Special Articles

Anesthesia training in Rwanda

[Formation en anesthésie au Rwanda]

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Background: In 2006 a program leading to a Master's degree in Anesthesia (MMed) was established in Rwanda as a joint venture between the National University of Rwanda (NUR), the Canadian Anesthesiologists' Society International Education Fund (CASIEF) and the American Society of Anesthesiologists Overseas Teaching Programme (ASAOTP). A MMed in Anesthesia is similar to a Fellowship in Canada and is common in many African countries. Most training programs are of three years duration. Rwanda has decided on a four-year program.

Principal findings: The background, organization and problems of the program are described. Challenges exist in recruiting residents and in developing an academic culture and evaluation system. Inadequate equipment and drug shortages limit the types of anesthesia provided. There is need for improvement in biomedical support. Volunteer Canadian and American anesthesiologists visit Rwanda to teach for a minimum period of one month. They instruct in the operating room and also in the classroom. While the focus of the program is on residents in anesthesia, the volunteers also teach the nurse anesthetists. The program has been in existence for only one year but progress has been made. The CASIEF will devote special attention to improving the management of pain.

Conclusions: In time, it is hoped that Rwanda will become self-sufficient in training its own anesthesiologists and in retaining them to provide anesthesia services throughout the country. As anesthesia and surgery evolve, there will be a need for sub-specialty training in anesthesia. It is hoped that, with continued assistance from the CASIEF and ASAOTP, the goal of the NUR will be achieved.

CAN J ANESTH 2007 / 54: 11 / pp 935–939

***Contexte** : En 2006, un programme aboutissant à une maîtrise en anesthésie (MMed) a été établi au Rwanda en tant que coentreprise / projet commun entre la National University of Rwanda (NUR), le Fonds international pour l'éducation de la Société canadienne des anesthésiologistes (CASIEF) et le Programme d'enseignement à l'étranger de la Société américaine des anesthésiologistes (ASAOTP). Une MMed en anesthésie est l'équivalent d'un Fellowship au Canada et est courante dans de nombreux pays africains. La plupart des programmes de formation durent trois ans. Le Rwanda a toutefois décidé de favoriser un programme d'une durée de quatre ans.*

***Constatations principales** : Le contexte, l'organisation et les problèmes du programme sont décrits. Des défis existent dans le recrutement de résidents et le développement d'une culture d'érudition ainsi que d'un système d'évaluation. Un équipement inadapté et des pénuries de médicaments limitent les types d'anesthésie offerts. Il faut améliorer le soutien biomédical. Des anesthésiologistes bénévoles canadiens et américains se rendent au Rwanda pour enseigner pour une période d'un mois au minimum. Ils enseignent aussi bien au bloc opératoire qu'en salle de classe. Bien que le programme soit principalement orienté vers les résidents en anesthésie, les bénévoles peuvent également enseigner aux infirmiers/ières anesthésistes. Le programme n'existe que depuis un an mais des progrès ont déjà été faits. Le CASIEF portera une attention particulière à l'amélioration de la prise en charge de la douleur.*

***Conclusions** : En temps voulu, nous espérons que le Rwanda pourra gérer de façon indépendante la formation de ses anesthésiologistes et les inciter à rester au pays afin d'offrir des soins d'anesthésie sur place. L'anesthésie et la chirurgie évoluant, des formations surspécialisées en anesthésie deviendront nécessaires. Nous espérons que, forte du soutien continu du CASIEF et de l'ASAOTP, la NUR pourra atteindre ses objectifs.*

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The Canadian Anesthesiologists' Society International Education Fund (CASIEF) and the American Society of Anesthesiologists Overseas Teaching Programme (ASAOTP) provide funding for the project. Dr. Enright is Chair of the Board of Trustees of the Canadian Anesthesiologists' Society International Education Fund.

Accepted for publication February 28, 2007.
Revision accepted May 8, 2007.

Anesthesia training in Rwanda

Rwanda is a small, land-locked country in Central Africa. Nine million people live in a territory about half the size of Nova Scotia. From the early 20th century, Rwanda suffered under various colonial rulers. The genocide of 1994 is well known to Canadians partly because of the role of General Romeo Dallaire who commanded the United Nations Force in Rwanda (UNAMIR) at that time. Since 1994, Rwanda has had a stable government and the recovery process is ongoing. Nevertheless life expectancy for males is 44 yr and for females is 47 yr. The total expenditure on health as a percentage of gross domestic product is 3.7.[1] This translates into $32 US per capita per annum.

Origins of the training program

As the 21st century dawned, leading educators in Rwanda realized that they needed to provide postgraduate medical training programs in Rwanda. For years, they had been sending their medical graduates abroad but the return and retention rate was extremely low. Even now, there is only one Rwandan anesthesiologist in the country. She was trained in Belgium and has practiced in Butare since her repatriation. All other anesthesiologists in Rwanda are expatriates working in the country on contract. Currently in the university hospitals in Kigali and Butare, there are four expatriate anesthesiologists one of whom devotes his time to intensive care. In the only private hospital in Kigali, there are two expatriate anesthesiologists. There are no anesthesiologists outside of these centres.

In 1996, the Kigali Health Institute (KHI) began a training program in anesthesia for nurses. These are not nurses as we know them but rather high school graduates who have studied specific health related subjects prior to graduation. They then take a three-year program in anesthesia at KHI and graduate with a diploma in Anesthesia. Their first year is classroom based. Their second year is a mix of clinical experience and theory and the final year is all clinically based. Since 1996, KHI has graduated 96 nurse anesthetists who work in hospitals all over the country and provide a good, if limited, service. There are still untrained people providing anesthesia in the rural areas.

In 2003, the rector of the National University of Rwanda (NUR) contacted the Canadian Anesthesiologists' Society (CAS) to request assistance in developing their own anesthesia training program. Why the CAS? Rwanda sees Canada as an ally and a country with things in common. Both countries are bilingual with English and French. The NUR was started with Canadian funding and the first rector was from Laval University. The CAS referred the request to the CAS International Education Fund (CASIEF) whose Board undertook a feasibility study. The subsequent report was positive and the CASIEF agreed to initiate the project. At about the same time, the American Society of Anesthesiologists Overseas Teaching Program (ASAOTP) was seeking a mission and the two groups decided that a combined effort would be a good idea. Accordingly, the project began in January 2006 and we now have had a full year of experience which was recently reviewed.

The CASIEF developed a similar program in Nepal in the 1980s.[2–4] It is considered a model of how assistance projects should work. Over the course of about 20 years, the Nepalese have become self-sufficient in training their own anesthesiologists. Canadians volunteered to teach in Katmandhu for many years. As Nepalese expertise grew, the CASIEF gradually stepped back and provided less and less assistance. We continue to support and mentor the Nepalese anesthesia program because of the strong and lasting relationships developed over the years. This is the ideal we envisage for Rwanda.

The NUR undertook to recruit residents for the anesthesia program. The response was not overwhelming. There is competition for physicians from non-governmental organizations who want them for many of their projects and offer salaries far in excess of what they earn as a resident. In addition, as the university began its push to develop the five basic training programs (surgery, anesthesia, medicine, obstetrics and pediatrics), it announced that all training would be completed in Rwanda. Medical graduates, who for years had watched their colleagues go to France and Belgium to train, now began to look for specialties where they could continue to do so. The prospect of doing all of their training in Rwanda was not attractive to them. This has continued to be an issue. The residency program is four years in length and will result in the awarding of a Master's degree in Anesthesia.

The program began in January 2006 with two first year residents and two third years who had returned from abroad. During the year there were six volunteer teachers in Rwanda for a total of about six months. In addition there was one resident volunteer. In 2007, volunteers will be there for eleven months. The teachers work in the operating rooms each morning with the residents in anesthesia. They teach utilizing the scheduled cases. In the afternoons, they do more formal teaching, not just to the residents, but also to the nurse anesthetists and the nurse anesthesia students.

The anesthesia faculty of NUR has developed a core curriculum which is delivered over the course of two years. The volunteers each choose a section of the

course to teach. The core program is repeated every two years. The more formal seminars are devoted to the core program. Additional teaching is done on the presenting cases and on areas of interest of the volunteers. Currently the curriculum is fairly basic and will need expansion. Continued assistance of the CASIEF and the ASAOTP is anticipated as the program develops. In addition, each fourth year resident must present and defend a thesis to the NUR. The volunteers are assisting the residents with their choice of topics and with the completion of their research.

Establishing an academic culture

There are many issues which present problems in organizing a project like the one in Rwanda. A major obstacle is the lack of an academic culture. Of necessity, everyone is focused on service. The contract anesthesiologists are there to get the work done, not to teach. We have been working with all the staff to recognize the importance of the academic program. This involves the teaching in the operating room as well as at the formal sessions. We have been emphasizing the necessity for the residents to be freed from duties to attend the teaching seminars. The residents carry a huge service load not just in the operating room but also in the emergency room and intensive care unit. They have night call every third night and every second weekend even when not actively working in those units.

The program is divided between the University Hospital in Kigali (CHUK) where the patient volume is high and the University Hospital in Butare (CHUB) where it is not nearly so busy. The NUR is located in Butare as is the head of the Anesthesiology Department. This division creates difficulties for the program. The volunteers are located in Kigali. The residents are divided between the two centres. In order to benefit from the volunteer teaching, the Butare residents are supposed to travel to Kigali (about two hours by a good road) every second week for the seminars. In the alternate weeks, the volunteer travels to Butare. Scheduling of residents needs to be improved so that attendance at the seminars is consistent. The faculty need assistance and support as they develop their organizational skills and learn how to plan and implement a residency training program. As new faculties are recruited from the graduating residents, it will be important to encourage them to teach and to act as role models for the residents. Instruction in modern pedagogic methods will be essential.

In order to develop an effective teaching program, there is a need for basic and special resources for learning. These are not readily available in any form. As part of our plan, we are donating books for the library and have had some success in this regard. Nevertheless, the availability of books is extremely limited. Journals have been non-existent. Recently we have come to learn that the World Health Organization (WHO) provides full text journal access through a special program for developing countries. This is called Health InterNetwork Access to Research Initiative (HINARI). It is an initiative of WHO, the world's leading biomedical publishers, Yale University library and others.[5] Access is provided to over 3,000 journals in biomedical and related social sciences to non-profit institutions in developing countries. This information has now been conveyed to both the faculty and the residents. It is a very valuable program that was not previously well known. An important limiting factor is lack of computer access. We have requested that the department of anesthesia in Kigali be provided with a computer and internet access. This would make an enormous difference, not just to the residents, but also to the faculty and the nurse anesthetists.

Another challenge facing the anesthesia residency training program is the development of an evaluation system. We have encouraged the faculty to mandate the use of log books for recording of cases done by the residents. We have provided them with evaluation forms which can be modified to suit the local circumstances. There is need to encourage ongoing assessment. Major examinations will be held at the end of the second year and at the completion of the program.

What of the residents themselves? They are bright and enthusiastic young doctors, very eager to learn and very appreciative of the efforts of the volunteer teachers. However they need to develop good work and study habits. They very much enjoyed having a Canadian anesthesia resident there. They were able to compare themselves to her. They also enjoyed discussion sessions with her which were moderated by the volunteer teacher. Because of the success of this trial, we will encourage selected residents to accompany their teachers. In 2007, there will be two Canadian residents going out to Kigali. It is our hope that these residents will realize the importance of their contribution to their colleagues and will continue to be involved long after their training is complete. The Rwandan residents are concerned that their training will be insufficient if it is all completed in Rwanda. Some flexibility may be available from NUR on this point but the Dean is very aware of the risk of non-return.

Continuing medical education is difficult to obtain. Costs of air travel in Africa are very high. Getting leave to attend a course can also be problematical.

We have been supporting efforts of the Association Rwandaise des Anesthésistes (ARA) to plan educational events. Under the auspices of the World Federation of Societies of Anesthesiologists (WFSA), a refresher course was held in 2005 and also a Primary Trauma Course. In January 2007, the ARA hosted a one-day conference in Kigali, also sponsored by the WFSA. This focused on the management of burns and problems in the recovery room. There were 96 registrants which constituted over 90% of the anesthesia care providers in the country. Nurses and surgeons also attended.

Integration of nurse anesthetists

The volunteers have been impressed by the huge interest shown by the practicing nurse anesthetists in improving their knowledge and techniques. They attend teaching sessions whenever they can and are continually seeking information from the teachers. They have a great deal of practical anesthesia experience but need to expand their knowledge base and understanding of clinical conditions. They view the presence of the volunteers as a huge asset. They have created a book of protocols brought by the various teachers so that they have something to use as a reference when managing a patient. It is important to realize that most nurse anesthesia students go through their course without ever owning an anesthesia text. Through a generous donation from the editor of Protocoles 2004 (Dr. Dan Benhamou), we have been able to obtain some textbooks for them in French. Dr. Iain Wilson, the editor, and the Association of Anaesthetists of Great Britain and Ireland (AAGBI) have donated the Oxford University Handbook for each of the residents. The AAGBI has a project underway to donate a textbook to every anesthesia provider in Africa. We endorse their efforts and are trying to make it happen in Rwanda. In addition, the ASAOTP has provided copies of Clinical Anesthesia Procedures of the Massachusetts General Hospital.

Equipment and other clinical challenges

There are other challenges which face the anesthesia providers and the teachers. Equipment and supplies are lacking in almost every aspect of anesthesia, recovery and intensive care. Improvements have been made but the needs are still great. In Kigali they have some anesthesia machines that have been specially designed for the developing world but even these are not without their problems. There is no culture of maintenance and repair. Spare parts are difficult to get and expensive. Rwanda has no seaport and transportation costs are very high. We hope to be able to send a biomedical engineer teacher out to work with their team to help to develop preventive maintenance protocols and to assist in increasing their repair skills. The WFSA has sponsored courses on equipment repair and servicing in East Africa and will do so again. Drugs are also scarce and can at times be completely unobtainable. The anesthesia providers have to use whatever they have available. Supplies such as epidural sets are unknown. Spinal needles and medications are available and spinal anesthesia is widely used.

Care of postoperative patients in the recovery room needs much improvement. Nurses are not specifically trained to work in that environment. It is not customary for the anesthesia provider to provide a report on the patient to the nurse. Vital signs are not routinely assessed. Nurses do not give pain medication. They have to call the anesthesia provider to do so. The CASIEF sponsored an experienced nurse educator from Canada to spend a month teaching in the recovery room in Kigali. She worked with the nurses to upgrade their skills and provided them with protocols for patient assessment and management. She was an invited speaker at the ARA meeting. The CASIEF hopes to be able to continue with this type of support.

The management of acute pain presents many challenges. Some opioids such as meperidine are available but not widely used. Even non-opioids such as acetaminophen can be difficult to find. Local anesthetics are freely available. The volunteers have been teaching, not just the residents and nurse anesthetists, but also the surgeons how to use local anesthetics to improve pain management. Patients on the wards suffer greatly from inadequately treated pain. It is our intention to supplement the work of the anesthesiologist teachers by sending out some nursing volunteers, who are experienced in pain management, to work with the nurses on the wards and with the medical staff to try to improve this aspect of care. The Louise Edwards Foundation in Montreal, through the efforts of Professor Franco Carli, has guaranteed funding for two nurses per year for three years.

Another major area of concern is obstetric anesthesia. Currently there are no deliveries at the CHUK. Most deliveries take place in another hospital in the city where unsupervised nurse anesthetists provide the anesthesia service. As is common in developing countries, prenatal care is often lacking, transportation is very difficult and mothers may present to the hospital in the late stages of complications. The adjusted maternal mortality ratio (maternal deaths per 100,000 live births) in Rwanda is 1,400 compared to six in Canada[6] although it must be noted that accurate figures can be difficult to obtain in developing countries. Put another way, for the year 2000, there were

20 maternal deaths in Canada compared to 4,200 in Rwanda. The perinatal mortality rate is 75 per 1,000 total births compared to six for Canada.[7] Later in 2007 a new maternity unit will open at the CHUK. We wish to be able to prepare the faculty, residents and staff for that event by improving training in obstetric anesthesia. Currently about 10,000 deliveries per annum are performed, with about 20 Cesarean deliveries per day. This will obviously present huge challenges if the millennium development goal of reducing maternal mortality by three quarters is to be met.[8]

As anesthesia improves, so will surgical services throughout the country. There are many types of surgery not yet available in Rwanda. There may be a need to send residents or anesthesiologists out of country to receive some extra training in the subspecialties. Under the auspices of the WFSA, there are subspecialty Fellowship opportunities available. Currently the WFSA supports pediatric anesthesia fellowships in Cape Town, South Africa and in Vellore, India. Intensive care training is also available in Vellore. It is hoped to begin an obstetric anesthesia fellowship program in Africa in the near future. In addition arrangements can be made and support provided by the WFSA for special training in a needed subspecialty. Candidates for these programs are chosen on the basis of their personal suitability, their commitment to return home to practice and of a guarantee of a position preferably in a teaching hospital.[9]

The future of the program

What of the future? The CASIEF and the ASAOTP recognize that this is a long term project. There is optimism that some of those Rwandan anesthesiologists training overseas will return home to practice. Two residents trained partly in Rwanda will graduate from NUR this year. They will stay in Butare to work. The increase in human resources will improve the supervision of the nurse anesthetists. It will also decrease the individual workload so that people can devote some time to teaching the residents. The plan is to gradually have the Rwandan faculty take on more of the teaching. Very slowly the role of the volunteers will diminish. The first graduates of this program will finish in 2010. If recruitment is successful, then within ten years we would expect to see Rwandan anesthesiologists in every major hospital in the country and a self-sustaining residency training program. There remains much to be done to improve equipment, supplies and drugs so these anesthesiologists will have appropriate tools for their work. However it is salutary to remember that the journey of a thousand miles begins with a single step.

References

1. World Health Organization website. Rwanda. Available from URL: http://www.who.int/countries/rwa/en/.
2. *Maltby JR, Rana NB, Amatya R, Shrestha BM.* Anaesthesia training in Nepal. Can J Anaesth 1987; 34: 51–5.
3. *Maltby JR, Amatya R, Rana NB, Shrestha BM, Tuladhar TM, McCaughey TJ.* Anaesthesia training and development in Nepal 1985-1990. Can J Anaesth 1991; 38: 105–10.
4. *Maltby JR, Rana NB.* Helping to establish anaesthesia training and development in Nepal. World Anaesthesia 1997; 1: 7–8.
5. World Health Organization. HINARI. Health internetwork access to research initiative. Available from URL; http://www.who.int/hinari/HINARI%20INF%20SHEET-%20English%2010%20May%202006.pdf.
6. World Health Organization. Maternal Mortality in 2000. Estimates developed by WHO, UNICEF, UNFPA. Available from URL; http://www.who.int/reproductive-health/publications/maternal_mortality_2000/mme.pdf.
7. Word Health Organization. Monitoring and Evaluation (MAE). Available from URL; http://www.who.int/reproductive_indicators/countrydata.asp?page=182#bottom.
8. United Nations Millennium Development Goals. Available from URL; http://www.un.org/millenniumgoals/#.
9. Education Committee Report 2006. World Federation of Societies of Anaesthesiologists. Available from URL; www.anaesthesiologists.org.