

Twenty Years of Collaboration Between Belgium and Benin in Training Anesthesiologists for Africa

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Belgium has been collaborating for 20 years with Abomey-Calavi University in Cotonou, Republic of Benin, to train anesthesiologists for Sub-Saharan, French-speaking African countries. With 123 graduates from 15 countries and 46 residents still in training, this program has succeeded in reversing the trend of a decreasing anesthesiology workforce in those countries, thus improving the quality of anesthesia and patient safety. Belgian government sources, as well as hospitals and anesthesia teams, provided most of the financial resources. Reasons for success, positive outcomes, and shortcomings are discussed, as well as future perspectives and threats. Failure to enroll enough female residents (15%) and brain drain (18% of alumni) are of concern. Alumni are capable of importing and adapting modern technology and practice. Graduates increase the impact of the Cotonou program by getting involved in teaching nonphysician anesthesia providers and by supporting new anesthesiology training programs being launched in several countries. Other African countries with training programs, by following this example, could accelerate anesthesiology progress by accepting foreign residents from the region. The role of anesthesiologists as anesthesia team leaders must be better defined, and residency training programs adapted accordingly. Continuing international support remains of critical importance, especially in the form of resident rotations to high-income countries. The development of structured anesthesiology programs should be encouraged by African governments as developing anesthesia is a prerequisite for surgical development in every discipline. (*Anesth Analg* 2018;126:1321–8)

At the 1996 World Congress of Anaesthesiologists in Sydney, Dr Kester Brown presented the conclusions of a task force about the global anesthesia workforce. All continents showed an increase in the number of physicians specializing in anesthesiology except for Sub-Saharan Africa (SSA), where numbers were decreasing in sharp contrast with the exploding population of that continent. In most SSA countries, numbers had fallen to such a level that educating future generations of specialists had become impossible, nonphysician anesthesia providers (NPAPs) were no longer trained, and continuous medical education was virtually unknown. Many countries had <5 anesthesiologists left, and some had none.^{1–6} Obstetrics and pediatrics also experienced a workforce crisis, in part, as a result of the failure of support from anesthesia.^{7–14} In French-speaking SSA, only Senegal and the Ivory Coast were in a better position.⁵ In 1994, a team of Belgian anesthesiologists from the French-speaking Catholic University of Louvain (UCL) and the Belgian branch of Médecins Sans Frontières had contacted their colleagues in Cotonou, Benin, and had

discussed the creation of an anesthesiology training program within the University of Abomey-Calavi, henceforth referred to as “the Cotonou program” or simply “Cotonou.” By the end of 1995, it was ready to run. This article reports on its achievements during 20 years of existence.

Both the UCL and Médecins Sans Frontières, supported by various Belgian government agencies, strongly encouraged the creation in Benin, a politically stable country, of an academic structure open to candidates from any SSA country.

EVOLUTION AND RESULTS

Organization of Teaching and Training

The Cotonou African coordinators tailored the program to the norms of the Conseil Africain et Malgache pour l'Enseignement Supérieur (CAMES, www.lecames.org/), a supranational organization in charge, among other missions, of harmonizing higher education standards for member nations. This introduced several constraints, including a prescribed 4-year curriculum, which may have contravened the perceived urgency to provide Africa with specialist anesthesiologists. This could also have deterred candidates from the few countries that, at the time, did not follow CAMES rules, namely the Democratic Republic of Congo, Rwanda, and Burundi. In spite of this, CAMES endorsement provided crucial advantages, among which was the automatic recognition of the qualification by 16 French-speaking SSA and Indian Ocean countries. It also enabled graduates to enter academic careers and to practice anesthesia/intensive care in any CAMES country. Initially called a certificate (Certificat d'Études Spécialisées), the degree was renamed a diploma (Diplôme d'Études Spécialisées [DES]) in 2011 to conform with the terminology of higher education in Europe and with the harmonization of curricula by the West African Health Organization (WAHO).

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Up to now, 180 residents from 17 countries have been admitted to the program after passing an entrance examination. Figure 1 shows enrollment over time and the influence of Belgian funding.

Our data so far show no tendency toward feminization in anesthesia. Of the 45 residents currently in training, only 7 (15.6%) are female, a proportion unchanged from the 19 of 123 (15.4%) alumni. This is in contrast to an average increase ($\pm 1\%$ per year for the last 20 years) of female graduates in medicine in the countries most represented in the program, a trend that shows no sign of leveling off. All these countries started with around 10% female graduates, but in 2016, Benin reached 31%, Burkina Faso 27%, Niger 28%, and Togo 26%, with recent peaks at 59%, 31%, 36%, and 27%, respectively.

One resident died, 5 abandoned anesthesia, and 5 migrated to France without taking final examinations (all data from communication between authors and alumni).

The 4-year program commences with 2 junior years involving anesthesia and basic intensive care teaching and clinical practice, with examinations at the end of each year. The third year is spent in a country with a higher level of health care. Although this is required by the rules of the faculty, residents, with the recommendation of the Beninese coordinators, have to find a paid position, usually in metropolitan France (57 residents), French overseas departments (Guadeloupe, French Guyana, Martinique: 7 residents), Belgium (37 residents), Tunisia (4 residents), or Morocco (3 residents). Fifteen residents spent their third year in SSA. These included residents from Abidjan who were invited to continue their curriculum in Cotonou during the Ivory Coast civil war or Cotonou residents who could find no place abroad. This latter reason has been a problem, especially since 2012, because of new academic restrictions in Belgium, new legal regulations in France, and diminished support from mentors in Benin. Many candidates spent >1 year abroad. Only 34 obtained their diploma in 4 years, 62 did so in 5 years, 18 in 6 years, and 9 in 7 years or more. Strikes in the health system or the

university accounted for some delays, but the need to compensate for the unpaid years by working abroad was the most frequently reported reason. The average time to graduation was 5.12 years. Those who spent their third year in France took more time to graduate. Taking advantage of a legal loophole, French hospitals hire developing country residents as “*faisant fonction d’interne*” (literally “acting as last-year medical student”) and pay them less than their French equivalents but still up to 8 times more, depending on the number of night duties, than a young specialist would be paid in their home country. Fourth-year residents present a written dissertation, improve their intensive care knowledge, supervise junior residents, and pass final theoretical examinations in basic sciences, anesthesiology, and intensive care, as well as clinical hands-on examinations. Examiners always include at least 1 European and 1 foreign African professor.

As new graduates were assigned to peripheral hospitals, the Beninese professors could start rotating residents to their services, which extended clinical training capacity beyond the 2 academic institutions located in Cotonou. This decentralization needed further Belgian financial support, described below under the heading Missions.

From January 2000 to January 2017, 123 anesthesiologists from 15 countries graduated from Cotonou. Despite the moderate absolute numbers involved, when considering individual countries (Table 1), especially when expressed as per 100,000 population in the context of rapid demographic growth (Table 2), this contribution more than doubled the total number of anesthesiologists in the 13 involved French-speaking Sub-Saharan countries (plus 1 Moroccan and 2 Malagasy graduates) despite nearly half of the anesthesiologists present in January 2000 having died, retired, or left for France. Burkina Faso and Niger made the most of this opportunity by sending 1 candidate almost every year and avoiding major brain drain.

Figure 2 and Table 1 underscore the heavy and early toll health issues exerted on the profession with 4 of 180 (2.2%) premature deaths and 1 crippling disease, not including 2

Cotonou anesthesiology program : recruitment, n

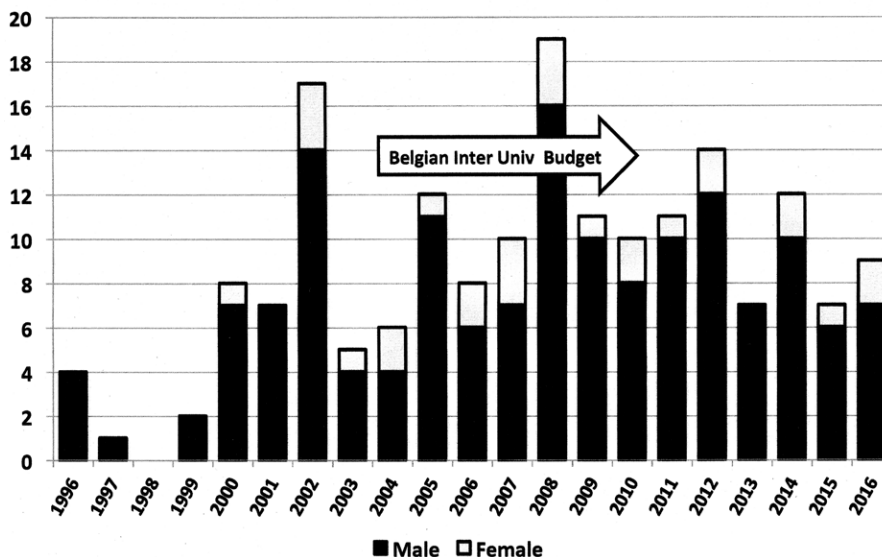


Figure 1. Evolution of recruitment in the anesthesiology training program of Cotonou. The arrow spans the years of maximal Belgian cooperation financial support via a federal government inter-university program involving the 3 French-speaking Belgian universities.

Table 1. Impact of the Cotonou Program on Sub-Saharan Africa Anesthesiologists' Workforce (January 2017)

	Population 2016, ×10 ⁶	Situation 1999 ^d	Retired, Left, or Died ^e	Cotonou Graduates				Impact Cotonou January 2017 ^a	Non-Cotonou ^e		Total in Africa January 2017 ^f	Cotonou In Training
				Graduates	Left Africa	Work(ed) in Africa ^b	Died/ Sick ^c		Local Diploma	IC–M–S		
Benin	11.17	5	3	30	7	23	1	24 (+19)	0	0	24	18
Brazza (Congo)	4.74	4	4	6	0	6	0	6 (+2)	0	7	13	2
Burkina Faso	18.63	5	2	18	2	16	0	19 (+14)	13	3	35	0
Cameroon	23.92	11	5	7	1	6	0	12 (+1)	34	1	47	4
Central Africa	5.00	1	1	2	1	1	1	0 (-1)	0	0	0	2
Chad	14.49	1	0	3	1	2	0	3 (+2)	0	0	3	5
Comoros	0.81	0	0	1	0	1	0	1 (+1)	0	0	1	0
Djibouti	0.90	1	0	2	0	2	0	3 (+2)	0	0	3	0
Gabon	1.76	12	5	9	1	8	0	15 (+3)	4	6	25	1
Guinea Conakry	12.94	3	0	6	2	4	0	7 (+4)	0	0	7	2
Mali	18.13	10	4	10	3	7	1	12 (+2)	23	7	42	1
Niger	20.70	4	3	12	1	11	0	12 (+8)	0	3	15	2
Togo	7.50	3	0	14	1	13	1	15 (+12)	0	1	16	5
Totals for 13 countries	140.69	60	27	120	20	100	4	129	74	28	231	42
Other countries with residents currently in training:				Democratic Republic of the Congo (1 resident), IC (1 resident), Malagasy (1 resident), Morocco (1 resident)								
Other country with graduate working in Africa:				Morocco (1 graduate)								
Other country with graduates:				Malagasy (2 graduates, none in Africa)				Morocco (1 graduate)				

Abbreviations: IC, Ivory Coast; M, Maghreb; S, Senegal.

^aFor each country, the impact of the Cotonou program is calculated as the number of Cotonou graduates who stayed in Africa^b minus those who died (3) or those who were too sick to work (1),^c plus the anesthesiologists present in the country in 1999,^d except those who since died, retired, or left the country.^e Italics indicate the absolute resulting contribution of Cotonou.

^fThe total anesthesiologists in each country as of January 2017 is calculated as the impact of Cotonou^a plus the sum of non-Cotonou graduates^e working in the country (ie, the output of local anesthesiology program and the combined input from IC, M, and S anesthesiology programs).

Table 2. Evolution of the Demography of Anesthesiologists, Expressed in per 100,000 Population, in Relation to the Demographic Growth of the General Population of 13 French-Speaking Sub-Saharan Countries Concerned by the Cotonou Project Between December 1999 and December 2016

	December 1999		December 2016		% Increase 1999–2016	
	Population, Millions	Anesthesiologists per 100,000	Population, Millions	Anesthesiologists per 100,000	Population	Anesthesiologists per 100,000
Benin	6.68	0.07	11.17	0.21	67	187
Brazza (Congo)	3.14	0.13	4.74	0.27	51	115
Burkina Faso	11.28	0.04	18.63	0.19	65	324
Cameroon	14.89	0.07	23.92	0.20	61	166
Central Africa	3.68	0.03	5.00	0.00	36	-100
Chad	8.04	0.01	14.49	0.02	80	66
Comoros	0.53	0.00	0.81	0.12	53	—
Djibouti	0.70	0.14	0.90	0.33	29	133
Gabon	1.20	1.00	1.76	1.42	47	42
Guinea Conakry	8.65	0.03	12.94	0.05	50	56
Mali	10.66	0.09	18.13	0.23	70	147
Niger	10.95	0.04	20.70	0.07	89	98
Togo	4.83	0.06	7.50	0.21	55	243
Globally	100.51	0.07	165.5	0.16	65	133
Countries' average		0.13		0.26		123
Countries' median		0.06		0.20		124

Source of demographic data: World Bank.

colleagues whose illnesses forced them to take on administrative positions. The mean age at graduation is 37.6 years, which leaves at best an average 27.4-year career as a specialist if retirement at age 65 is presumed.

To the best of our knowledge, 53 alumni (44%) are currently involved in teaching, at least 22 of them in academic institutions; 3 have already qualified as CAMES full professors, 2 in Benin and 1 in Burkina Faso.

Brain Drain

Twenty-two alumni (18%) work in France. The number (%) of graduates leaving Africa after their diploma did vary according to where they spent their third-year internship: France (including overseas departments) 16/64 (25%), Belgium 4/37 (11%), North Africa 0/7 (0%), and SSA 2/14 (14%). Adding the 5 residents who left for France before graduation gives a total brain drain of 15.5% from enrollment. Supplementary

CES/DES Cotonou : graduates per year, n

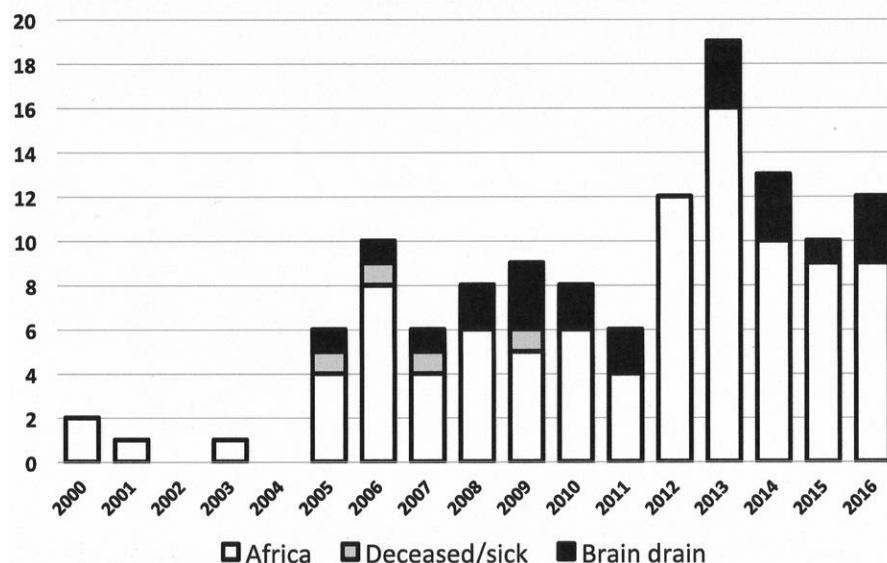


Figure 2. Number of anesthesiologists graduating from Cotonou since the creation of the academic program. “Deceased/sick” refers to specialists who died (3) or became unable to practice medicine (1) since graduation through January 2017. Brain drain refers to doctors who left to practice anesthesia out of Africa after graduating as specialists. CES indicates Certificat d’Études Spécialisées; DES, Diplôme d’Études Spécialisées.

years spent abroad after third year (a total of 105 years for those who later stayed in Africa) can be considered as yet another, uncounted, form of brain drain as it reduces the useful career of future specialists for their country.

Additional Benefits

Exposure to European anesthesia allowed graduates to adapt recent technical and organizational advancements to Africa, improving patient safety^{13–15} and rapidly broadening the scope of anesthesia to include regional anesthesia techniques,^{16–19} day surgery,²⁰ pain management,^{21–25} difficult airway management,^{26–28} and complex surgery.^{29,30} Obstetrics,^{31–37} pediatrics,^{20,38–41} and trauma^{25,37,40–45} benefited most from this input. Additionally, the common culture brought by shared training led to regular supranational coordinated studies.^{5,46,47}

In 2002, the Cotonou program staff opened a school to train nurses and midwives in anesthesia; 159 graduated before a conflict about the (non-university) level of delivered diploma forced it to close temporarily. It restarted under new statutes in November 2017 to deliver a Master's degree accessible after a Bachelor's degree in Nursing or Midwifery.

Cotonou alumni took active teaching positions in many other countries to train NPAPs including Burkina Faso, Chad, Congo, Gabon, Haiti, Mali, Niger, and Togo. A program in Guinea should start in 2018.

With their number of anesthesiologists increasing, Mali, Burkina Faso,⁴⁸ and Gabon started their own anesthesiology DES training programs in 2007, 2010, and 2012 and have, respectively, 26, 13, and 4 graduates so far.

As is demonstrated, the Cotonou experience provides useful data concerning lengths of residency, age at graduation, feminization, morbidity and mortality of trainees, and brain drain that could be used to improve planning for the future anesthesia workforce in Africa.

Belgian Involvement and Financial Support

Academic subsidies are scarce in Benin, and scholarships for Beninese doctors willing to specialize were only provided

between 2008 and 2011. Globally, some SSA residents benefited from a scholarship from their government or the World Health Organization, but most survived only on emergency room night-duty stipends organized by the Beninese coordinators. Therefore, the program is heavily dependent on foreign financial support. Funds came essentially from Belgian institutions (see the Acknowledgements).

Belgium became involved in the Beninese anesthesiology program for historical reasons: UCL already supported various medical academic programs in Benin such as the faculties of medicine, obstetrics, physical rehabilitation, transfusion, endocrinology, and histopathology. In 2004, a special 6-year €315.000^a budget was obtained from a Belgian Federal Government program involving all 3 French-speaking Belgian universities. The program encouraged nonacademic training hospitals to welcome and pay African residents during their third-year internship.

The total of Belgian money spent over 20 years amounts to €1,289,848. Scholarships accounted for 65.22% of expenses. Fifty-six percentage of scholarships came from nongovernmental sources, essentially 9 Belgian teaching hospitals. Teaching missions came second with 18.55% of expenses. An average of three 1-week missions were completed each year by 1, occasionally 2, Belgian professors. They advised local coordinators, participated in clinical and classroom teaching but avoided any local decision-making roles. Material resources represented 10.61% of expenses, including 106 pulse oximeters distributed in 2015 to equip all Beninese operating rooms as part of the Lifebox initiative.⁴⁹ Consumables were only given in response to residents' needs to treat victims of the Porga catastrophe (explosion of a petrol tanker in the center of a village). Educational material costs another 1.35%. Administrative costs amounted to 4.27% to pay for a part-time Belgium-trained and supervised

^aOver 20 years, the value of the Euro varied significantly with respect to the US dollar, between a minimum of \$0.825 (in 2000) and a maximum of \$1.599 (in 2008). Benin uses the Franc CFA (African Financial Community Franc), which is fixedly linked to the Euro. Hence, all amounts are given in Euros in this article.

accountant and part-time secretaries to assist with administration of the program.

When international cooperation became a regional rather than federal responsibility in Belgium, budgets decreased abruptly, medicine no longer being a priority. Wallonia-Brussels International cooperation still supports Cotonou nurses and medical training in anesthesia at a mean rate of €46,500 a year. At the same time, academic institutions lost interest in cooperating with low- and middle-income countries, anesthesia being no exception. A temporary ban on accepting third-year graduates in Belgium meant that the benefit that fourth-year returnees provided when supervising junior residents was lost. This had a dismal effect on clinical final examination results a few years later. The recent federal Belgian government project to prevent non-European Union (EU) residents spending third-year rotations in Belgium was successfully rebuffed in May 2016, but it remains a definite threat for the future.

DISCUSSION

Quantitatively, the Cotonou program has had a major impact on French-speaking SSA countries. At the end of 1999, most countries did not have the critical mass of anesthesiologists necessary to maintain teaching programs.⁵ Since this time, success of Cotonou and dissemination of the alumni of the program have strengthened the teaching capacities of many countries, particularly for NPAPs. Anesthesiology DES programs are expected to follow, as in Mali, Burkina Faso, and Gabon. After 20 years of relentless effort, the program has now tipped the scale. Recovering from near extinction, anesthesia is now continuing to thrive in the region. Other programs, such as those in Dakar (Senegal) and Abidjan (Ivory Coast), have been very active, albeit without the same international effects. When added to Moroccan programs, their combined contribution was similar to that from Cotonou in Congo, Gabon, and Mali. Elsewhere, their contribution was marginal (Table 1). For completeness, the program in Malagasy (Madagascar) has trained 88 anesthesiologists (there were 12 anesthesiologists in 2000), in spite of 6 deaths, 5 retirements, and migration of 17 (15%); since 2000, Cameroon has graduated 44 specialists (34 for Cameroon, 1 Congolese, and 3 working elsewhere in Africa) with migration of 6 (13%), leaving 2.1 per year for Africa.

Qualitatively, there is increasing evidence that Cotonou alumni are able to transfer modern anesthesia techniques into the African environment and so improve safety and availability of surgical care.^{50,51} This in some ways contradicts the often-heard theory that any training given in Europe would be useless to African residents because environments and pathologies are too different.^{52,53} Supranational scientific initiatives by Cotonou alumni further emphasize their capabilities.^{5,46,47}

Regardless of the success of the Cotonou program, the current situation remains fragile. Progress still rests on a precious small number of overstretched people. A single center like Cotonou will not be able to sustain the needed quantitative and qualitative growth of anesthesiologists for obvious reasons. First, the exponential growth of the African population calls for an exponential growth in training capacities

for African anesthesia personnel. Second, the growth of any training center soon reaches its limits of qualitative training (which Cotonou probably did) due to limited access to patients in academic clinical settings and to the limited availability of competent teachers. Finally, in time, the number of alumni will level off due to health issues and retirement. Several similar programs will thus be needed to meet the demand for anesthesia providers in the short term. The importance of creating and supporting new schools for NPAPs and new academic programs for anesthesiologists in other countries cannot be overemphasized. All existing and future programs should be encouraged to train residents from less-advanced countries.

For the foreseeable future, anesthesia will remain predominantly in the hands of NPAPs in Africa.^{5,54–58} The role of anesthesiologists, who are now graduating in significant numbers, needs to be clearly defined as they could be perceived as a threat by NPAPs. This clarification has not been made in any African country and not doing so could result in conflict. However, it has been demonstrated that the arrival of an anesthesiologist in an African hospital rapidly reduces surgical mortality,¹³ especially for cesarean deliveries.³³ This can be explained by the introduction of spinal anesthesia and modern monitoring such as pulse oximetry as well as a better understanding of physiology and pharmacology. Conversely, increasing the burden of anesthesia without providing adequate supervision by anesthesiologists could prove dangerous as has been demonstrated by a surge in maternal mortality due to an increase in the frequency of cesarean deliveries as soon as this procedure was reimbursed, without simultaneous reimbursement of vaginal delivery, in some African countries.

It is our belief that future anesthesiologists should receive specific training to supervise the clinical work of small, structured teams of NPAPs, aiming for complete coverage of a country, to promote adequate case documentation, ensure continuous quality improvement, and transmit statistics to health authorities. Governments should use a directive approach about this issue because it influences the whole surgical field. Medicolegal responsibilities within such teams should also be clarified. However, there would be a clear advantage to sharing the same organizational scheme across all French-speaking Sub-Saharan countries. Perhaps, the Société d'Anesthésie-Réanimation d'Afrique Noire Francophone, the SSA regional anesthesia society, could undertake the development of such guidelines. Extending the scope of anesthesiologists' responsibilities might require a lengthening of DES training, which could have significant financial and other implications.

Brain drain remains a major concern. Eighteen percent of graduates left their countries to practice in France, partially encouraged by its "chosen immigration" policy. None migrated to Belgium despite the number of candidates who spent 1 year in that country, because Belgian laws prevent non-EU doctors practicing medicine for >2 years without repeating part of their medical training and their whole residency. Since 2010,^b France has new rules limiting the time

^bArrêté du 3 août 2010 du ministère de l'Enseignement Supérieur (de la République française) relatif au *Diplôme de Formation Médicale Spécialisée* et au *Diplôme de Formation Médicale Spécialisée Approfondie*.

spent in France by non-EU doctors for additional training, but it does allow them to get a complete residency after a selection process to fill a limited number of positions. Because of the very limited number of African residents or specialists, these rules still allow for a substantial brain drain. Similar brain drain statistics from Madagascar and Cameroon show that the problem is not limited to Cotonou.

The impact of the loss to Africa of a single specialist is far greater than the benefit of that same specialist to France. Active recruitment of African specialists by high-income countries poses an ethical question. African countries share the responsibility: for example, for 8 years, Benin failed to organize recruitment examinations for specialists, thus jeopardizing the future of the specialty in both public service and the university. Young specialists had to leave their country to sustain their families. Elsewhere, war and insecurity prevented graduates from returning to their countries or forced them to flee with their families. International financial regulators also bear some responsibility as they have forced African governments to reduce the number of public servants, including doctors. This is counterproductive as it deprives countries of the top graduates of their educational systems to the benefit of high-income countries, nurtures underdevelopment, and sustains the migrant crisis.

Countries like Chile could inspire African governments to develop adequate legislation and reap higher benefits from their specialist training programs. To get more specialists in less-favored provinces, Chile provides residency scholarships in exchange for a predefined bonded term in the public health service after graduation, the contract being secured by a presigned financial promissory note.^c Such a contract also guarantees a paid job to young specialists as soon as they graduate, minimizing brain drain. Such schemes are highly efficient in maximizing return on investment but require long-term planning.

CONCLUSIONS

We believe that the main reason for success of this collaboration between Belgium and Benin is that African partners have maintained leadership of the project. Another reason was time. This report shows that time and persistence are even more important than money. The financial costs were small; education costs are low compared to humanitarian action, and the impact is greater and lasts longer. During his career, each graduate will attend a large number of patients and will likely be involved in teaching anesthesia or intensive care at various levels. For all these reasons, an argument can be made to incorporate clinical education and, wherever feasible, clinical training of African anesthesiology residents into each humanitarian mission.

A 1-year rotation in a technically more advanced country remains an important part of training. Its near loss from the Cotonou program almost led to disaster. We say this despite the risk of losing residents or graduates through brain drain.

The failure of African anesthesia training programs to recognize the feminization of medicine is worrisome, and the issue may warrant more research. Recruiting from only two-thirds

(today) or one-half (tomorrow) of medical graduates will necessarily affect the future of anesthesiology. French-speaking African anesthesiology still awaits female role models.

African governments should consider the introduction of bonded public health positions, similar to the Chilean scheme, for new graduates to ensure that home countries benefit maximally from the investment in training.

No hospital can function without adequate anesthesia services; anesthesia is a unique discipline in that respect. Anesthesiologists must convince health authorities to coordinate investments in anesthesia with surgical specialties as they develop. The guidelines provided by the recent Lancet Global Surgery initiative could help SSA countries develop coherent surgical, obstetric, and anesthesia plans that follow internationally admitted standards and objectives.⁵⁹

Among all the SSA countries with anesthesiology training programs, only Cotonou accepted a significant proportion of foreign candidates from less-fortunate countries. Other programs should open their doors in view of the increasing demand and knowing that many countries cannot envision teaching their own nationals in the short term or possibly ever. The programs could also consider training NPAPs.

Teaching has always been the program's essence, which Cotonou alumni are now spreading all over French-speaking Africa.^{48,60} ■

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DISCLOSURES

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Contribution: This author is the current Beninese coordinator of the program, and data collector and coauthor of the manuscript.

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^c(1) Chilean Law no. 19.664, article 11, Regulation no. 91. (2) Chilean Law no. 15076, article 43 and its specific regulations. (3) Supreme Decree of the Ministry of Health of no. 507/year 1990, article 19 b/1. A copy of such a contract is available (in Spanish or French) on request to the authors.

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