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CASE STUDY

Development of the anaesthesia workforce and organisation of the speciality in Uganda: a mixed-methods case study

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Background: The development of modern anaesthesia practice in many low-income countries has lagged behind that of high-income countries despite early reports. Detailed descriptions of 'surgery under anaesthesia' in Uganda are available through Robert W. Felkin's elaborate accounts of caesarean sections done in the Bunyoro-Kitara Kingdom. However, the earliest documented 'modern' surgical and anaesthesia procedures were performed by Sir Albert Cook and his brother Dr Jack Cook in 1897 at Mengo Hospital. Since then, anaesthesia has developed into an independent speciality with workforce development, professional bodies and a recognised practice. This study aimed to describe the development of the anaesthesia workforce and speciality since independence while sharing our experiences to benefit those countries on a similar journey.

Methods: We employed a mixed-methods approach, including surveys among anaesthesia providers, as well as key informant interviews and a workforce database review. Whenever possible, information was corroborated with written literature.

Results: There are three levels of training of anaesthesia providers in Uganda, including a Master of Medicine in anaesthesia for specialist physician providers, a Bachelor of Science in anaesthesia and a Higher Diploma in anaesthesia for non-physician providers. There are two Master of Medicine programmes, two Bachelor of Science in anaesthesia programmes and seven Higher Diploma programmes. The existing workforce consists of 68 specialists and more than 600 non-physician providers. The anaesthesia providers are organised under professional associations, namely the Association of Anesthesiologists of Uganda and the Uganda Anaesthetic Officers Association. International and regional collaborations have been critical in the development of anaesthesia in Uganda.

Conclusion: Uganda still has a low density of anaesthesia providers both in number and distribution but has established critical steps to substantially increase the workforce. These steps include three levels of training with numerous training programmes, professional bodies and partnerships. We present our experiences with different strategies, highlighting those that have failed, and suggest further recommendations on developing anaesthesia in Uganda.

Keywords: anaesthesia, Uganda, sub-Saharan Africa, non-physician anaesthesia providers, physician anaesthesia providers, workforce

Working definitions

Admission: A student is approved to study in a programme following a merit-based process by the university.

Enrolment: A student who has been admitted to a training programme and who has accepted this admission by picking the admission letter and starting school.

Graduated: A student who has completed the programme and has qualified with an MMed irrespective of the time of completion.

MBChB: A bachelor's degree in human medicine and surgery awarded by the university.

MMed: A postgraduate degree awarded by the university upon completion of a Masters of Medicine programme.

SPAP: A licensed specialist physician anaesthesia provider who has completed the MBChB and MMed training in anaesthesiology and critical care.

NPAP: A licensed non-physician anaesthesia provider who has completed a diploma or bachelor's training in anaesthesia.

Medical officer: An MBChB, or equivalent, graduate who is licensed to practice independently but has not yet undertaken specialist training in a Master of Medicine programme or its equivalent.

Anaesthetic officer: A non-physician anaesthesia provider who has completed a two-year Higher Diploma in anaesthesia training and is licensed with the Allied Health Professionals' Council.

Regional referral hospital: A secondary-level public hospital that is highly differentiated by function with 5–10 clinical specialities and 200–800 hospital beds.

National referral hospital: A tertiary-level public hospital that provides specialised care and is the final referral point in the healthcare system, with 300–1 500 hospital beds.

Private-not-for-profit facility: A health facility that is owned by civil societies and organisations, whose first and foremost reason of operation is the provision of health services and that do not aim to make profit for distribution to owners.

Introduction

In Africa, as in other parts of the world, there is anecdotal evidence that medicine was practised before the arrival of the Europeans and 'modern medicine' as we know it. The same is valid for surgery and anaesthesia in Uganda (Figure 1). Detailed descriptions of surgery under anaesthesia in Uganda are available through Robert W. Felkin's elaborate accounts of caesarean sections done in the Bunyoro-Kitara Kingdom.[1] In Felkin's publication, 'Notes on labour in central Africa', he describes in detail a successful caesarean section performed entirely by African 'traditional surgeons' under intoxication with alcohol from banana wine. Antisepsis, heat rods for haemostasis and wound closure were also used. Felkin witnessed this event in 1879, only 32 years after W.T.G. Morton's public demonstration of ether in the United States of America,[2] and J.N.P. Davies supports these findings in his report on the existence of organised medical practices, including surgery and anaesthesia in a kingdom far separated from outside influence at the time.[3]

From the 1890s through colonial times, 'modern' surgery was practised in Uganda, albeit a privilege to the Europeans, and African nobles and royals. Much of the expansion to the local communities is attributed to Christian missionaries. The earliest documented 'modern' surgical and anaesthesia procedures were performed by Sir Albert Cook and his brother Dr Jack Cook starting in 1897 at Mengo Hospital. By 1901, the brothers conducted over 200 surgeries per year under general anaesthesia with chloroform. Thus, Sir Albert Cook, who is considered the 'Father of modern medicine' in Uganda, is also accredited for introducing the 'modern' practice of anaesthesia in Uganda.[4]

Sir Albert Cook was also key in forming the first medical school in Uganda, Makerere Medical School, in 1924, which later transformed into Makerere University Medical School.[5] With Mulago National Referral Hospital (MNRH), opened in 1962 as a training hospital, Makerere University Medical School remained the only medical school in the country until the Faculty of Medicine at the Mbarara University of Science and Technology (MUST) opened in 1989. These two universities would become the country's major training institutions of specialist physician anaesthesia providers.

This study aimed to describe the development of the anaesthesia workforce and speciality since independence while sharing our experiences to benefit those countries on a similar journey.

Methods

We employed a mixed-methods approach, including surveys among anaesthesia providers, as well as key informant interviews, a workforce database review and a non-systematic literature search. We conducted a total of six key informant interviews, two with each of the three informants who are regarded as pioneers of their respective academic programmes at Makerere and Mbarara and were serving in critical positions at the time of the interviews. The research team selected these key informants because they have been directly involved in developing anaesthesia as a speciality. The initial interviews provided a historical narrative, including establishing academic departments and training programmes, key partnerships, and other significant events. The second set of interviews refined the list generated from the initial interviews to improve clarity and accuracy. The interviewer recorded all interviews on paper and then shared it with the informants to cross-check accuracy.

We interrogated the anaesthesia workforce database developed as a collaborative project between Global Partners in Anesthesia and Surgery (GPAS) and the Association of Anesthesiologists of Uganda (AAU). We extracted data on anaesthesia provider numbers, place of work, training programme, and year of training and graduation.

Two surveys, administered through SurveyMonkey (Momentive R), were used to determine the current training cost of anaesthesia in the different programmes, as well as employment and income after training.

Whenever possible, information was corroborated with written literature, including new articles, departmental records, journal correspondences and Ministry of Health documents.

Data analysis

Data from interviews were reviewed and organised into themes by one member of the research team and later organised chronologically to provide a rich historical narrative on anaesthesia training, formation of academic departments, partnerships and establishment of professional societies.

Survey data, primarily descriptive, was exported to Microsoft Excel (Microsoft® 2013), in which data visualisations were made and quantitative data analysed using basic descriptive statistics.

Results

Anaesthesia training programmes

Before 1970, anaesthesia was provided either by surgeons (who were mainly foreign 'expatriates') or by their 'medical assistants' who were trained to provide ether or chloroform under the surgeon's instruction. Formal training of anaesthesia providers started in 1971 when the Ministry of Health (MoH) initiated a three-year training programme for Ordinary Level (O-level) certificate holders, who did not possess any medical background. The three years were followed by a mandatory year of internship before graduation.[6] The award was a National Diploma in Anaesthesia and the cadre, anaesthetic assistant. This programme was revised in 1985 following the Health Ministers Conference of the East, Central and Southern Africa Health Community to have a medical background as a prerequisite for anaesthesia training. As a result, the pre-entry qualification was changed from an Ordinary Level certificate to a Diploma in Clinical Medicine, Nursing or Midwifery. In addition, the academic programme duration was reduced to 18 months with an extra six months of internship at a regional referral hospital before taking a standard national examination. The Higher Diploma in Anaesthesia programme has trained non-physician anaesthesia providers

(NPAP), commonly known as anaesthetic officers, for the last 30 years at Mulago Paramedical School (now Uganda Institute of Allied Health and Management Sciences) and its campus at St. Mary's Hospital, Lacor in Gulu district. Anaesthetic officer tutors manage the programme with minimal specialist physician anaesthesia providers (SPAP) involvement. Other programmes are presented at Kabale University, Mbale School of Clinical Officers, Fort Portal School of Clinical Officers, Ishaka Adventist Hospital and Kitovu Hospital (Figure 2).

Training of medical doctors in anaesthesia did not start until 1983 when the MoH initiated a one-year, hands-on programme at MNRH to equip medical officers (non-specialist medical doctors who have completed an MBChB and an internship) with knowledge and skills in anaesthesia and critical care. Two students would be admitted annually and would qualify with a Postgraduate Diploma in Anaesthesia, after which they practised anaesthesia independently. This qualification became a prerequisite for the three-year Master of Medicine in Anaesthesia (MMed) programme that commenced in 1985 at Makerere University. In this programme's inaugural year, two students, Dr Joseph V.B. Tindimwebwa and Dr Cephas Mijumbi, enrolled. Since then, SPAPs have trained through this pathway, although the Postgraduate Diploma requirement was abandoned in 1995. The entry criteria are an MBChB and a one-year internship training in medicine and surgery.

Before 2000, the MMed programme at Makerere University attracted very few students, usually not exceeding two per year. However, the admissions have steadily improved, since the 2000s (Figure 3), with the addition of a second MMed programme at MUST. Dr Stephen S. Ttendo was the pioneer student and is the current Head of Department. The programme at MUST has since grown in student numbers (Figure 4).

The Bachelor of Science in Anaesthesia (BScA) programme was started at Busitema University, eastern Uganda, in 2017. The programme is a 3–4-year, competence-based, spiral programme with a broader pool of potential trainees, including any clinical diploma, advanced level (similar

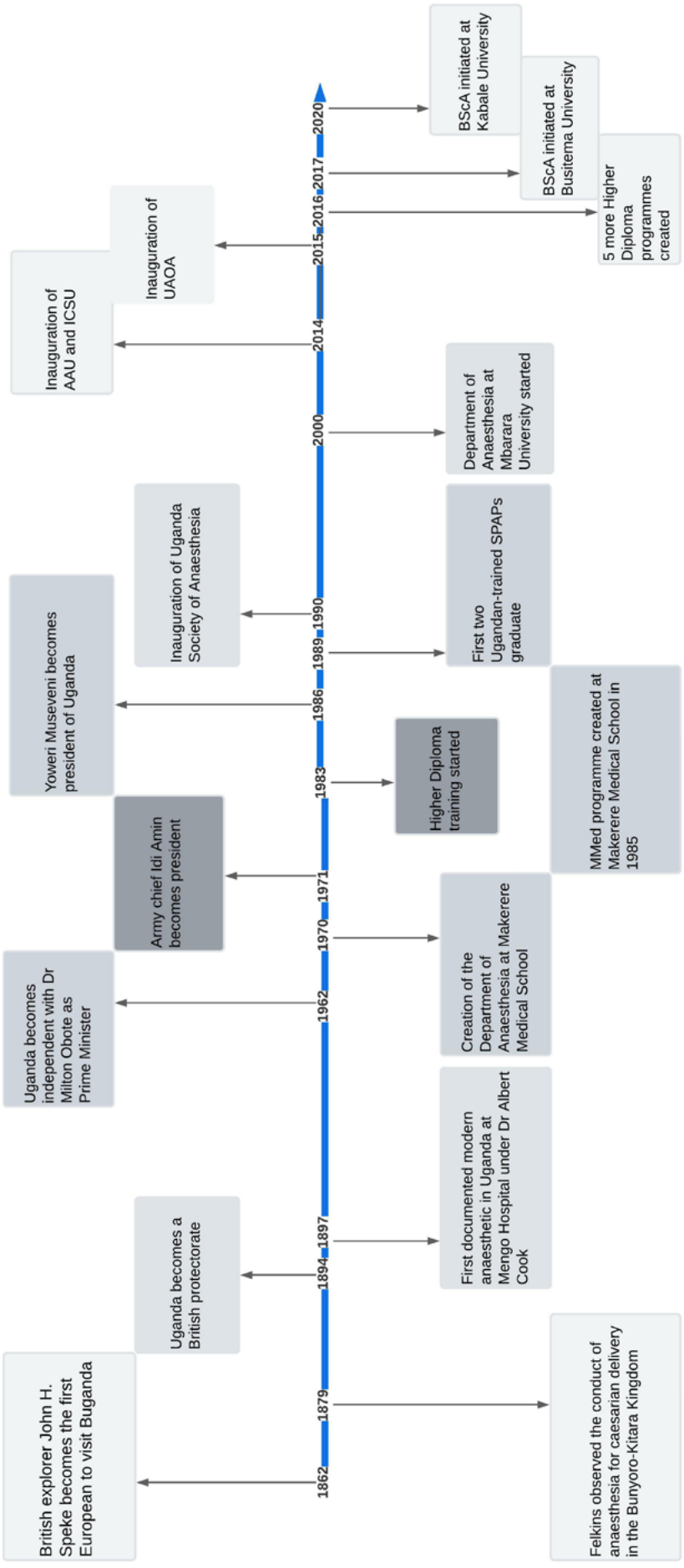

Figure 1: Major events in the history of anaesthesia in Uganda
MMed – Masters of Medicine, USoA – Uganda Society of Anaesthesia, AAU – Association of Anesthesiologists of Uganda, ICSU – Intensive Care Society of Uganda, UAOA - Uganda Anaesthetic Officers Association, BScA – Bachelor of Science in Anaesthesia

Table I: Annual training costs and Ministry of Health employment entry-level annual salary

Expense	MMed UGX (USD)	BScA UGX (USD)	High Diploma UGX (USD)
Training fees/tuition (range)*	5 317 500 (1 519.0)	5 400 000 (1 542.6)	2 750 000 (785.6)
Research (average)**	10 000 000 (2 857.0)	N/A	1 000 000 (285.7)
Living expenses (average)***	13 747 000 (3 927.1)	6 192 000 (1 768.9)	6 400 000 (1 828.3)
Official income during training per annum (Net)	22 176 000 (6 335.0)	N/A	N/A
Total average expenses for entire programme****	67 193 500 (19 195.0)	46 368 000 (13 245.8)	19 300 000 (5 513.4)
Ministry of Health entry level *****	U2	U4 suggested	U5
Entry level salary (Gross) *****	54 011 544 (15 429.3)	26 400 000 (7 541.6)	14 400 000 (4 113.6)

* Included fees and other programme requirements payable by the student, varies between the training programmes and between universities offering the programmes. This does not indicate the cost of training to the institution.
** Vary depending on the research project. BSc students do not require research to complete but need to be involved in an expense-free quality improvement project.
*** Vary depending on which city the training programme is located in.
**** MMed programme is 3 years, BScA programme is 4 years, High Diploma programme is 2 years.
***** BScA graduates are yet to be incorporated in the government employment structures. The entry point and salary listed are suggested in line with the salary scale structure.
USD–UGX conversion rate – $1–3 500.58

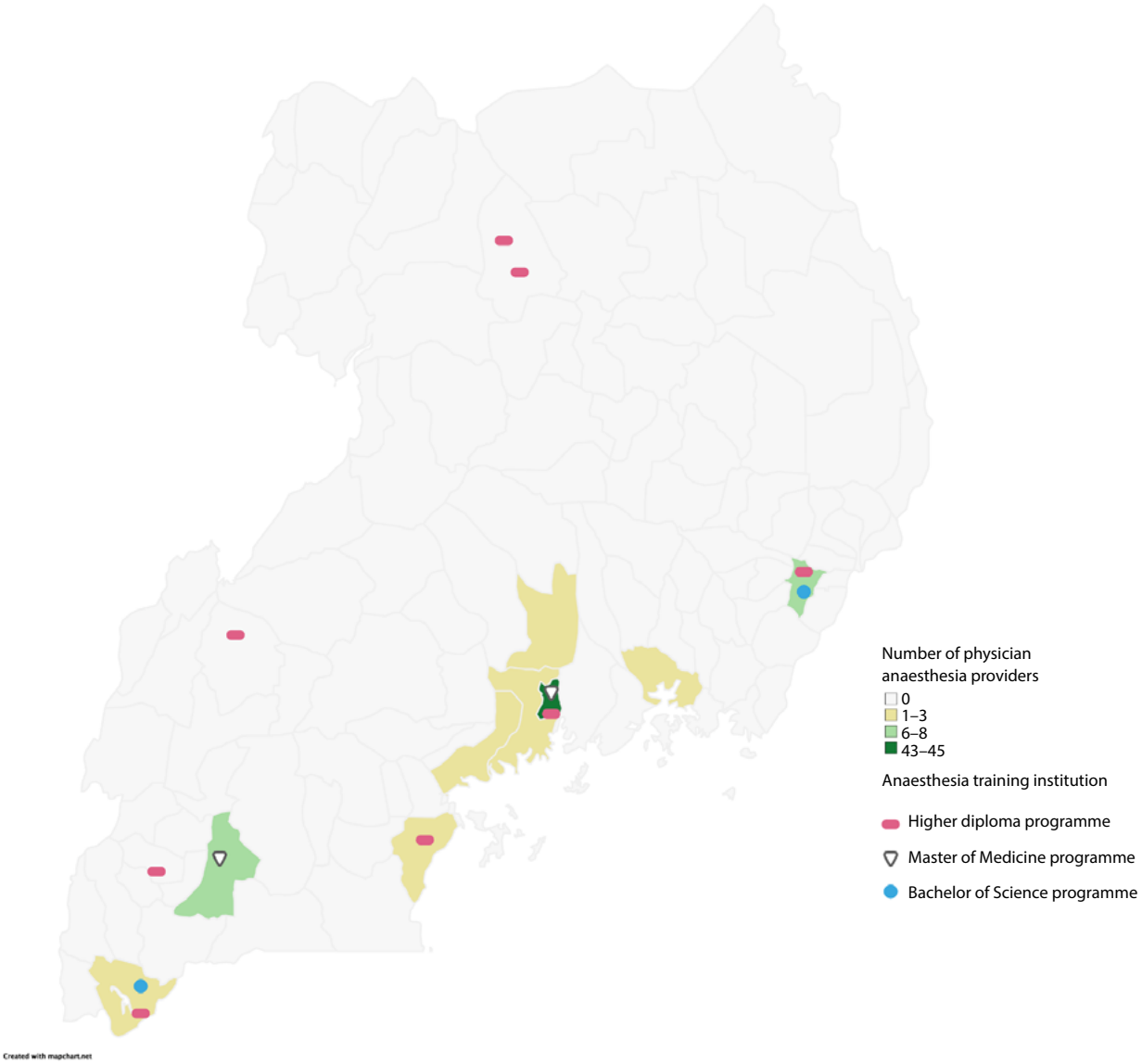

Figure 2: Spatial location of current anaesthesia training programmes and distribution of physician anaesthesia providers in Uganda
Uganda is divided into 146 administrative units (districts). Two districts have MMed programmes (Kampala and Mbarara), two have a BScA programme (Mbale and Kabale) and seven have a higher diploma programme (Bushenyi, Masaka, Mbale, Gulu, Kabale, Kampala and Kabarole).

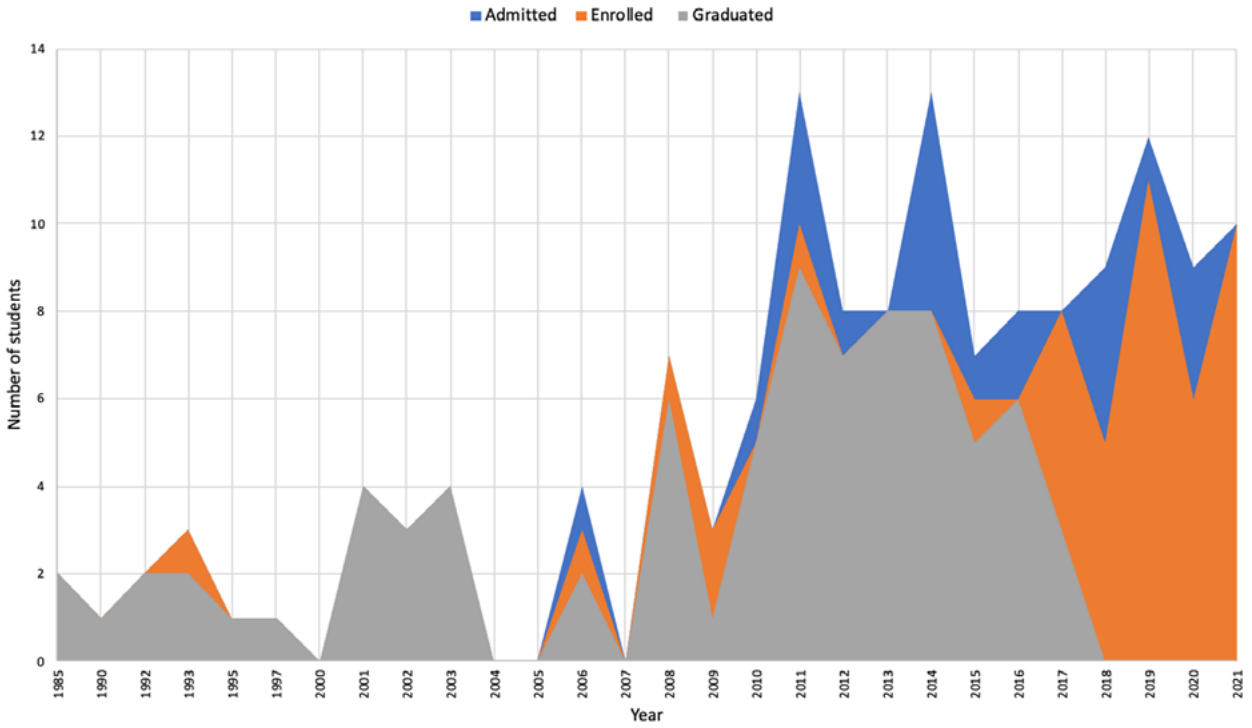

Figure 3: An area graph of student admission, enrolment and graduation from the Makerere University Master of Medicine in anaesthesia programme based on the year of admission
Note: where only grey colour is evident, it indicates that the number of students admitted, enrolled and graduated were the same.

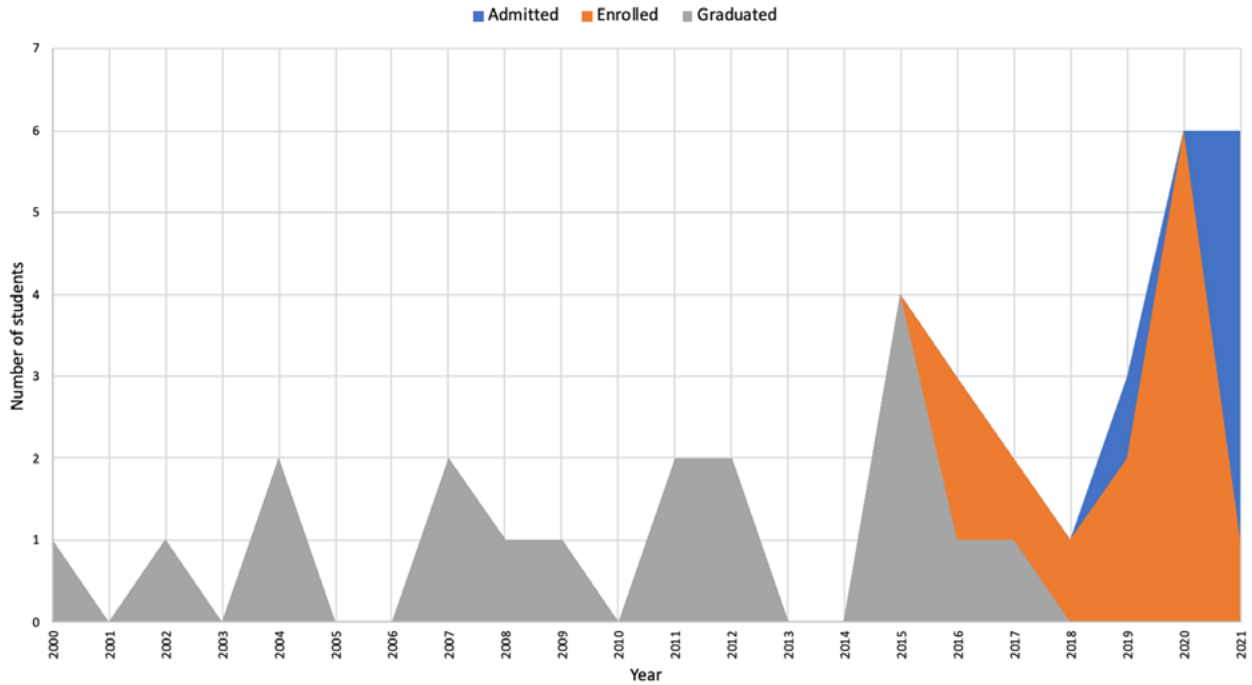

Figure 4: An area graph of student admission, enrolment and graduation from the Mbarara University Master of Medicine in anaesthesia programme based on the year of admission
Note: where only grey colour is evident, it indicates that the number of students admitted, enrolled and graduated were the same.

criteria to an MBChB) and Higher Diploma in anaesthesia holders. The programme is divided into two years of basic sciences (with the MBChB class) and 1–2 years of clinical anaesthesia, critical care and emergency care. SPAPs supervise training at multiple training sites. To date, 110 students have enrolled in the programme, and approximately 23 will have graduated by the end of 2022. A similar BScA programme was started at Kabale University in 2020 and currently has 60 students.

In 2022, two master's programmes, seven higher diploma programmes, and two bachelor's programmes actively train the country's anaesthesia workforce (Figure 2). As of 2022, the cost of training to the student across the three training programmes ranges from UGX19 300 000–67 193 500 (5 513.4–19 195.0 USD) (Table I). Training is funded through either full or partial scholarships from various sources or out-of-pocket. In 2018, the MoH started paying MMed students a net salary of 2 615.6 USD

per annum, revised to a net salary of 6 335 USD per annum in 2021.

All training programmes are regulated by the Uganda National Council of Higher Education (UNCHE) on behalf of the Ministry of Education and Sports. At the same time, licensure to practice, competence and professionalism are overseen by the Uganda Medical and Dental Practitioners Council (UMDPC) for SPAPs and Uganda Allied Health Professionals Council (UAHPC) for NPAPs.

Stopgap programmes

The first stopgap programme was the Postgraduate Diploma in anaesthesia, aimed at increasing the number of medical officers with anaesthesia skills. This programme lasted ten years and graduated six students. The MoH initiated another stopgap programme in 2001 to increase the number of NPAPs in the short term to work at the newly established Health Centre IV facilities. The programme accepted diploma nurses and midwives already employed in government hospitals. The students were trained at regional referral hospitals for one year, after which they returned to practice at their primary hospital. This programme was not affiliated with any academic training institution but with clinical anaesthesia departments at hospitals. This cadre was called anaesthetic assistants. Within two years, 188 anaesthetic assistants had been trained, but the programme was closed.

Academic departments

The clinical unit of anaesthesia at MNRH was established in the mid-1970s by Dr George Kityo, the first Ugandan SPAP, trained in the United Kingdom. Dr Patricia Margaret Coyle from Australia later joined him.[7] Together, they forged the first academic anaesthesia department at Makerere University in 1984, with Dr Patricia Coyle as the first head. Dr Catherine Omaswa, another British-trained Ugandan anaesthesia and critical care specialist, later also joined the department. After completing their MMed training in 1989, Dr Cephas Mijumbi and Dr J.V.B. Tindimwebwa joined the department too. Dr Henry Bukwirwa, a Kenyan-trained SPAP, returned in 1990 to boost the department, taking over as head. Subsequently, Dr J.V.B. Tindimwebwa was head until 2014. By 2022, the department had grown to 13 Ugandan academic faculty and an average of 25 students across the years of training.

The Department of Anaesthesia at Mbarara Regional Referral Hospital was opened in 1995 and later transformed into an academic department under MUST by Dr Traudl Elsholz,[8] a German SPAP who had worked in different parts of Africa at the time. She worked at MUST between 1998 and 2004, during which she established the second MMed in anaesthesia programme in 2000. Dr Stephen S. Ttendo was the first graduate and later became the head of the department, taking over from Dr Elsholz. Currently, the Department of Anaesthesia at MUST comprises six Ugandan faculty and an average of eight residents across the three years. By 2021, the two MMed programmes had graduated 98 SPAPs, with a completion rate of 66% and 58% at Makerere and Mbarara, respectively (Figure 3 and 4).

Establishing the speciality of anaesthesiology in Uganda

The practice of anaesthesia

Between 1960 and 1990, anaesthesia was a supporting service under the surgery department at MNRH and other hospitals across the country. In the early 1990s, Dr Joseph V.B. Tindimwebwa and Dr Cephas Mijumbi pushed for an independent anaesthesia department, autonomous from surgery. This independence was applied across the country in many public hospitals. Since then, the speciality has continued to grow in the country, with most surgery-enabled hospitals establishing anaesthesia administrative units with specialist SPAPs or senior NPAPs as leads. The current entry levels and salaries, as per the single spine salary structure, are shown in Table I.

The biggest threat to the speciality has been the high levels of attrition and emigration, with 34% of all MMed graduates emigrating, primarily to other African countries.

Establishing professional bodies

Under the mentorship of the then-Secretary-General of the Society of Anaesthesiologists of East Africa (SAEA), Dr Eugine Egan of Tanzania, Drs Mijumbi, Bukwirwa and Tindimwebwa resolved to create a platform for continuous medical education for the anaesthesia providers in Uganda, who were mainly NPAPs. As a result, the Uganda Society of Anaesthesia (USoA) was established in 1990, playing a significant role in improving in-service training and advocating for NPAPs' interests. The society was led by an elected executive of SPAPs and NPAPs. In 2014, the two groups formed separate professional bodies: The Association of Anesthesiologists of Uganda (AAU) and its sister society, the Intensive Care Society of Uganda (ICSU) for the specialist physicians in 2014, and the Uganda Anaesthetic Officers Association (UAOA) for the NPAPs in 2015. These two bodies (AAU/ICSU and UAOA) continue to co-exist with a shared mandate to provide leadership, advocate and lobby for better anaesthesia services, and provide continuous medical education and professional development for their members. The USoA, although not dissolved, has since been rendered non-functional.

Collaborations and partnerships in the growth of anaesthesia in Uganda

Collaborations and partnerships have significantly contributed to anaesthesia education in Uganda and the growth of the speciality at large.[9-12] Several partnerships have supported the anaesthesia cause in Uganda, but only a few are described here.

In 2006, the Association of Anaesthetists of Great Britain and Ireland (AAGBI) and the Global Partners in Anesthesia and Surgery (GPAS) invested in an education programme to increase the number of SPAPs in the country over ten years. This programme provided living allowances, tuition, learning resources, mentorship and exposure to the international community, which increased enrolment and retention of trainees in the MMed programmes.

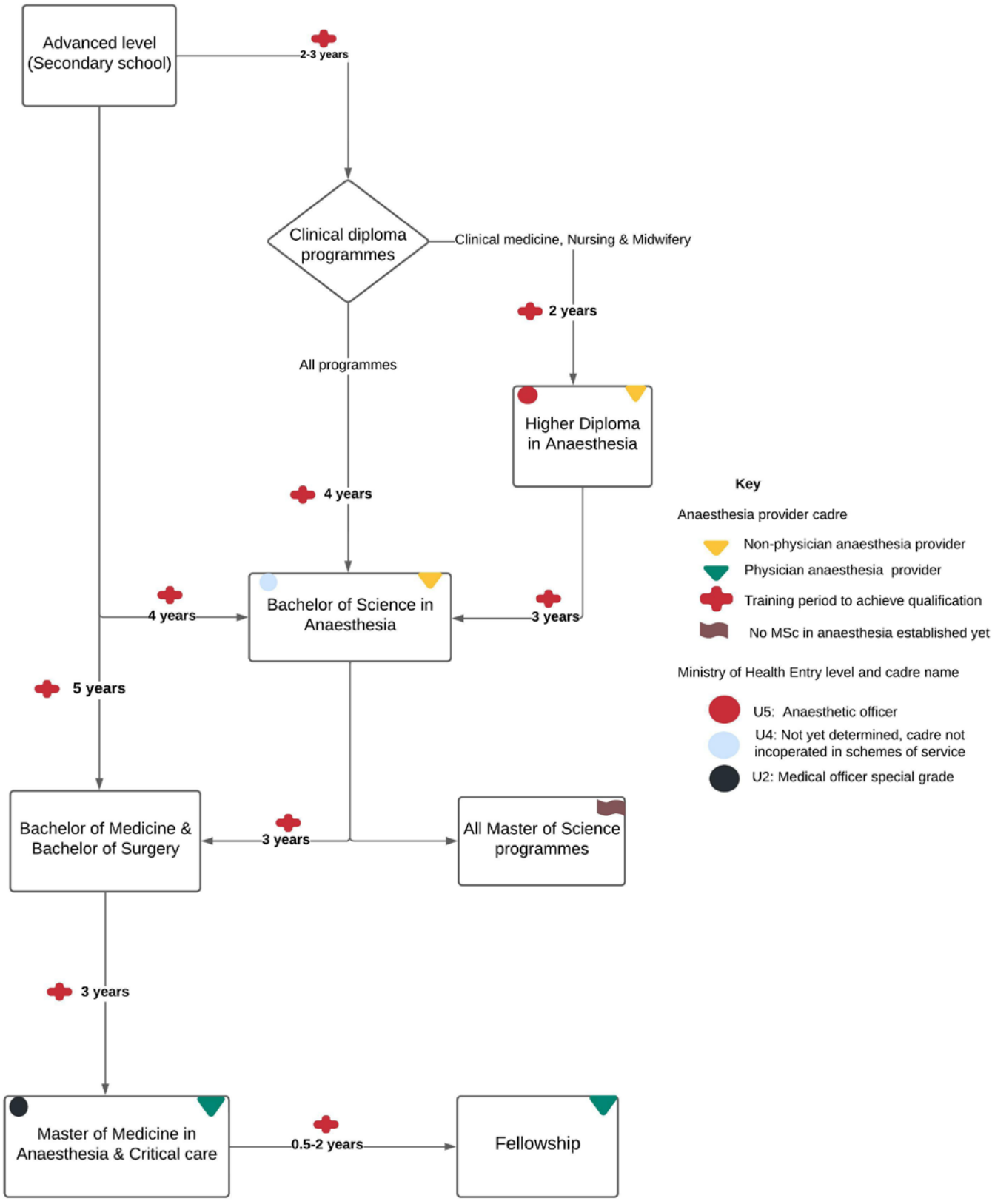

Figure 5: Anaesthesia provider training pathways and employment salary scale

The funding from AAGBI mandated that trainees remain in Uganda after completing their training through a binding agreement. At the end of the funding period (June 2018), over 40 physician anaesthetists had completed training, with over 90% practicing in Uganda. All graduates practised in Africa at the time of the study.[12] In addition, GPAS (recently through Center for Health Equity in Surgery and Anesthesia [CHESA]) has continued to support both the MMed programme at Makerere, the BScA at Busitema and the AAU in various ways.

The late Prof. Brian Warriner of the University of British Columbia, Canada, supported the Makerere programme through direct student interaction. He travelled to Uganda annually and

spent 2–3 weeks with new trainees, providing mentorship and classroom-based teaching.

At Mbarara University, Dr Stephen S. Ttendo worked closely with the AAGBI, McMaster University (Canada) and Harvard University (USA) to develop the training programme and student and faculty research programmes at MUST.

The World Federation of Societies of Anaesthesiologists (WFSA) is another key partner that has supported Ugandan SPAPs to undertake fellowship training at universities and hospitals across the world through its signature 'Fund-a-fellow' programme.[13] Largely through WFSA, with other partners, the country currently boasts seven cardiac anaesthesia fellows, five paediatric anaesthesia fellows, five regional anaesthesia and pain fellows, four obstetric anaesthesia fellows, seven critical care fellows, and two medical education fellows. In 2021, Makerere University and the Uganda Heart Institute graduated the first cohort of cardiac anaesthesia fellows, trained through a split programme where part of the training is done locally and the other by a high-income country.

Regionally, the Kenya Society of Anaesthesiologists (KSA) supported the AAU at its time of establishment by providing guidance and mentorship.

Discussion

Sustainable Development Goal 3 calls for the achievement of universal health coverage, including access to quality surgical services.[14] The Lancet Commission on Global Surgery developed six indicators of surgical care worldwide. The surgical workforce, including surgeons, obstetricians and anaesthetists, is key to achieving increased access to safe, affordable and timely surgery.[15] However, most low- and middle-income countries (LMICs) do not have a great enough anaesthesia workforce to enable access to surgery.[16] Countries with established training programmes should share their experiences and strategies to cover the existing anaesthesia workforce gap.

In Uganda, there are three levels of training, including the Higher Diploma, the BScA (NPAP) and the MMed in anaesthesia programme (SPAP). Combined, these programmes have trained almost all of Uganda's anaesthesia workforce, with the Higher Diploma contributing over 600 providers and the MMed just under 100 providers, a third of whom have left the country. Moreover, these programmes converge into a single academic and/or career pathway, providing academic and professional growth opportunities.

SPAP programmes are located in urban areas, utilising public and private hospitals as training sites. Most NPAP training programmes, however, are rural, using public and private-not-for-profit hospitals as training sites. Multiple sites allow learning from environments similar to the work setting, thereby preparing students for practice,[17] but make the programmes more expensive. Besides tuition, the biggest drivers of cost are living and research costs, which make urban and university-based programmes more expensive to the students. To the trainees, the cost of training in the 4-year BScA is double that of the 2-year Higher Diploma, while the 3-year MMed programme is the most expensive, costing four times as much as the Higher Diploma. The cost of training in any anaesthesia programme is high for a primarily rural population (83.6%) that depends on subsistence farming.[18] Over the last 15 years, anaesthesia training has received significant funding from the MoH and other development partners through ring-fencing scholarships, boosting the number of trainees across all programmes.

Before 2000, the number of students enrolling for the MMed programme at Makerere University was meagre. However, it has steadily increased due to various efforts: a new MMed programme at Mbarara, the AAGBI/GPAS collaboration, prioritisation of anaesthesia for scholarships by MoH, and champions from within. The most notable champion was Dr Arthur Kwizera, the first AAGBI fellow. His strategy involved recruiting interns, seeking out and engaging the best medical students, encouraging career counsellors to include anaesthesia in the list of career options, and increasing anaesthesia's visibility through newspaper articles. As the number of SPAPs increased, medical students and interns doctors became more exposed to anaesthesiology and critical care, increasing the chances of anaesthesia as a career option.

On the other hand, the NPAP programmes have had consistently high enrolment due to a broader pool of potential trainees. However, before 2016, there were only two NPAP programmes, limiting the number of trainees. The government has since created five more schools for the Higher Diploma. The remaining challenge is the number of trainers in these programmes and the quality of supervision during training.

Graduates of recognised anaesthesia training programmes practice independently after obtaining a licence from UMDPC (MMed) or UAHPC (Higher Diploma and BScA) without further assessment. However, they must provide evidence of continuing professional development for licence renewal. The scope of practice is at the provider's discretion as the guiding document is in the development phase.

As in other LMICs, a significant challenge to workforce development has been the attrition through medical emigration. For example, since 1985, Uganda has lost one-third of all SPAPs, primarily to other African countries including Kenya, Eswatini and Botswana. Other avenues include employment by international organisations like United Nations missions in Somalia and South Sudan. There also have been trainees from Congo DRC, South Sudan and Somalia who have returned to their home country after training. Less than five SPAPs have emigrated to high-income countries outside Africa. Evaluating the AAGBI support to SPAPs training in 2017, Hewitt-Smith et al.[12] found a lower rate of medical emigration. However, more SPAPs in that cohort have since left the country. The primary driver of medical emigration is better-paying jobs. Many, however, have stayed because of family ties and the employment opportunities available. Similarly, it is not uncommon to find NPAPs trained in Uganda

working in South Sudan and Somalia. In 2003, the government implemented the single spine salary structure that standardised all public servant salaries, paying all diploma holders in health alike without considering the additional training and unique responsibilities of anaesthesia providers (Figure 5).[19] This change resulted in attrition and negatively impacted the recruitment of anaesthetic officers into public service at the existing entry point and salary.

The stopgap programmes presented above were not sustainable for various reasons. Firstly, established as projects, their foundation was not within established institutional programmes, and their continuity depended on project funding. Secondly, while the trainees assumed more responsibilities as anaesthesia providers, their salaries stayed the same, forcing many anaesthetic assistants to return to their old jobs. Lastly, the career pathways for progression were unattractive. For example, the Postgraduate Diploma made SPAP training longer than other MMed programmes.

Establishing the speciality of anaesthesiology in Uganda

Historically, anaesthesia was viewed as a supportive role, guided and directed by the surgeon during the pre-independence era. Post-independence, Uganda relied heavily on expatriate anaesthetists, Ugandans trained on the job and Ugandan specialists trained in other countries. However, the socio-political turmoil between 1970 and 1979 affected progress in anaesthesia. As a result, most expatriates fled the country leaving only a few who concentrated mainly on providing clinical care. The few Ugandan specialists trained in Europe did not return. Over the past three decades, there has been a reasonable degree of political stability in most of the country, enabling the progress of the anaesthesia speciality. The key informants believe that the organisational separation from the surgical department marked the start of anaesthesia as a speciality, and we have registered significant progress in both workforce and service delivery over the last 30 years. However, the current workforce is still limited in numbers and distribution. Uganda has 68 SPAPs and approximately 600 NPAPs for 43 million people, with most providers located in Kampala and other urban centres. In 2015, the MoH estimated that only 30% of the anaesthesia provider positions were filled in public hospitals, compared to 83% for nurses and 72% for medical doctors.[20] Employment in the public service is through advertisement, which is unpredictable and bureaucratic. In addition, retention and remuneration in the public service are unattractive, making it extremely difficult to employ SPAPs in public hospitals out of Kampala, the capital of Uganda. As a result, SPAPs prefer and find employment in the private facilities within Kampala before government employment. Outside Kampala, there is a trend towards having SPAPs in academic institutions and private-not-for-profit hospitals. Dual employment (in public and private facilities) is not uncommon, with SPAPs spending 50% of the time at the government employment, although they will earn more from their private employment. A recent study on incentives to work upcountry among SPAPs in Uganda found that having a colleague, and a variety of surgical cases were better incentives than a salary increment.[21] So perhaps the government should look into other incentives to attract SPAPs into the public service.

A key milestone in the anaesthesia journey in Uganda has been the organisation of professional bodies. Initially, both SPAPs and NPAPs belonged to one body, USoA, but it became clear that the body was not meeting the unique needs of either group. Therefore, the SPAPs formed the AAU/ICSU, while the NPAPs formed the UAOA. For the SPAPs, an opportunity lay in the association with the WFSA, the world body for physician anaesthesia specialists, which would provide a sense of belonging, educational opportunities, networking and resources. Regionally, a physician association was a prerequisite to joining the College of Anaesthetists of East, Central and Southern Africa (CANECSA). Similarly, the UAOA belongs to the International Federation of Nurse Anesthetists (IFNA), the world body for NPAPs. Both groups continue to work hand in hand to develop the profession.

Collaborations and partnerships in the growth of anaesthesia in Uganda

International collaborations have played a critical role in workforce development and establishing the speciality. In the early stages, collaborations and partnerships provided visibility for the programmes, training resources and learning materials, tuition and welfare support, and advocacy.

The influence of regional bodies has been immense. For example, the Health Ministers Conference of the ECSA health community resulted in the guidelines for basic anaesthesia training for NPAPs. In addition, at the formation of the AAU, the KSA was instrumental as it provided much-needed support and mentorship. Our partnerships are mainly based on mutual benefits, flexibility and responsiveness to local needs, and have adapted to changing needs over time. This evolution has been essential in achieving self-sustaining training programmes and professional bodies. Notably, the MMed training programmes have little external input. Similarly, the AAU can now attract partnerships and funding opportunities for workforce development. In addition, it sets standards, defines the scope of practice and provides overall leadership for anaesthesia and critical care service delivery. We continue to collaborate and forge new partnerships regionally and internationally.

Future direction

There is a need for more creative ways to expand the workforce. Currently, efforts towards collegiate training and fellowships for SPAPs are in high gear to supplement university training.

While perioperative anaesthesia care has become widely available, other essential services like critical care, pain management and emergency care are still limited to training hospitals. These need to be developed to increase access to all Ugandans.

Future work for the professional bodies will involve advocacy for better recruitment, retention and remuneration policies, and gazette the anaesthesia scheme of service, the scope of practice and the billing schedule for private practice. Lastly, there is a need for a leadership development programme for all anaesthesia providers.

Conclusion

Uganda still has a low density of anaesthesia providers both in number and distribution but has established critical steps to substantially increasing the workforce. These steps include three levels of training with numerous training programmes, professional bodies and partnerships. We have provided our experience on different strategies, highlighted those that have failed, and suggested further recommendations on developing anaesthesia in Uganda. We hope that other LMICs in the early stages of workforce development will find this historical narrative helpful.

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Conflict of interest

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BF and MTN are training consultants with Gradian Health Services, the makers of the Universal anaesthesia machine.

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References

1. Dunn PM. Robert Felkin MD (1853-1926) and caesarean delivery in Central Africa (1879). Arch Dis Child Fetal Neonatal Ed. 1999;80(3):F250-1. https://doi.org/10.1136/fn.80.3.F250.
2. Bigelow HJ. Insensibility during surgical operations produced by inhalation. Boston Med Surg J. 1846;35(16):309-17. https://doi.org/10.1056/NEJM184611180351601.
3. Davies JNP. The development of 'scientific' medicine in the African Kingdom of Bunyoro-Kitara. Med Hist. 1959;3(1):47-57. https://doi.org/10.1017/S0025727300024248.
4. Billington WR. Albert Cook 1870-1951: Uganda pioneer. Br Med J. 1970;4(5737):738-40. https://doi.org/10.1136/bmj.4.5737.738.
5. Kiryabwire JW. Neurosurgery in Uganda. Neurosurgery. 1987;20(4):664-5. https://doi.org/10.1227/00006123-198704000-00029.
6. Carswell JW. Anaesthetist required for Uganda. Anaesthesia. 1980;35(4):391. https://doi.org/10.1111/j.1365-2044.1980.tb05128.x.
7. Mellor L. Coyle, Patricia Margaret. Faculty of Medicine Online Museum and Archive, University of Sydney; 2008. Available from: https://sydney.edu.au/medicine/museum/mwmuseum/index.php/Coyle, Patricia_Margaret. Accessed 4 Mar 2022.
8. Ghebremedhin M. Eritrea has to make our help unnecessary: Dr. Traudl Elsholz. TesfaNews. February 5; 2017. Available from: https://tesfanews.net/interview-dr-traudl-elsholz-training-anesthetists-eritrea/. Accessed 4 Mar 2022.
9. Lipnick M, Mijumbi C, Dubowitz G, et al. Surgery and anaesthesia capacity-building in resource-poor settings: description of an ongoing academic partnership in Uganda. World J Surg. 2013;37(3):488-97. https://doi.org/10.1007/s00268-012-1848-x.
10. Haglund MM, Kiryabwire J, Parker S, et al. Surgical capacity building in Uganda through twinning, technology, and training camps. World J Surg. 2011;35(6):1175-82. https://doi.org/10.1007/s00268-011-1080-0.
11. Haglund MM, Warf B, Fuller A, et al. Past, present, and future of neurosurgery in Uganda. Neurosurgery. 2017;80(4):656-61. https://doi.org/10.1093/neuros/nyw159.
12. Hewitt-Smith A, Bulamba F, Ttendo S, et al. A mixed-methods evaluation of the Association of Anaesthetists of Great Britain and Ireland Uganda Fellowship Scheme. Anaesthesia. 2018;73(3):284-94. https://doi.org/10.1111/anae.14116.
13. World Federation of Societies of Anesthesiologists (WFSA). Fund a colleague's Education (FACE). Available from: https://wfsahq.org/get-involved/fund-a-colleagues-education-face/. Accessed 4 Mar 2022.
14. World Health Organization. Sustainable Development Goal 3: Health. Geneva: World Health Organization. Available from: http://www.who.int/topics/sustainable-development-goals/targets/en/. Accessed 4 Mar 2022.
15. Meara JG, Leather AJM, Hagander L, et al. Global surgery 2030: evidence and solutions for achieving health, welfare, and economic development. Lancet. 2015;386(9993):569-624. https://doi.org/10.1016/S0140-6736(15)60160-X.
16. Kempthorne P, Morriss WW, Mellin-Olsen J, Gore-Booth J. The WFSA Global Anesthesia Workforce Survey. Anesth Analg. 2017;125(3):981-90. https://doi.org/10.1213/ANE.0000000000002258.
17. Edgcombe H, Baxter LS, Kudsk-Iversen S, Thwaites V, Bulamba F. Training non-physician anaesthetists in sub-Saharan Africa: a qualitative investigation of providers' perspectives. BMJ Open. 2019;9(3):e026218. https://doi.org/10.1136/bmjopen-2018-026218.
18. CountrySTAT. Key indicators. Available from: http://countrystat.org/home.aspx?c=UGA&p=ke. Accessed 4 Mar 2022.
19. Ministry of Public Service. Circular standing instruction No. 5 of 2018. Salary structure for financial year 2018/2019. Available from: http://www.publicservice.go.ug/download/csi-no-5-of-2018-salary-structure-for-fy-2018-19/. Accessed 4 Mar 2022.
20. Ministry of Health. Health sector development plan 2015/16-2019/20. Uganda: Ministry of Health 2015. Available from: http://health.go.ug/cause/health-sector-development-plan-2015-16-2019-20/. Accessed 4 Mar 2022.
21. Law TJ, Subhedar S, Bulamba F, et al. Factors affecting job choice among physician anesthesia providers in Uganda: a survey of income composition, discrete choice experiment, and implications for the decision to work rurally. Hum Resour Health. 2021;19(1):93. https://doi.org/10.1186/s12960-021-00634-8.