

Career Management in Medical Laboratory Science: Guidance for Upcoming Medical Scientists

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Abstract: - *The Medical Laboratory Science (MLS) is an aspect of laboratory medicine that make uses of complex scientific techniques based on resonance epistemic decision in analyzing human samples-fluid and tissues-which aids in the diagnosis, treatment, prognosis of diseases and monitoring of response to prescriptions. A biomedical scientist is one qualified and versed in the principles and practice of the art and science of medical laboratory science. This paper therefore, attempts to unveil the various prospects in which a biomedical scientist can make more impact beyond routinely bench work and directly impinge on the medical landscape. Also, to identifies medical laboratory science and venture into its nature, requirements, challenges and prospect with a view to inform and broaden the outlook of parents, students, teachers and counsellors. Counsellors are therefore, expected to adequately inform parents and students the need to comprehend what MLS is all about. The paper further proffers recommendations that government should ensure the provision of necessary equipments in universities offering MLS and hospitals with the units. Similarly, protective devices should be put in place by the government in the two places to checkmate the issue of exposure to radiation and other hazardous challenges.*

Index Terms:- Medical Laboratory Science, Nature, Challenges, Prospects, Guidance

INTRODUCTION

Every normal individual has ambition of becoming someone in a particular field of endeavour; one's passion may be in an occupation one has potentialities, while some may nurse ambition in profession without the needed abilities. It is very imperative that interest of an individual in a given field of endeavour is married with ability to feature in the profession (Godswill, 2014). Such interest-ability matching exercise is normally conducted by professionally trained counsellors through various tests and non-tests techniques; a given situation determines the test to be settled for. Some professions have specific academic requirements while others require both academic and physical requirements a candidate must satisfy before entry. In social science, arts and humanities academic requirements are paramount. While in medical and allied health sciences and military and paramilitary lines physical and academic play vital role in admission. Career in the allied health sciences according to Raphael (2014) is like radiography, physiotherapy, nursing, medical laboratory sciences etc., are academic based programmes which require the individual to be mentally, physically, academically and science based candidates who must meet the set criteria for admission. The present paper identifies career in medical laboratory science (MLS) a specialized field preparing candidates for eventual practice in hospitals and health related institutions. MLS graduates can be found in much health institution providing vital function to complement other segments of the institutions to function in the most professional manner. The study therefore, expose students of secondary school levels, teachers, parents and the community on the need to study the programme, support and understand the nature and challenges in the Medical Laboratory Science in Nigeria Institutions of higher learning (Raphael, 2014).

Interestingly, Abdullahi (2014) posited that new demands are constantly being made on medical laboratories due to growth and development in medicine, technology and society. Medical laboratory scientists have the knowledge required to introduce and use advanced analyses and instruments. The author further position that, medical laboratories contribute in assessing and choosing instruments for use in medical laboratories, point-of care-testing and patients' self-testing (Abdullahi, 2014). Medical laboratory scientists offer guidance and training to other health professionals on the use of point-of-care testing equipment, and in guiding patients who perform self-testing, Increasing use of gene technology, specialized laboratory analyses and new technologies in the health service will require greater expertise in medical laboratory science. However, rapid developments in laboratory medicine and technology have led to constant changes within the medical laboratory scientist profession. Moreso, the ability of medical laboratory scientists to acquire new knowledge and positively contribute to further development is the greatest guarantee that medical laboratories will be able to adapt to the needs of patients and the health

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services also in the future. This requires the education of sufficient numbers of biomedical laboratory scientists and for educational programmes to be adapted to the future need for expertise in biomedical laboratory science (Nordic Information Technology Organization, 2014).

CONCEPTUAL FRAMEWORK

A Medical Laboratory Science is a healthcare profession where chemical, hematological, immunologic, histopathological, cytopathological, microscopic, and bacteriological diagnostic analyses on body fluids such as blood, urine, sputum, stool, cerebrospinal fluid (CSF), peritoneal fluid, pericardial fluid, and synovial fluid, as well as other specimens are performed (Bountis and Kay, 2015). According to School of Health and Rehabilitation Sciences (2019) defined medical laboratory science as the use of clinical laboratory tests to detect, diagnose, monitor and treat disease. However, the Medical Laboratory Science Program provides students with an education in clinical laboratory science and prepares graduates to become certified medical laboratory scientists (MLS) and/or pursue post-baccalaureate studies in medical, dental, optometry or other graduate or professional program. The program however, has multiple "tracks" to choose from based on the future academic and professional career goals of the student. On the other hand, while the Medical laboratory scientists (formerly known as medical technologists) are laboratory professionals who are part of the medical team of specialists that works together to determine the presence, extent or absence of disease. They perform a full range of laboratory tests, from simple blood screens to more complex tests to detect diseases like cancer, coronary artery disease and diabetes. They analyze, evaluate and validate laboratory data in the five major areas of the clinical laboratory: chemistry, immunology, hematology, transfusion medicine and microbiology. This information is then used by the medical team to make decisions regarding a patient's medical care. Greater than 70% of all medical decisions are based on the results of clinical laboratory testing. According to University of Kansa Medical Centre (2020) defined medical laboratory scientists as a biology/chemistry-based bachelor's degree that prepares students for exciting, challenging and dynamic careers in places such as hospital labs and clinics, forensic labs, veterinary clinics, industrial research labs and molecular biotechnology labs. They further posited that professionals in this field analyze blood, urine, tissue, and other body specimens. Operational, medical laboratory scientists are key members of the health care team that are concerned with the study and practice of diagnostic medicine by generating accurate and reliable test results in chemistry, hematology, immunology, immunochemistry, and microbiology.

Career Management can be defined as a mindful preparation of one's activities and arrangements in the professions one embark on the course of life for better accomplishment, enlargement and financial steadiness. It is a chronological development that begins from an accepting of covers on job-related understanding.

Career management definition according to Arnold 1997 are "the attempts that is made to influence the career development of one of more people" and the formal activities of providing training, mentoring and careers advice. Career management is important to an organization which helps it to secure the skills and knowledge for its future and needs (Martin, Romero, Valle and Dolan, 2001). Martin et al., 2001). However, most of the human resource professionals have explained the use of career management for enhancing employees' career motivation and commitment since there is a link between career management, performance, developmental behavior, and participation in development activities. (e.g. Kidd and Smewig, 2001; Meyer and Smith, 2000), has proposed that the desire from within to get promoted and the deficit of promotable talent are the two main forces of organizational career development efforts. Career management practices are effectively useful in several situations where productivity depends only on the application of knowledge rather than physical energy, and hence employee loyalty forms the important factor for long-term retention and productivity (Hall, 2002; Lawler, 2008). Many researches in the area of career management view that career support leads to increased organizational commitment (Kidd and Smewig, 2001; Meyer and Smith, 2000; Anantharaman and Paul, 2004; Sturges, Guest, Conway & Davey, 2001; Sturges, Conway & Liefoghe, 2010).

Importantly, developments in laboratory technology have shown that some of the routine tasks, previously performed by medical laboratory scientists in medical laboratories, have become fully automated, while medical laboratory scientists extend their practice into new fields. The Training in educational laboratories and clinical placements in medical laboratories are integrated part of study programme. Upon graduation, the candidates qualify for authorization as a medical laboratory scientist. The title medical laboratory scientist is protected. Collection, processing and analysis of human biological samples are core tasks in medical laboratory science. Practice of the profession integrates medical, technological and methodological knowledge and skills. The analytical work performed by medical laboratory scientists depends on an understanding of medicine (Brenner, 2003).

MEDICAL LABORATORY HISTORICAL BACKGROUND IN NIGERIA

The need for such diagnostic facility became imperative worldwide with increasing unclear pandemics and pestilences. Thoughts and reflections on the above necessity crept into Nigeria gradually in the 1920s. This was facilitated by our colonial

pathologists and technologist from the United Kingdom (David & Tony, 2012). Importantly, the discovery of causative agents of devastating epidemics such as tuberculosis, cholera, diphtheria, etc. coupled with the acute shortage of Laboratory Assistants to effectively man the laboratories during WorldWar1, prompted a rapid and geometric growth in the need for trained Nigerian Laboratory Assistants (Shonekan, 2004). This need Association of Medical Laboratory Scientists of Nigeria (2014) prompted at that time, the creation of the most simplistic training procedure via attachment to research laboratories and hospital side benches at Vom, Ibadan, and Lagos in the 1940s and 1950s (Shonekan, 2004). Interestingly, the Medical Laboratory Scientist is a professional where individuals undergone a prescribed training in accredited institution(s) with approved curriculum, inducted into the profession, possesses code of conduct, goes through a mandatory internship, and ensures conformity of standards and adherence to the ethics of the Medical Laboratory Profession. During routine practice, senior professional colleagues may have reasons to certify or verify laboratory reports. This is normal in order to ensure that he/she generates accurate result(s). In the spirit of the International code of Medical Ethics as amended in Venice in 1983, only practioners who have personally carried out tests or verified may certify or counter sign test results (David & Tony, 2012).

However, the National Acts and Birth of Medical Laboratory Science Council of Nigeria Acts of 2014 is a period that marked a steady growth/development of the profession of Medical Laboratory Science in Nigeria. It is also witnessed positive changes in the leaderships of the Institutes and the Association, all culminating in the rapid growth and progress of the profession (Agbonlahor, Ihimekpen, Okara and Saliu, 2014). Decree No 56, 1968 is a decree was the basic law establishing the profession of medical Laboratory Technology (Science) in Nigeria. Decree No 59, 1978 and Decree 43, 1988: These decrees recognize medical laboratory science as a distinctively regulated profession. Decree 54, of 1999: this established the institute of medical laboratory science technology of Nigeria or the Medical Laboratory Scientists and Technology of Nigeria (MLSTN). National Assembly Act 11 of 26th June 2003 which was signed into Law by President, Olusegun Obasanjo, establishing the Medical Laboratory Science Council of Nigeria (MLSCN): This Act repealed all the previous decrees (Agbonlahor, Ihimekpen, Okara & Saliu, 2014)

Interestingly, the National Act and Birth of Medical Laboratory Science Council of Nigeria., established the Council and its Board charged with, among others, the responsibility to regulate the training and determine the minimum qualification of a practitioner of medical laboratory science (beuah, 2000). This Act marked a major turning point in Medical Laboratory Science practice in Nigeria. Apart from repealing the unacceptable decrees of 56 of 1968 and 54 of 1999, it empowers the council not to only to determine the skills and body of knowledge required by Medical Laboratory Scientists, Medical Laboratory Technicians, and Medical Laboratory Assistants in Nigeria but also to regulate the practice of the profession in this country, MLS has satisfied the true meaning of a profession. And the practitioners are now recognized as authentic professionals who are not subservient to any other profession. The Council with its Board is an important agency of the Federal Government (Emeribe, 2010).

EVOLUTIONISM IN MEDICAL LABORATORY SCIENCE

The need for acquisition of higher knowledge due to overall professional responsibilities of biomedical scientists in the day-to-day operation in clinical laboratories is evident. There was a continual development of the academic level of the profession, Assistant to Technician to Technologist to Scientist (Abiola and Oghome, 2011). As a result of these events the professional requirements advance from “no formal qualifications”. In the 1940s and 1950s, to bachelor degree programmes in the last 30 years. The degree is awarded upon completion of a one year compulsory internship which affords the student scrupulous training. Postgraduate training exists in the master and doctorate degrees. Today, in developing and developed countries, bachelor programme has been established although associate diploma still exists in the later. Now, Medical, or Biomedical, Laboratory Science is well develop body of knowledge that includes portions of the basic and medical sciences, medical techniques and research methods. This facilitates the production of qualitative medical diagnostic testing. The results are of great value and meaning to health care practitioner (Abiola & Oghome, 2011).

ENTRY REQUIREMENTS INTO MEDICAL LABORATORY SCIENCE

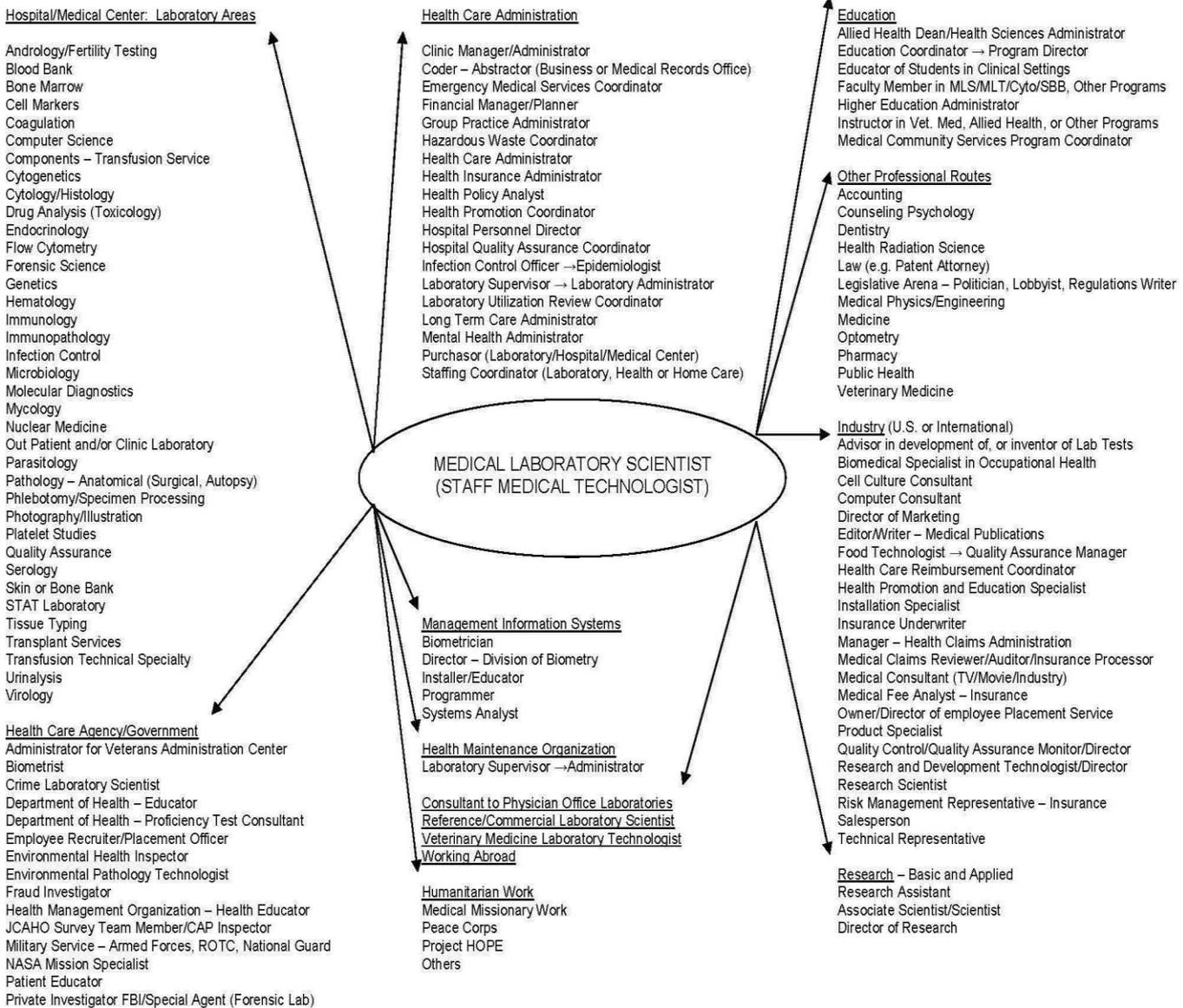
Research by Abiola & Oghome (2011) highlighted some entry requirements into MLS. According to the authors, there are basic requirements of physical and academic aspects that each candidate must satisfy for the entry requirements of the chosen university in addition to the general requirements of being physically and mentally sound and of age. For instance, the entrance into MLS programme is very competitive especially in public universities. The JAMB UTME subject combination to study MLS must include; chemistry, biology and physics. The Joint Admission and Matriculation Board (JAMB) cut off mark requirement for MLS into any national universities across the country varies but the score must be above 180 points and a candidate must successfully pass the UTME. The Duration of the MLS is 5 year course. Science students are the only suitable candidate for this profession with at least 5 credit in ‘0 level exams such as National Examination Council (NECO) and West Africa Examination Council, (WAEC). The subjects combination required to pass at credit level in sciences include: English language, Mathematics, Physics, Chemistry and Biology.

RESPONSIBILITIES AND FUNCTION OF MEDICAL LABORATORY SCIENTISTS

The education of medical laboratory scientists provides knowledge, skills and attitudes related to: collection of blood samples from patients; securing pre-analytical conditions and processing biological samples; drawing blood from blood donors and manufacturing blood products; applying techniques and using analytical instruments in medical laboratories; assessing the potential, limitations and sources of error of laboratory methods; assessing the reliability of the analytical results and their statistical and medical probability; performing quality assurance of laboratory services; understanding the role of laboratory medicine in the health service; complying with professional ethical guide-lines; and continuous updating and developing professional knowledge (Davis, Lantis & Finn, 2004).

Green (2005) further cited that in order to assess the quality of analytical instruments and provide advice on which analyses small units would benefit from, biomedical laboratory science expertise should be involved already during the planning phase. This will guarantee quality and an appropriate repertoire of analyses. Importantly, Medical laboratory scientists' analytical skills can be utilized better in the processes of creating flow in patient care and monitoring the quality of the interaction between health services. The competence of medical laboratory scientists can be utilized in the work with internal and external audits both inside and outside hospitals (Green, 2005). Research and development in medical laboratories could become an even more important task in the future, and can be performed by medical laboratory scientists with a master's or higher degree in collaboration with other groups of personnel (Horvath and Pewsner, 2004). Interestingly, medical laboratory science deals with both education and research, and makes important contributions to medical and technological development. Medical laboratory scientists in medical laboratories conduct many large and small development projects, such as method validation and sample stability studies. Due to the lack of formal research expertise in many locations, this important research and development activity is to a lesser extent published (Kubik, Bogunia and Sugisaka, 2015). Medical laboratory science according to Armeý, Hopper, Tran, Ward and Hanson (2014) play a role in different research projects, and as core facilities are built around research institutions, they play an important role here. Medical laboratory scientists on the other hand, contribute in the pre-analytical processes, securing quality in storage of specimens for analysis, selection of methods, trace-ability, securing adequate quality in methods and analyses, and in quality assurance of all steps in the analytical process (Armeý, Hopper, Tran, Ward & Hanson, 2014).

CAREER OPPORTUNITIES IN MEDICAL LABORATORY SCIENCE



Weber State University Organogram of Career Opportunities in Medical Laboratory Science: 2020. Source: <https://webcache.googleusercontent.com/>

COUNSELLING INTERVENTION

Counselling is fundamentally meant to properly situate individual to realize his strengths and weaknesses through professional intervention by counsellor and participation of clients. It's thus a confidential relationship between the two in which many areas of endeavours are explored to pave way for effective functioning of the client thereby emerging as an enlightened person of worth in his environment. It's an indisputable fact that, there is no individual that is self-sufficient; each person has strengths and weaknesses. The ability to preserve and facilitates one's strengths, resolve to accept weaknesses are what provide the needed base for attainment of a more realistic development and progress in many endeavours.

Counselling is a professional field of endeavour tailored towards assisting individuals to realize their strengths and weakness in order to function effectively in various settings. It has a number of services meant to facilitate human development; counselling is one of them. Counselling is a relationship between professionally trained person willing to assist, direct and guide other persons who cannot function in the desired direction due to circumstances beyond their control. Counselling, as a service within guidance programme is not only meant to ensure success of individuals in various settings but also an important segment in positioning individuals to attain various successes in life pattern especially the Medical Laboratory Scientists by professions.

Counseling is therefore a learning-oriented process which usually occurs in an interactive relationship with the aim of helping a person to adjust to existing/prevaling condition. Counselling is also a concept denoting a relationship which is purposely designed and intended to help people with problems to understand and clarify their views about life and to learn to

reach their self-determined goals through meaningful choices. Therefore, the preceding discuss might have set the ground for counsellors, parents and potential candidates to have their outlook broaden on the area in question. The exposure will give the counsellor the impetus to scan for more relevant vocational counselling theories to apply in assisting interested and to attract others to apply for the course in various universities of their choice. Theories like Trait and Factor, Psychoanalytic, Client-Centered, Rational Emotive theories etc. may be consulted to help candidates realize the possibility of marrying their interest and ability in the proposed calling. The counsellor could also consider the societal needs, marketability/employability in the vocational counselling encounter. The counsellor could make it plain to the students and parents, the following in order to instill some level of motivation, these include:

Physical Mental Requirements: candidates opting for MLS must be physically and mentally sound; a medical examination is being conducted by universities to ascertain the physical and mental wellbeing of applicants. In radiography students must participate in classroom and laboratories experience in order to be grounded in the field. Students could be exposed to machines and equipment for practical and professional purposes. Thus, a student of physical and mental status may not be able to cope with the rigorous challenges of class and lab demand. Students with special needs like acute visual impairment, mental retardation or physical and health impairments may not feature well in the profession.

Internship: Candidates wishing to study MLS should consider the demand to meet professional requirements even after graduation from a five year course in the university. A radiographer must participate in a one year mandatory internship programme in a hospital where there exists a relevant department/unit. Within the period an intern is expected to attend and pass a professional course of Postgraduate Certificate being run by the Radiographers Registration Board of Nigeria (RRBN) to be certified to practice in and outside the country.

Job Opportunity: MLS have been trained to operate machines and equipment to capture both external and internal human images for medical diagnostic purposes mostly in hospital and related places. The training and their fewer numbers provide an avenue for them to function in academic, public and private hospital and related areas. MLS works in the military and paramilitary sectors; MLA also obtains jobs in foreign countries and international organizations like United Nations International Children's Emergency Fund (UNICEF), National University of Río Cuarto (UNRC) etc. MLS's salary in Nigeria is attractive when compared to other salaries. They earn a fat salary like other health workers.

Entrepreneurial Nature: MLS have acquired the needed professional, entrepreneurial and technical knowhow to practice as licensed professional to establish and run their independent private Diagnostic Centers both as a profit and humanitarian ventures. Such ventures sustain them and their families thereby contributing to address the issue of joblessness among youth.

Hazard/Disease Contraction: A MLS should be careful not expose himself to contract any disease in his relation with patients; some patients may be affected by dangerous contagious disease. MLS should strictly comply with all the protective devices in their working places to avoid contraction of any disease.

CONCLUSION

The nature, requirements, challenges, prospects, duties and responsibilities of medical scientists are well known and have been published repeatedly in job descriptions and professional journals. Conclusively, the issue is not what the responsibilities are, but rather, how these can be fulfilled in a manner that helps the patient, the hospital and the university at large. Interestingly, the research study presents medical laboratory science to students, parents, counsellors, upcoming medical laboratory scientists and the general public with a view to simplify its knowledge and nature. The study also provides details about the profession and exposed its advantages and the hazardous nature. The paper further makes recommendation for the development of the field.

RECOMMENDATIONS

For effective and functional enrolment into Medical Laboratory Science courses, the following recommendations were made:

1. Parents should be guided by the exposed counsellors on the importance of MLS in the scheme of a nation development; radiographers works in military, paramilitary and civilian formations.
2. Teachers especially in the science subjects of chemistry, physics, biology and mathematics should encourage their students to apply for MLS in their UTME examinations so as to address the issue of the number of radiographers in the health sector.
3. Counsellors should update themselves on the status of MLS as a course in universities, requirements, challenges, job opportunities and the number of universities offering the course. Such will help expose students to the profession.
4. Students should have the required information about MLS regarding its importance and the challenges in order to be adequately prepared against any eventuality.
5. Government should ensure the provision of necessary equipments in universities offering MLS and hospitals with the units. Similarly, protective devices should be put in place by the government in the two places to checkmate the issue of exposure to radiation and other hazardous challenges.

Declaration of Conflicting Interest

The authors declare that there is no conflict of interest.

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