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Commentary

Respiratory therapy education in Ghana: A perspective

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INTRODUCTION

Respiratory Therapy (RT) is an allied health profession that applies science and technology to manage and care for patients with airway and breathing problems and associated cardiopulmonary disorders. It is a vital healthcare discipline that significantly improves the quality of life for individuals with chronic respiratory disorders.[1] RT encompasses a range of specialized treatments and interventions aimed at managing and treating various respiratory conditions, including acute respiratory distress syndrome (ARDS), asthma, chronic obstructive pulmonary disease (COPD), pneumonia, and others. Respiratory therapists are trained to assist in treating people with these acute and chronic respiratory healthcare disorders in hospitals and the community. They are key players in preventing and managing cardiorespiratory diseases that can impair the body's ability to maintain adequate oxygenation.[2]

Approximately 75% of respiratory therapists are employed in hospitals or other acute care settings.[3] These environments often comprise critical care units, high-dependency units (HDU), accident and emergency departments, and medical or surgical acute care and post-operative care units. In mechanical ventilation, they have expertise in airway management, ventilator settings and oxygen therapy. They are also trained to work in the pediatric intensive care unit (PICU), neonatal intensive care units (NICU), and delivery suites to provide ventilatory support for newborns and premature babies. They form part of a multidisciplinary team with critical care nurses, acute care physicians, pediatricians, pulmonologists, and intensivists.[4]

Respiratory diseases are a leading cause of death and disability in the world, with an estimated 334 million people suffering from asthma and 65 million suffering from COPD, which is the third leading cause of death worldwide.[5] Pneumonia and birth asphyxia kill millions of children annually and is a leading cause of death among children under the age of five.[6] Lung cancer kills 1.6 million people each year and is the deadliest form of cancer and the fifth most common cause of death.[5] Over 10 million people develop tuberculosis (TB), and 1.4 million die from it each year, making it the most common lethal infectious disease.[5]

In Ghana, respiratory diseases accounted for approximately 60% of hospital admissions, according to a 2016 Ghana Health Service Report.[7] Currently, Ghana's main cause of death is stroke, often with hypertension and heart disease, in which lower respiratory infections commonly occur and are often superimposed as terminal events.[8] Respiratory infections were the third leading cause of death in health institutions in Ghana, accounting for 13% of mortalities in 2018.[9] With the leading causes of mortality being directly or indirectly related to cardiorespiratory disease, the RT profession stands to move the needle as efforts are made to reduce death and disease across the continent. There is a dire need for respiratory care professionals across Africa.

OBJECTIVE

Although the RT profession has been established for over seventy years in the USA, it's a new discipline in Ghana. This Commentary highlights the inception of this discipline in Ghana and the nuances of training allied health professionals. Specifically, it describes the establishment of a respiratory therapy undergraduate Bachelor of Science (BSc) program at the University of Ghana, the first of its kind in Ghana and most of West Africa. This Commentary also indicates the current state of respiratory therapy education in Ghana and identifies gaps, challenges, and opportunities for improvement.

ESTABLISHMENT OF THE FIRST RESPIRATORY THERAPY PROGRAM IN GHANA

The process of starting the Bachelor of Science in Respiratory Therapy degree program at the University of Ghana (UG) began over 10 years ago. A team of RT professionals from Weber State University (WSU) and Kansas University Medical Centre (KUMC) in the United States (U.S) had been visiting Ghana regularly to provide training in respiratory

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care and donated equipment at Komfo Anokye Teaching Hospital (KATH) and Korle-Bu Teaching Hospital (KBTH).[10] They and some specialists they interacted with recognized the need to establish the RT profession in Ghana. A team from the University of Ghana and leadership of the College of Health Sciences also visited WSU, and a memorandum of understanding was signed with WSU. This team, along with some faculty from the RT program and WSU, developed a curriculum and established the BSc in Respiratory Therapy degree program at the School of Biomedical and Allied Health Sciences (SBAHS) at the University of Ghana.

Prior to this, in 2011, two Ghanaian, U.S.-trained respiratory therapists were employed at KBTH in the Department of Medicine under the supervision of a pulmonologist, who, observing their broad range of skills, was very interested in the profession. Around the same time, an academic with a special interest in respiratory care and pharmacology, having joined the team of respiratory therapists during one of their visits to Ghana, decided to investigate ways to collaborate with them and promote RT education and training in Ghana. These two are the first and second authors of this paper. They both had a chance as visiting fellows of the American Association for Respiratory Care (AARC) to experience the profession's scope of practice and write to share the experience.

The first author of this paper subsequently became the program director for the establishment of RT training and was the first Head of Department appointed for the BSc in Respiratory Therapy program. The two AARC Fellowships allowed the trainers to witness essential aspects of the training, including laboratory practicals and simulations within a simulation laboratory. At the AARC International Congress, there were opportunities provided by the then-President of AARC for a presentation to be delivered at the International Council for Respiratory Care (ICRC), who was excited at the development and progress of RT training in Ghana.[11]

RESPIRATORY THERAPY WORLDWIDE: LEVELS OF CERTIFICATION AND DEGREES AVAILABLE

There are approximately seventy formal RT programs in about ten countries globally, and their graduates all required education, credentialing, and government acceptance. The BSc Respiratory Therapy program is successfully offered in the USA, Canada, Taiwan, Philippines, China, India, Saudi Arabia,[12] Egypt, Ethiopia, Liberia, and Ghana. Training of candidates at the undergraduate level has been proven to be successful in many countries, and a few countries such as the USA and India have started a postgraduate level Master's degree and PhD in RT.[13,14]

In the USA, the Commission on Accreditation for Respiratory Care (CoARC) accredits entry into professional practice respiratory care programs at the Baccalaureate, Associate, and Master's degree levels. CoARC divides respiratory therapy programs into three main degree types and combinations. The three major categories are Associate of Science, Bachelor of Science, and Master of Science. The Associate's degree is the most common, a 2-year course akin to a Diploma program in Ghana, but for which they can only work under the supervision of a Registered RT. While the Bachelor's degrees comprised only 18% of training programs,[15] the University of Ghana decided at inception that the BSc would best fit the purpose of providing skilled health professionals to be part of a team.

BSC PROGRAM DESIGN AND CURRICULUM

The BSc in Respiratory Therapy at the University of Ghana is a four-year program which combines theoretical coursework with clinical experience and skills development. The curriculum adopted and tailored for the program was initially modelled on the WSU curriculum, with a few modifications made specific to Ghana. The design includes integrated academic and clinical education, basic sciences in the first year, clinical sciences, laboratory work and clinical observations in the second year, and hands-on clinical experience in their third and fourth years with clinical rotations.

The curriculum of the RT program was based on an understanding of competencies relevant to respiratory care as described in the paper by Barnes et al.,[4] and guided by the WSU RT leadership and academicians. Various teaching and learning approaches, including didactic lectures, laboratory sessions, high-fidelity simulation, e-learning, early clinical exposure, case-based learning in small groups, and facilitated and self-directed learning, are used throughout the program. The competencies include patient assessment, diagnostics, disease management, evidence-based medicine and respiratory care protocols, emergency and critical care, leadership, therapeutics and devices.

In the final year, two successive cohorts had the opportunity to visit KUMC, Kansas, U.S., to partake in a one-month clinical elective in an environment where RTs were commonly part of a medical team. The students had the chance to observe aspects of the profession they had heard about that were unavailable in our resource-limited setting. Sponsorship was sought for this, and it has been a great opportunity for students to understand the critical role RTs play.

ACCREDITATION AND REGULATION

Introducing a new program at the University of Ghana required going through several stages of approval. The University Academic Board approval process was relatively straightforward; however, one of the biggest hurdles was securing accreditation for the RT program through the Ghana Tertiary Education Commission (GTEC), an accreditation body. Since all new programs being introduced by a university in Ghana must go through accreditation by GTEC, it was necessary to provide several justifications for numerous key areas. These were, namely, the national relevance of the program, the aim and objectives of the program, alignment with the mission of the institution, the target market for admissions and employment, similar programs run by other institutions, enrolments, staffing, funding, evidence of practical training and collaboration with professional bodies. Although seeking accreditation for the RT program was a lengthy and tedious process, it did not

Table 1. Student numbers on the BSc RT program (at Level 200) from inception.

Academic Year	Number of Students Admitted	Number of Students Repeated	Number of Students Graduating	Number Failed Finals	Pass Rate of Licensure Exams
2016 – 2017	9	0	9	0	100%
2017 – 2018	8	0	8	0	100%
2018 – 2019	7	0	6	1	100%
2019 – 2020	9	1	8	0	100%
2020 – 2021	9	0	9	0	89%
2021 – 2022	14	3	11	0	N/A
2022 – 2023	17	2	N/A	N/A	N/A
2023 – 2024	27	N/A	N/A	N/A	N/A
TOTAL	**100**	**6**	**51**	**1**	

deter our team from the goal of launching the BSc RT program to shape the evolution of this new profession in Ghana.

Formal recognition of this new profession in Ghana was sought from the Ministry of Health (MOH) early in planning the program. The Director of Institutional Care at the MOH was invited to be a member of the curriculum development team. The Allied Health Professions Council (AHPC) in Ghana governs the training and practice of all allied health professionals, and it has fully supported the program from the start. Graduate respiratory therapists must pass a licensure exam by the AHPC after completing a mandatory year of internship (national service) before being registered with the AHPC as Registered Respiratory Therapists (RRTs) and renew their licenses annually.

DISCUSSION

In August 2016, the first cohort of nine students was enrolled in the BSc Respiratory Therapy program after an interviewing process. They subsequently graduated in November 2019 and became RRTs a year later. Hence, the RT profession officially commenced in Ghana in 2019 and is still in its early years.

Table 1 shows the number of RT students admitted to the BSc RT program since it was established and displays additional metrics on the number of students who successfully graduated and subsequently passed licensure exams. To date, 100 students have been admitted to the program. The admissions trend has grown exponentially within eight years of starting the program. It has tripled in number, from nine pioneer students in 2016 to 27 admitted in 2024. Student performance has been of a very high standard. To date, 51 students have successfully graduated, with forty having subsequently completed the licensure exams and few resits, reflecting a pass rate of almost 100%. Since the start of the program, only one student has failed to obtain a BSc degree.

Currently, there are 40 credentialed respiratory therapists. **Figure 1** shows their employment rates, professional integration, and those who have pursued further education. The chart shows that over half of the RRTs (52.5%) have been employed in Ghana. They practice mainly in hospitals in Accra, including KBTH, the University of Ghana Medical Centre (UGMC), 37 Military Hospital, the Accra Regional Hospital, and Komfo Anokye Teaching Hospital (KATH) in Kumasi. A fifth (20%) of RRTs are currently employed abroad, mainly in the U.S., which reflects the quality and authenticity of the program, while 17.5% have pursued further education, having registered or completed Masters or MPhil programs in Ghana, the U.S. and the UK. As 17.5% are actively seeking employment, having recently completed their National Service, the largest intake has been by the UGMC. A small number (10%) have embarked on a military career in the Ghana Navy and Armed Forces, providing greater career opportunities and prospects. Each of these RRTs is a product of the University of Ghana's BSc program in RT, and they are already making a huge impact in saving lives and applying their expertise to manage severe respiratory disorders. The COVID-19 pandemic certainly highlighted and promoted these professionals' positive impact as they proudly volunteered for service in ICUs and acute COVID treatment centers.

As the plans to establish RT training were rolled out, the need for advocacy for doctors and other health professionals was of key importance. A study conducted by one of the first cohorts of RT undergraduate students in 2019 to assess the awareness and perception of healthcare practitioners at KBTH on the scope of practice of respiratory therapists found that the majority of respondents had good knowledge and awareness of RT practices, and 91.8% thought that RTs could enhance work in their department (*unpublished dissertation by Linda Agyekum, 2019*). This was probably related to the fact that two U.S.-trained RTs had been employed at KBTH previously and were well-recognized in certain departments. At the time, they could not fit anywhere on the existing salary scale used by the MOH and were paid by the hospital's internally generated funds. The Director of Institutional Care's early involvement in the planning of the curriculum, presentations made to the MOH by the Dean and leadership of UG SBAHS, and media publicity in June 2017 by the Ecobank Foundation in Ghana pledging $30,000 over five years for the newly established RT BSc

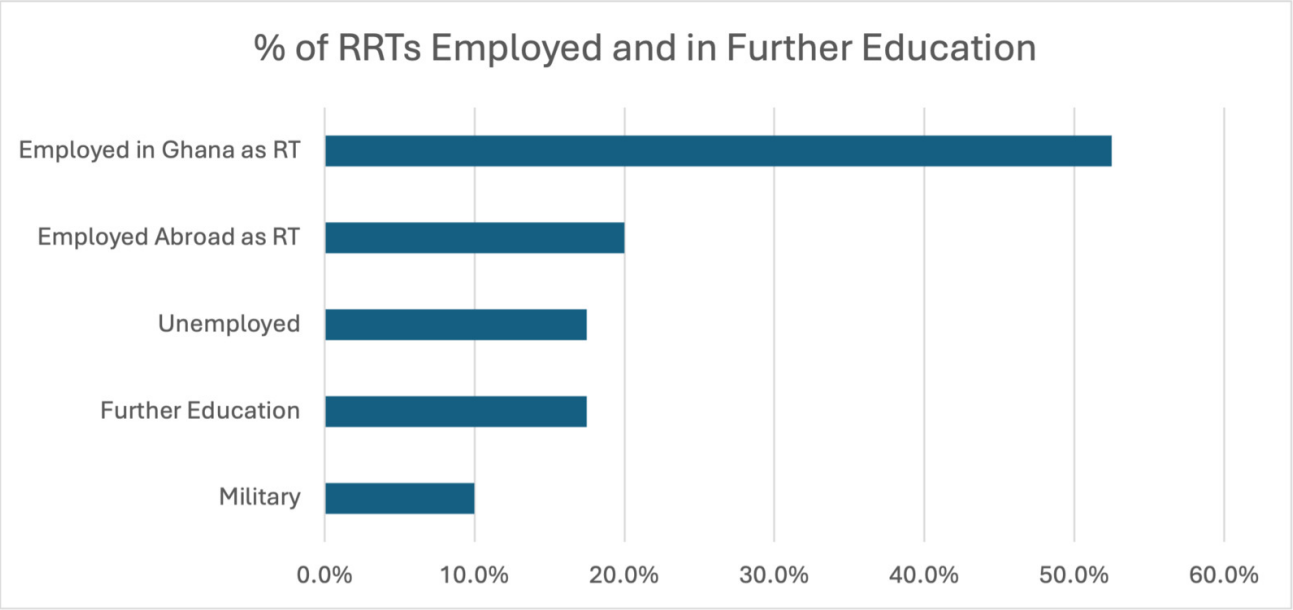

Figure 1. Employment rates and further education levels of Registered Respiratory Therapists (RRTs).

course,[16] all helped to achieve government's recognition of the RT profession. Ecobank's funding helped sponsor the USA observership for the first two cohorts of RT students and partially funded faculty fellowships from Ghana to the AARC. However, it was not until 2020, with the qualification of the first RTs, that Respiratory Therapy was formally recognized as a health profession in the GHS and placed on the salary scale.

Until the outbreak of COVID-19, not many people had heard of RT, even in America, where the program had begun many years before.[17] For the respiratory therapists in Ghana, this served as an opportunity for their existence to be known, especially by other health professionals who came to appreciate their skills and their contribution to the multidisciplinary team. It was the perfect opportunity to shine the spotlight on this new profession and appreciate their specialized skills, which would ultimately save lives in that unprecedented time.

CHALLENGES IN RESPIRATORY THERAPY EDUCATION IN GHANA

To implement the RT program at the University of Ghana, it was crucial to have access to high-quality respiratory equipment for training. WSU, KUMC, and Charity Beyond Borders (CBB) donated equipment, books, resources and support. In 2017, solicited respiratory care and educational supplies worth thousands of dollars were donated by the CBB for the RT Program.[16]

Faculty development and recruitment for the program have proved challenging due to the limited availability of qualified faculty with RT expertise. Since there were no RT faculty in Ghana when the program was established, the courses in the curriculum were taught by a mix of anesthesiologists, pulmonary and internal medicine physicians, pediatricians, perfusionists, and physiologists, among others. The University's requirements stipulate that lecturers must have a PhD or a Masters in the field. Hence, potential RT lecturers, trained Ghanaian RRTs from the USA who had ample experience in the field, were not eligible to be employed as faculty. Our solution to this has been to encourage graduates from the program to go into academia as assistant lecturers and enter into Master's and MPhil programs both in Ghana and abroad. Associate professors from KUMC and WSU were also adjunct faculty who provided lectures, laboratory experiences, and clinical interactions, usually during their yearly visits.

Clinical training is a critical element of the curriculum for the BSc RT Program in Ghana, and one of the main challenges has been insufficient access to clinical facilities for hands-on training. Partnerships were established with hospitals like KBTH and UGMC to train RT students during their clinical rotations throughout the teaching semester and in between semesters. To help improve clinical training of the students, recommendations are to keep student cohort numbers low during admissions to ensure adequate clinical exposure.

Comparing the Ghanaian RT education model with other countries, particularly the U.S. and Canada, program duration, curriculum focus and clinical training period have slight variations. Canadian universities generally offer a 3-year advanced diploma degree in RT. In the U.S., a 2+2 BS in Respiratory Therapy includes two years of prerequisites followed by two years of professional RT coursework. This is compared to Ghana's 4-year program at the University of Ghana (UG), 3 years of which is spent in Respiratory Therapy. With the curriculum, Ghana's program is consistent with that of the U.S. universities and has a lot of similarities with Canadian university programs. However, some courses like anesthesia, pregnancy, fetal and newborn development are not part of the Ghanaian curriculum. It is also worth noting that none of these universities require a final-year research dissertation, which is mandatory in Ghana. Clinical training is consistent for all countries, and

a dedicated number of hours are required for students in clinical placements. Most universities in Canada and the U.S. have dedicated state-of-the-art laboratories of mannequins, oxygen equipment, ventilators, and other RT devices, which is something that UG is aspiring to build over time. Ghana can certainly adapt and learn lessons from other international models to add value and promote the program's success.

PUBLIC AWARENESS

Since the inception of the profession, RRTs in Ghana have passionately embarked on public awareness initiatives, including establishing professional societies, increasing awareness of the respiratory therapist's role through media and workshops, and engaging students and professionals. The University of Ghana Association of Respiratory Therapy Students (UGARTS) was formed and acts as a platform to empower students, promote leadership skills, and foster professional growth through networking and mentorship. The Ghana Association for Respiratory Care (GARC) was established in 2020 by the pioneer group to advance professional excellence and science in the practice of the profession. The association also advocates for integrating respiratory therapists into Ghana's healthcare system and collaborates with stakeholders to create job opportunities. Advocacy by the GARC leadership and interactions with the Human Resource Directorate of the GHS contributed to the GHS recently advertising 10 positions for Chief Respiratory Therapists nationwide. These positions may need to be filled by experienced RRTs from abroad for now, but they could be the solution to the lack of RRT faculty for BSc programs.

The Africa Respiratory Care Association (ARCA) was launched in 2024 to promote continental collaboration and tackle shared respiratory health challenges, supporting Ghana's efforts to align its RT program with regional standards. ARCA is linked to international organizations like the AARC in the U.S. and other African countries like Egypt to promote global collaboration and knowledge sharing. This will facilitate access to best practices, guidelines, and advocacy tools to enhance the visibility and development of RT in Ghana.

FUTURE DIRECTION

The RT profession in Ghana is poised for significant growth and impact as it continues to evolve and address the country's respiratory health challenges. Anticipated developments and goals for RT in Ghana include increased enrollment of students in BSc RT programs and the introduction of postgraduate programs (MSc, PhD) in RT. As the University of Ghana is the only institution offering the BSc program, expansion to other universities across Ghana will help to evolve the profession.

The long-term impact of RTs on patient outcomes in our ICUs and emergency wards has not yet been studied; however, it is planned as an area of research and will provide further evidence of the benefits of RT professionals being part of the healthcare team. It is hoped that this, as well as advocacy and teaching support from our RRTs with Masters, MPhil and PhD degrees, and with the support of faculty of the first RT training program in Ghana, will encourage other universities in Ghana and the West African sub-region to start their BSc programs. A significant means of achieving this is for respiratory care associations to create and offer more international fellowships and attachments in U.S. and Canadian hospitals so clinicians can see first-hand RRTs in their multiple professional roles. This significantly motivated the start of the University of Ghana BSc in Respiratory Therapy program.

In addition, plans for a roadmap are being detailed with the AHPC, which will assist the council in developing respiratory therapy training accreditation guidelines to ensure that other institutions looking to develop similar programs will meet the required infrastructure, faculty, and equipment standards.

By 2030, RT in Ghana is expected to be a well-established, integral part of the healthcare system. Respiratory therapists will be vital in improving health outcomes and responding effectively to public health emergencies. This will position Ghana as a hub for RT education and practice in West Africa, providing training opportunities for neighbouring countries and making Ghana a leader in respiratory care in Africa.

CONCLUSION

The University of Ghana is a flagship West African institution, the first to offer a BSc Respiratory Therapy undergraduate program. It was established in August 2016. The program began with the first cohort of nine pioneer students who graduated in November 2019. By 2024, one hundred students had joined the program. Pioneering a new profession took great commitment and vigilance. To date, the program is running well, having produced forty homegrown RRTs that are impacting lives in Ghana and abroad.

The program, designed to address the specific healthcare needs of Ghana as a whole, also equips students with the skills and expertise needed to address respiratory health issues in the community. There is a dire need to demonstrate the relevance of respiratory care and to highlight the unique contribution respiratory therapists make to the multidisciplinary team of healthcare professionals in the country and the West African sub-region, and this will be the focus of our research and future papers.

CONTRIBUTORS

All authors contributed to the conception or design of the work, the acquisition, analysis, or interpretation of the data. All authors were involved in drafting and commenting on the paper and have approved the final version.

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