of the course has been the involvement of the local anaesthesia societies. Their role in introducing and adopting the SAFE program throughout their regions is vital to the continuing improvement of obstetrical anaesthetic care, resulting in better outcomes for mothers and their babies.

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