

## Developing an Anatomy Unit in Rwanda: Overcoming Challenges

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### ABSTRACT

Rwanda, the historical background reveals that anatomy was introduced into the medical program 6 years after the beginning of medical education. The development of the clinical anatomy unit started in 2002. Initially, the anatomical specimen was collected from amputated limbs and body organs from an autopsy.

Growing the field of anatomy in Rwanda has been a long journey guided by a constant commitment by the pioneers. The process was based on a guiding philosophy of delivering anatomy relevant to the clinical practice. The cadaver dissection practice is a gold standard for a challenging task. It needs strategies to build a system that facilitates the acquisition of cadavers, its processing, and the use and disposal of remains in human conditions. A law that regulates the use of human bodies, organs, and tissues in teaching and research was promulgated in 2010, and signed MoU on the supply of cadavers for teaching purposes with various hospitals in Rwanda.

In 2020, the Society of Clinical Anatomy of Rwanda (S-CAR) was founded to promote the growth of anatomical sciences and create a community for anatomy in Rwanda. The regular organization of surgical anatomy dissection courses has positively impacted the surgical trainees' skills and anatomy delivery. Despite the challenges, anatomy is alive in Rwanda, as testified to by the successful organization of the First Anatomy Annual Congress in October 2022.

**Keywords:** Anatomy Laboratory, Dissection, Cadaver for Education, Anatomy Law, Rwanda

### INTRODUCTION

University of Rwanda is a young university as it started as "Université Nationale du Rwanda" (UNR) by the appointment of the first Vice Chancellor, Dominican Priest Georges-Henri Levesque, a Canadian, on June 1, 1963. He had the mission to drive the project of establishing a university in Rwanda. The VC Lévesque was replaced by a Rwandan in 1972.

The law establishing the UNR was promulgated on May 12, 1964 and the first academic year started

on November 3, 1964. UNR started with three faculties: the Faculty of Education, the Faculty of Social and Economic sciences, and the Faculty of Medicine. The Faculty of Medicine recruited as intakes medical assistants with the aim of upgrading them to medical doctors. The Faculty of Medicine was under the Deanship of the Faculty of Medicine at the University of Gent, Belgium, and the teaching staff came from that university. The first UNR medical curriculum did not contain basic sciences; it was a clinical curriculum of four years.

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The medical curriculum with basic sciences content, including human anatomy, began six years after the start of medical education with the academic year 1970-1971. Anatomy, along with other biomedical fundamental sciences, was taught by professors from Belgium. Rwandan surgeons began taking over the teaching of anatomy from 1983.

As for all sectors of national life, medical education experienced a big loss during the genocide against the Tutsi in 1994.

At the reopening of UNR in April 1995, anatomy was taught by surgeons and others working in surgery at University Teaching Hospital, known from its French acronym, HUB, which has been changed in our days to be known as CHUB.

In 2002, a project financed by Belgian French Universities, CIUF-CUD, started to train anatomists, train anatomy laboratory technicians and build infrastructure for a teaching anatomy laboratory. From that point, anatomy at the University of Rwanda progressively grew.

### **GROWTH OF THE ANATOMY IN RWANDA THROUGH CONFRONTING CHALLENGES**

Anatomy is an essential fundamental science for medical education and medical practices. The teaching of anatomy has evolved over decades; however, cadaveric dissection remains the gold standard and the most effective modality for the delivery of anatomy [1].

The delivery of anatomy in medical education is a difficult task worldwide, especially for low and middle-income countries (LMIC), including Rwanda.

The University of Rwanda has the oldest and biggest medical education program in Rwanda, with an intake of 160 students per year. The revised medical curriculum of six years' medical program includes 3 modules of human anatomy which are taught in year one and year two. Those modules include human anatomy 1 (limbs, back, and spinal cord), human anatomy 2 (thorax, abdomen, pelvis, and perineum), the human anatomy 3 (head, neck, and neuroanatomy). They cover the whole human anatomy and are taught using a multimodal approach.

To deliver those anatomy modules, a functioning anatomy unit is needed. This unit needs a guiding philosophy, qualified staff with an adequate student-to-staff ratio, adequate infrastructure and equipment, a cadaver supply system, a consumable

supply system, adequate financial resources, and an anatomy community in Rwanda.

### **GUIDING PHILOSOPHY FOR ANATOMY AT THE UNIVERSITY OF RWANDA**

Anatomy delivery is an important part of the medical education and should be embedded within the humanity of medicine [2]. The content of anatomy modules must be relevant to attain the outcomes of the undergraduate medical program. While designing the content of anatomy modules and medical curriculum, many questions arise: what is the adequate minimum content, at which level is anatomy taught the best, what is the sequential delivery of different modules, and how to integrate clinical and fundamental sciences learning?

The academic value of teaching anatomy is through functional and clinical anatomy rather than the accumulation of memorization of facts [3]. This guiding philosophy of teaching anatomy that is relevant to clinical practice implies that from the beginning, the students are exposed to relevant clinical applications of anatomy (Figure 1).

Making this philosophy an institutional value has been a long struggle throughout the last two decades. Clinicians attracted to be involved in anatomy teaching have been constantly discouraged from doing so until the last two years. Although the full acceptance of this guiding philosophy is not yet a common understanding for our university, more surgeons are now involved in anatomy delivery and growth.

### **QUALIFIED STAFF AND ADEQUATE STAFF-TO-STUDENT RATIO IN ANATOMY**

The standard of the East Africa Community (EAC) for the medical program is that the academic staff-to-student ratio is 1:12 for anatomy and other fundamental biomedical sciences. The EAC also recommends a mix of academics from various backgrounds and essentially to have a balance of medical and non-medical academic staff [4]. This requirement meets exactly the guiding philosophy at the University of Rwanda. Various authors pointed out the academic advantage of the involvement of surgeons and other relevant clinicians in the delivery of anatomy as they easily extract the clinical applications from their own experience [4,5]. The interaction of students with



**Figure 1: Students having a clinical application of anatomy through reading medical images in the radio-anatomy laboratory**

those who are in practice is a very motivating experience for the students.

Currently, the department of human anatomy has a good academic staff-to-student ratio of 1:13 and a balanced mixed background of the academic staff. The permanent academic staff includes seven PhD holders in anatomy, a senior neurosurgeon who has spent more than a decade volunteering in anatomy delivery, an orthopedic surgeon, and three general surgeons. It also includes a senior general surgeon, a senior orthopedic surgeon, a urologist, and an ENT surgeon who serve as non-permanent staff.

### **STRATEGICAL LEADERSHIP TO SUSTAIN THIS HARD-WON ACHIEVEMENT**

To further sustain the continuous development of qualified academic staff in anatomy, a master's program in clinical anatomy and PhD program in clinical anatomy have been developed, and the first intakes have begun the programs.

### **INFRASTRUCTURE AND EQUIPMENT**

Adequate infrastructure and equipment are crucial in the delivery of medical education. It accounts



**Figure 2: Students during a practical session with the ANATOMAGE**



**Figure 3: Trainees during a dissection course**

for 30% of the EAC accreditation assessment of medical programs. Infrastructure and equipment are expensive, and when it comes to LMIC, it is necessary to prioritize the spending to be efficient with limited resources. Since 2002, with the project to set up an anatomy laboratory for teaching, the unit has continuously expanded its capacity. Currently, the department of anatomy has four laboratories. An e-laboratory with world-class anatomy technology, the ANATOMAGE offers our undergraduate and postgraduate students an extraordinary learning experience (Figure 2).

A gross anatomy laboratory that allows for dissection. The gross anatomy laboratory includes the embalming space, cool storage for cadavers with a capacity of 14 cadavers and under extension process to accommodate 20 cadavers, a dissection hall with 8 table capacity and under extension as well to have 18 table capacity, a museum that contains a collection of prosected specimen and sets of bones. A radio-anatomy laboratory that allows students to interact with peers and instructors through various medical images (X-Ray, CT-Scan, MRI) is very much appreciated by them (Figure 1). A histology laboratory that is a new acquisition of the department and shared with the Department of Anatomy Pathology.

Cadavers for education and research

Cadaver dissection is still the gold standard of anatomy delivery. It has passed the test of time and debate on its usefulness in the technologically advanced world [6]. It is preferred by most medical students and is unlocked deeply in the conviction

of anatomists [7,8]. Dissection represents a unique experience for every trainee from undergraduate medical students, resident postgraduate trainees, and even specialized medical doctors. It is even an empirical fact from our personal observations that the more senior a trainee is, the more he/she gains from the cadaver dissection courses. Therefore, cadavers are the most precious resource in an anatomy department. To develop and grow, an anatomy department should build systems to supply the cadavers, process the cadavers, conserve and store them, and bury the remains in professional and humane conditions.

At the beginning of 2002, our anatomy laboratory was receiving for teaching amputated limbs and viscera organs from autopsy and processing them into teaching specimens. The barrier to getting full cadavers was the lack of law regulating the use of the human body in teaching and research. We embarked on the journey of getting the cadaver dissection legal framework in Rwanda. In 2004, a preliminary survey was conducted in HUYE to look at the acceptance of cadavers in therapeutic education and research by the Rwandan population. In that survey, 83.5% of respondents agreed that cadavers could be used for teaching purposes. However, 15.6% agreed they could donate their body to science after their death (unpublished data).

After the survey, the Government of Rwanda submitted a draft of law regulating the use of human body, organs, and tissues in therapeutic, teaching and research. The Government of Rwanda

**Table 1: Cadavers supplied by the hospital from 2019 to 2022**

Year	Hospital	Male cadavers	Female cadavers	Total	Total/Year
2019	CHUB	3	2	5	11
	CHUK	4	2	6	
2020	CHUB	3	0	3	8
	CHUK	3	1	4	
	KABUTARE	2	0	2	
2021	CHUB	1	1	2	6
	CHUK	1	1	2	
	KABUTARE	2	0	2	
2022	CHUK	12	1	13	21
	KIBAGABAGA	7	1	8	
Total					46

*CHUB: University teaching hospital of Butare; CHUK: University teaching hospital of Kigali*

owned the draft of the law and submitted it to the parliament for adoption.

The Anatomy act, law no: 04/2010 of 16/4/2010, was promulgated in the Rwanda official gazette n018 of 03-05-2010. Since then, the UR Department of Anatomy has organized the supply of cadavers for teaching and research purposes. Article 15 of the law is the legal basis of the cadavers we receive in anatomy from unclaimed bodies in hospital mortuaries. A debate on the ethical acceptance of using unclaimed cadavers is still ongoing. We agree without a doubt that donated bodies should be the standard for Anatomy departments. However, education needs in countries where donation program encounters insurmountable barriers should be met not by all means but at least legally. The legality of the use of unclaimed bodies is not a simple task for us in Rwanda, it took us 6 years to get the law. We are also aware that with socioeconomic development, unclaimed bodies will decrease and eventually be unavailable at all. The need to campaign for a body donation program is our priority, and World Anatomy Day (WAD) is a unique opportunity for this purpose.

To ease the supply of cadavers to the Department of Anatomy from hospitals, memoranda of understanding (MoUs) with various hospitals had been signed, implemented and we are getting cadavers from hospitals regularly (Table 1); hence dissection is now a common practice at UR Human Anatomy Department (Figure 3).

## CREATING AN ANATOMY COMMUNITY FOR RWANDA

Scientific isolation is a very painful feeling for every pioneer in the building of a demanding field like anatomy. Thriving in scientific isolation can only be achieved if the pioneer understands that “the mission is greater than any challenges”. That principle is like a vaccine against discouragement while facing the odds. Another strategy for thriving in scientific isolation for a pioneer is to be able to appreciate every small success and build on it.

With the emergent new Universities with medical education, the University of Global Health Equity (UGHE) in 2019 and the Adventist School of Medicine of East-Central Africa (ASOME) at the Adventist University of Central Africa (AUCA) in 2021, Anatomists in Rwanda were increasing and therefore it calls for togetherness.

Since July 31, 2020, the Society of Clinical Anatomy of Rwanda (S-CAR) was founded to promote the growth of Anatomy in Rwanda and build a community for anatomy in Rwanda. Since then, a number of achievements have been attained, including the following. An anatomy instructor training workshop resolves on the indicative modules for the anatomy educator program. Based on that indicative program, the UR has developed and implemented a MSc in clinical anatomy and a PhD in clinical anatomy programs.

Although S-CAR was founded during the COVID-19 pandemic, one month after, in August 2022, it was able to organize the first dissection course, which has become the flag bearer of our society. Since



**Figure 4: Photo of participants of the first anatomy congress in Rwanda, October 2022**

then, up to December 2022, 25 dissection courses have been conducted, benefiting 362 participants. The greatest achievement of the S-CAR is the successful organization of the first anatomical congress in Rwanda (Figure 4).

## CONCLUSION

Perseverance, scientific discipline, and constant commitment to anatomy science in Rwanda have yielded a dynamic anatomy community in Rwanda which will be the engine for the further growth of anatomy nationally with an impact regionally and worldwide as it contributes to the strengthening of the health system in the country.

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