

## Retraction Notice

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### Retraction initiative (multiple responses allowed; mark with **X**):

- All authors  
 Some of the authors:  
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 Other:

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### Retraction type (multiple responses allowed):

- Unreliable findings  
 Lab error  Inconsistent data  Analytical error  Biased interpretation  
 Other:  
 Irreproducible results  
 Failure to disclose a major competing interest likely to influence interpretations or recommendations  
 Unethical research  
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 Data fabrication  Fake publication  Other:  
 Plagiarism  Self plagiarism  Overlap  Redundant publication \*  
 Copyright infringement  Other legal concern:  
 Editorial reasons  
 Handling error  Unreliable review(s)  Decision error  Other:  
 Other:

### Results of publication (only one response allowed):

- are still valid.  
 were found to be overall invalid.

### Author's conduct (only one response allowed):

- honest error  
 academic misconduct  
 none (It conflicts the interests of authors)

\* Also called duplicate or repetitive publication. Definition: "Publishing or attempting to publish substantially the same work more than once."

**History**

Expression of Concern:

yes, date: 2020-6-5

no

Correction:

yes, date: yyyy-mm-dd

no

**Comment:**

The article has been retracted due to the investigation of complaints received against it. The substantial portions of the text came from Prof. Philip O. Olatunji, "We came to this painful conclusion as a result of parochialism, distortion of facts, deliberate ignorance, falsehood and slander contained in the said article". The scientific community takes a very strong view on this matter and we treat all unethical behavior seriously.

This article has been retracted to straighten the academic record. In making this decision the Editorial Board follows [COPE's Retraction Guidelines](#). Aim is to promote the circulation of scientific research by offering an ideal research publication platform with due consideration of internationally accepted standards on publication ethics. The Editorial Board would like to extend its sincere apologies for any inconvenience this retraction may have caused.

Editor guiding this retraction: Professor Luigi Iuliano (EB, OJIM)

# Professional Autonomy in the Running of Diagnostic Laboratories in Nigeria

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## Abstract

Professional autonomy is defined as the quality or state of being independent and self-directing, having authority to make decisions, enabling professionals to exercise judgment in accordance with one's professional knowledge base and regulatory framework. The aim of this review is to highlight the importance of professional autonomy in the running of diagnostic laboratories in Nigeria. Professional autonomy is the professional duty of care and working within the legal, ethical and regulatory frameworks that govern a profession. Pathology is the study of diseases. It is the bridge between science and medicine. While the Medical Laboratory Scientist manages the science side of pathology, Pathologist manages the medicine or clinical part of the bridge. Medical Laboratory Scientists in Nigeria are regulated by the Medical Laboratory Science Council of Nigeria (MLSCN) while Pathologists are regulated by the Medical and Dental Council of Nigeria (MDCN). The role of the Medical Laboratory Scientist as a Laboratory Manager is huge and involves the management of staff regulated by the MLSCN (Medical Laboratory Scientists, Technicians and Assistants) including support staffs, equipment, reagents and consumables in the delivery of accurate, precise, reproducible and timely diagnostic results that enable clinicians to make an informed decision in the effective management of patients. They provides medical laboratory diagnostic products and services; evaluate laboratory information management system (LIMS); report results according to SOP and protocols; maintain medical laboratory equipment performance, service, repair, replace and troubleshoot; ensure staff training and compliance; carry out instrument validation and reagent certification; forecasting and budgeting; manage diagnostic laborato-

ry revolving funds, inventory control management of equipment, reagents and consumables; maintain medical laboratory productivity by monitoring and scheduling workload and making operational or staffing adjustment; ensures that laboratory participates in external quality assurance and have a robust internal quality control program; perform laboratory staff proficiency testing; develop SOP, procedures and protocols; train employees; maintain security and confidentiality of patient data; carry out staff recruitment, orienting, training, appraisal, counseling, retention and discipline; ensures that laboratory staff maintain their professional license and are involved in continuous professional development; review professional publications; help in the induction and orientation of new staff, trainee physicians, nurses, students and visitors to the diagnostic laboratory; perform quality audits and provide administrative support and supervision of Medical Laboratory Scientist on call. Pathologists on the other hand run their specialty-based clinics; take consults from the clinical colleagues, perform clinical audits; act as clinical liaison in the interpretation of specialized laboratory test result to their clinical colleagues; offer specialty-based clinical advice to their colleagues; be on call to manage their patients on admission as well supervise their trainee pathologist on call; train their residents; carry out clinical research; manage their clinical budget and clinical-related revolving funds. It is the best practice that the scientific aspect of the bridge is managed and headed by a Medical Laboratory Scientist while the medicine aspect is headed and managed by the Pathologist. It is against the principle of professional autonomy, harmony and holistic care for diagnostic laboratories predominantly staffed by professionals regulated by the MLSCN (Medical Laboratory Scientist, Technicians and Technicians) to be headed by another professional who is regulated by a different regulatory agency and who is not privy of the MLSCN requirements and standards required for the training, management and practice of the profession of Medical Laboratory Science. The implementation of these best evidence-based practices is needed to allow for harmony in diagnostic laboratories in Nigeria and will facilitate the rendering of best and holistic medical care to well-meaning Nigerians.

### **Keywords**

Professional Autonomy, Diagnostic Laboratories, Nigeria, Pathology, Bridge, Science and Medicine

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## **1. Introduction**

Professional autonomy is defined as the quality or state of being independent and self-directing, having authority to make decisions, enabling professionals to exercise judgment in accordance with one's professional knowledge base and regulatory framework. It is a professional duty of care and working within the legal, ethical and regulatory frameworks that govern a profession [1]. Medical Laboratory Scientists work in the diagnostic laboratory to ensure the provision

of accurate reliable and timely test results, thus enhancing the quality of care and patient safety. However, to ensure autonomous and unsupervised practice on call, Medical Laboratory Scientist certified and regulated by the Medical Laboratory Science Council of Nigeria are trained on the bench, competency tested and risk assessed by the laboratory manager before being included on the Laboratory Scientist call duty roster. This is to ensure that the staff is competent and understands the need for safe working procedures and emergency action plans to allow for a safe and effective practice to protect the interest of the vulnerable public [2] [3].

Professionals should be encouraged to work within their scope of practice. Scope of practice is the area or areas of one's profession in which you have the knowledge, skills and experience to practice lawfully, safely and effectively, in a way that meets the regulatory standards of the profession and does not pose any danger to the public or to the professional [4]. Evidence-based best practice request among others that every health professional should be; able to practice safely and effectively within their scope of practice, be able to practice within the legal and ethical boundaries of their profession, maintain fitness to practice, practice as an autonomous professional exercising their own professional judgement, assure the quality of their practice, understand the key concepts of the knowledge base relevant to their professional practice, draw on appropriate knowledge and skills to inform their practice and understand the need to establish and maintain a safe practice environment. This review will discuss pathology as a bridge between science and medicine, the evidence-based medical laboratory science practice in some developed economies, professional roles of Medical Laboratory Scientists and Pathologists and the need for the implementation of evidence-based and holistic practices in the medical laboratories in Nigeria.

## **2. Performance of Delineated Roles in Medical Laboratory Science and Pathology**

Pathology is the study of disease. It is the bridge between science and medicine [5]. While the Medical Laboratory Scientist manages the science and actually the diagnostic side, the Pathologist manages the medicine or clinical part of the bridge. In the UK and the most developed countries there are groups of professions with distinct roles within pathology; Medical Laboratory or Biomedical Scientist, Pathologists (medical doctors with specialist laboratory training) and Clinical Scientists (Scientist with specialist clinical training) [6]. The roles and responsibilities of these professions are clear, unambiguous and parallel. Medical Laboratory Scientists or Biomedical Scientists continues to manage diagnostic laboratories providing, accurate, precise, reproducible and timely laboratory results to enable the evidenced-based management of patients while Pathologist manages the clinical part of the service. Medical Laboratory Scientist is the protected title by the law of the Federal Republic of Nigeria to be used by professionals qualified to work unsupervised within the diagnostic laboratories in the

following disciplines; biochemistry, haematology, microbiology, immunology, virology, histology, cytology and blood transfusion services. Medical Laboratory Science is practiced in healthcare laboratories to diagnose, carry our research and monitor the effectiveness of treatment. Medical Laboratory Scientists analyse body fluids and tissue samples from patients, identifying diseases and providing reports that highlight the effectiveness of potential treatments. Medical laboratories are involved in over 70% of diagnoses upon which the evidence-based management of patients is based. Pathologists on the other hand are specialist medical practitioners who diagnose disease based on laboratory result produced by Medical Laboratory Scientist, render clinical interpretation or consultation based on the results of laboratory test to their clinical colleagues in the area of speciality, offer advice on further investigations required on a patient, manages patients with diseases in their area of speciality, monitor patient response to treatment and may be involved directly in the performance of certain specialist procedures in their field of speciality required in the delivery of care. Pathology practice has nine different areas of activity; anatomical pathology, forensic pathology, chemical pathology, genetic pathology, clinical haematology, immunopathology, microbiology, general pathology and clinical pathology.

### **3. Evidenced Based Medical Laboratory Science Practice in Developed Countries**

#### **3.1. United Kingdom**

Biomedical Science Profession is regulated in the United Kingdom by the Health and Care Professions Council (HCPC) while the Institute of Biomedical Science (IBMS) is the professional body. Founded in 1912 the IBMS represents approximately 20,000 members employed mainly in National Health Service (NHS), private laboratories, veterinary laboratories, the National Blood Authority, Health Protection Agency (HPA), Medical Research Council, Department for Environment, Food and Rural Affairs, Ministry of defence (MOD) as well as in other related commercial fields and in teaching in Universities. Registration with the HCPC is a legal requirement for Biomedical Scientists working in the UK. The IBMS assesses and accredits undergraduate or higher-level courses and qualifications for candidates seeking registration. The Institute also awards its own Certificate of Competence in Biomedical Science and works with the HCPC to approve laboratories for registration training like the Medical Laboratory Science Council of Nigeria. The Institute is also licensed to award the designations Registered Scientist and Technicians. The IBMS was granted licence by The Science Council by Royal Charter in 2003 to award the designation Chartered Scientist to qualifying and deserving IBMS members [7]. The designation Chartered Scientist is a mark of excellence awarded to scientists practising at their full professional level and who stay up-to-date and have made a mark in their scientific field. List of other chartered professions includes biologist, accountant or surveyor. The function of the IBMS among others include: setting

standards of practice in Biomedical Science to protect the interest of the vulnerable public, represent the interests of biomedical science to the UK government, media and universities, advises UK government departments and national organisations on all matters relating to biomedical science, assesses competence for biomedical scientists to practice, assesses qualifications for registration with the regulatory HCPC, accredits university degrees in Biomedical Science, organises a continuing professional development scheme and provides assessors for recruiting senior staff to laboratories. The Academy for Healthcare Science (AHCS) is a United Kingdom body which brings together the UK's Healthcare Science Professions under a common umbrella [8]. It plays an important role in the statutory regulation of Healthcare Scientists following the completion of modernising scientific carriers training programme [9] and works closely with the National School of Healthcare Science [10]. The Academy for Healthcare Science has four main roles; provision of a unified professional voice for the healthcare science workforce, act as the overarching body for issues related to education, training and development in the UK health system and beyond (maintaining professional standards and quality management of education and training), ensures the healthcare science profession has a high profile that influences and informs the health and care system in the UK and provide engagement and support for wider strategic scientific initiatives. The role of the Biomedical Scientist in the UK has evolved significantly. Biomedical Scientist can now go on the Clinical Scientist Register regulated by the HCPC by undergoing the Scientist Training Programme (STP) program. The clinical scientist can take the FRCPath part 1 and 2 examinations of the Royal College of Pathology (UK). On completion of the Higher Specialist Scientist Training (HSST) programme the Clinical scientists become appointable as a Consultant in laboratory departments in the NHS, private or voluntary sectors. Clinical scientists perform specialist investigations enabling the diagnosis and management of disease processes. They are involved in cutting edge science practice, ground breaking research and technological innovation, providing expert care and high-quality service to patients, leading to improvements in quality of life. They are fundamental to deciding the definitive diagnosis of a wide range of diseases, and use technological advances in order to drive improvements in longer term monitoring of disease. They often advise medical doctors on tests and interpret data using their understanding of disease processes underpinned by broader knowledge and experience within their specialist area of healthcare science. Consultant clinical scientists are providing expert scientific and clinical leadership alongside and, at the same level as their medical consultant colleagues. Consultant clinical scientists in the UK are helping to shape the future guidelines and the implementation of new and emerging technologies to help advance patient care.

### 3.2. United States of America

In the United States, a Medical Laboratory Scientist (MLS), Medical Technolo-

gist (MT), or a Clinical Laboratory Scientist (CLS) typically earns a Bachelor's Degree in Medical Laboratory Science, Clinical Laboratory Science, or Medical Technology. There are three major certification agencies in the United States of America for clinical laboratory scientists [American Association of Bioanalysts (AAB), American Medical Technologists (AMT) and the American Society for Clinical Pathology (ASCP)] [11]. All three national accrediting agencies will certify scientists in the clinical laboratory as generalist (chemistry, haematology, immunology, immunohematology/blood bank, and microbiology). Today, the Medical Laboratory Scientist who perform the majority of the testing in a typical medical laboratory in the US possess the equivalent of an associate's degree or a baccalaureate degree. Those within supervisory roles (section heads, shift supervisors and managers) usually have some type of post-baccalaureate education or certification, whether it is specialist certification, a graduate certificate, or a master's degree in laboratory, science, business, or related fields. Laboratory directors possess a PhD degree with specialized board certifications in laboratory disciplines. All laboratories that provide testing for the purposes of diagnosis and treatment of disease in humans in the US must possess a certificate under the Clinical Laboratory Improvement Amendments of 1988 (CLIA), appropriate to the level of complexity of the testing performed [12]. As in other countries, staffing shortages have become a major issue in many clinical laboratories in the United States (boomer retirement, inadequate recruitment and retention). For the decade 2010-2020, workforce needs are expected to grow by 13%. This translates into about 11,300 positions per year that will need to be filled, with only about 5000 new graduates per year coming out of various programs [13]. Medical Laboratory Scientist in the US can pursue higher education to advance or further specialize in their career; Doctor of Medical Laboratory Science for specialization, education and management roles, Doctor of Philosophy for management and directorship roles in the clinical laboratory as well as for academic research and professorship. Doctors of Philosophy holding a degree in a biological science, and who are board certified by a CLIA-approved entity, are qualified as a medical laboratory director or Doctor of Clinical Laboratory Science which qualifies them to oversee or direct almost all types of clinical laboratories. In 2005, a task force was commissioned by the American Society for Clinical Laboratory Science (ASCLS, formerly ASMT) to explore the practice levels and educational needs for laboratory professionals [14].

### 3.3. Australia

The Australian Institute of Medical Scientists (AIMS) provides assessment of laboratory employees' professional skills and qualifications. They assess the suitability of a staff to work as a Medical Laboratory Scientist. In Australia, most Medical Laboratory Scientists are employed in public hospitals or private diagnostic laboratories. They conduct medical laboratory tests and apply knowledge and methodology from various scientific disciplines providing evidenced-based



information to assist doctors in the diagnosis, treatment and prevention of human disease. Duties include determining the nature, cause and progress of disease through the testing of blood, body fluids and tissues in medical and pathology laboratories. Medical Laboratory Technicians help with laboratory tests on blood, body fluids and tissues in medical and pathology laboratories under the direction of Medical Laboratory Scientists and operate diagnostic and monitoring of laboratory equipment. In Australia, medical laboratory scientists complete a four-year undergraduate degree program in medical laboratory science or Master of Medical Laboratory Science. These programs are accredited by the Australian Institute of Medical Scientists (AIMS).

### 3.4. Canada

In Canada, three-year college or technical school programs are offered that include seven semesters, two of them comprising an unpaid internship. The student graduates before taking a standard examination (Canadian Society for Medical Laboratory Science, or CSMLS, exam) to be qualified as a medical laboratory technologist (MLT). Many MLTs go on to receive a bachelor of science degree after they are certified. Canada is currently experiencing an increasing problem with staffing shortages in medical laboratories. In Canada Medical Laboratory Technologists conduct a variety of medical laboratory tests to facilitate the diagnosis, treatment and prevention of disease. Medical Laboratory Technologist performs a range of duties: conduct analyses of blood, urine and other body fluids, prepare and microscopically examine tissue section, conduct blood group, type and compatibility tests for transfusion purposes, set up, operate and maintain laboratory equipment and conduct quality control assessment of testing techniques. They work in hospitals, medical laboratories and clinics, Canadian Blood Services, Research institutes, Universities and government research laboratories. To be appointable a laboratory manager in Canada you must have a Baccalaureate degree in medical laboratory technology, be a good standing member of the College of Medical Laboratory Technologists of Ontario (CMLTO), have a minimum of three years formal or informal leadership experience, and at least 5 years relevant experience in a hospital or clinical laboratory setting. The laboratory manager role include; managing the design, implementation, maintenance, reporting and improvement of the quality management system, leads the laboratory information system (LIS), laboratory safety and point of care testing teams, oversee all risk management/patient safety issues including incident reporting, risk mitigation and patient safety improvement. plan, lead and manage the quality improvement program to ensure ongoing improvement of systems and processes that add value and maximize effectiveness and efficiency, oversee planning for, integration of and compliance to regulatory/accreditation requirements, plan, organize and manage internal and external assessments, provide quality management education for staff and management that facilitates integration, change and professional development, scan en-

vironment, evaluate service performance and make recommendations to management regarding best practice, industry trends, customer needs and planning, provide advice to hospital management regarding quality management and risk management issues, implement emotional intelligence with good communication and leadership skills.

### 3.5. New Zealand

In New Zealand, a Medical Laboratory Scientist must complete a bachelor's degree in Medical Laboratory Science or Biological or Chemical Science recognized by the Medical Sciences Council of New Zealand. Once they graduate, they must have worked for at least six months under supervision, be registered with the Medical Sciences Council of New Zealand, and hold a current Annual Practicing Certificate [15]. Medical Laboratory Scientists in New Zealand perform laboratory tests on blood, other body fluids and tissue samples which provide information to assist in the diagnosis, treatment and prevention of disease; test samples for the presence of disease and potential causes; test and study blood, tissue and fluid samples; evaluate test results and communicate results to requesting clinicians; test, set up, use and maintain laboratory equipment; maintain laboratory quality assurance and safety standards; supervise and train subordinate staff such as medical laboratory technicians and develop new methods and equipment for laboratory testing. In New Zealand, laboratory managers who are Medical Laboratory Scientist oversee the day-to-day operations of laboratories to ensure the delivery of accurate and timely diagnostic results, develop procedures and maintain quality standards for specific lab procedures, train, supervise, and mentor laboratory scientist, technicians assistants and students, oversee laboratory safety policies, training, and enforcement and manage inventory, stock, audit and organize supplies and chemicals.

## 4. Professional Role of Medical Laboratory Scientist and Pathologist

In the developed world, the diagnostic laboratory is managed by the Laboratory Manager who is a qualified Medical Laboratory Scientist or Biomedical Scientist with the requisite degree in Medical Laboratory Science, license by the regulatory body, management qualification and significant years of experience working in the diagnostic laboratory post qualification. In the Nigerian setting, the laboratory manager should be the highest-ranking Medical Laboratory Scientist (Director, Deputy Director or Assistant Director of Medical Laboratory Services) who is professionally regulated by the Medical Laboratory Science Council of Nigeria (MLSCN). The role of the Laboratory Manager is huge and involves the management of staff regulated by the MLSCN (Medical Laboratory Scientists, Medical Laboratory Technicians and Medical Laboratory Assistants) including support staffs, equipment, reagents and consumables. The responsibilities of the laboratory manager amongst others includes: provides medical laboratory diag-

nostic and therapeutic information, products, and services by establishing specimen preparation procedures; develop and implement analytical procedures; evaluate laboratory information management system; report results according to protocols; certify instrument performance, arrange equipment troubleshooting procedures, manage the servicing, repair and replacement of equipment; establish quality standards; ensure staff training and compliance; manage forecasting and budgeting, maintain medical laboratory supplies and inventory, place and expedite orders for supplies and verify receipt of supplies and carry out pre-acceptance testing of supplies; manage diagnostic laboratory revolving funds; maintain medical laboratory productivity by monitoring and scheduling workload and making operational or staffing adjustments; maintain quality results by participating in external quality assurance and have a robust internal quality control program; review quality control and quality assurance programs; performing laboratory staff proficiency testing before being allowed to work un-supervised on any bench and on call duty; make adjustments in policy and procedures; generate reports, maintain records and medical laboratory information system by identifying information needs and problems; recommend improvements to hospital management; establish priorities; writing user manuals; maintaining security and confidentiality of patient data, implements new programs, tests, methods, instrumentation, and procedures by investigating alternatives; maintaining medical laboratory staffing by recruiting, selecting, orienting and training employees; completes operational requirements by scheduling and assigning employees; maintains medical laboratory staff performance by counseling and disciplining employees; plan, monitor, and appraising job results; ensures that laboratory staff maintain their practicing license, professional and technical knowledge by engaging in continuous professional development (CPD); review professional publications; participate in professional societies; help in the orientation of new staff, trainee physicians, nurses, students and visitors to the diagnostic laboratory and provides administrative support and supervision for the hospital by acting as manager of Medical Laboratory Scientist on call duty.

Pathologists on the other hand are medical doctors regulated by the Medical and Dental Council of Nigeria (MDCN) or the Royal College of Pathology (RCPath) in the case of the UK. They work in one of five main areas: chemical pathology/clinical biochemistry; study of chemicals in the blood, Haematology; study of disorders of the blood, histopathology; study of disease in human tissue, medical microbiology and virology; study of infection and immunology; study of the immune system. To become a consultant pathologist, you'll need to complete a degree in medicine followed by specialist training in any of the area of pathology. Pathologists are Medical Doctors with specialist training in Pathology. They have no business in the day to day physical testing of samples in diagnostic laboratories. Their core responsibilities are: to run their specialty-based clinics; take consults from the clinical colleagues; interpretation of laboratory results;

clinical audits; carry out specialized procedures like bone marrow aspiration and examination of blood and tissue films, clinical liaison and interpretation of specialized laboratory test results to their clinical colleagues; attendance at multi-disciplinary meetings; offering of their specialty based clinical advice to their colleagues; be on their separate and distinct call duty roster along with their trainees to manage their patients on admission as well as to offer their specialty-related clinical advice to their colleagues; training of their residents; clinical research, management of their clinical budget and the clinical-related revolving funds.

### **5. Need for the Implementation of Evidenced-Based Practices in the Laboratory in Nigeria**

Pathologists are clinicians who contribute significantly to the provision of high quality efficient and effective health care. They are medical practitioners with two years specialist training in one of the specialities in Pathology allowing them to interpret complex laboratory test results and advise on further investigation appropriate to the diagnosis and monitoring of patients. In developed countries, Pathologists are saddled with huge responsibilities; see patients in their weekly or bi-weekly clinics, delivering care to patients with disease conditions in their field of specialty. Haematologist for example run their haematology clinics; carry out specialist procedures such as collection of bone marrow, examination of blood and marrow films, interpret results assisting other clinicians in the diagnosis and treatment of disease whilst supporting hospital departments including accident and emergency, intensive care, operating theatres, special care baby units and haematology oncology, offer specialist advice to other clinicians on patients admitted with conditions in the area of specialization. Laboratory Service Managers on the other hand are Medical Laboratory Scientist of Biomedical Scientist who manages the human (subordinate Biomedical Scientist, Technicians and Attendants) and material (equipment, reagents and consumables) endowment in the delivery of accurate, precise and timely laboratory result need for the evidenced-based management of patients. Working in the diagnostic laboratory is like working in a manufacturing plant where raw materials are transformed into finished products. In the case of the laboratory, Biomedical Scientist converts raw materials (patients' samples, equipment, reagents and consumables) to finished products (accurate and timely laboratory results). These diagnostic results become raw material that clinicians including pathologist need to offer an evidenced-based quality care to patients.

Recently there has been a clamor among Pathologists in Nigeria to have pathologist in training on Medical Laboratory Scientist call duty roster to carry out unsupervised the function of routine testing of patient samples. This clamor to have residents in Pathology (Pathologist Trainees) who have not been trained to use analyzers, who have not been competency tested, who are not licensed and who have not been certified competent by the laboratory manager (Director,

Deputy Director or Assistant Director of Medical Laboratory Services) to perform diagnostic services unsupervised in the diagnostic laboratory in Nigeria is quackery and will put the lives of well-meaning Nigerians at risk. It is like asking a non-certified pilot to fly a plane with passengers on board. Above all, it is not best practice to ask any professional to carry out diagnostic testing in the laboratory using equipment and reagents to carry out testing on patients' sample or any task that border on patient management for which they don't have the requisite training or competence. Also, it is not within the scope of practice for trainee Pathologist to work unsupervised to take calls in the diagnostic laboratory to test patients' sample with the hope of generating result upon which the evidenced-based management of patients will be based (other than for student research purposes). These residents are free to take their clinical calls looking after patients with conditions under their specialty under the supervision of their consultants like it is done all over the developed world. Similarly, it is outside the scope of practice for Medical Laboratory Scientist for example to perform invasive procedures like bone marrow aspiration that is outside their scope of practice. Our responsibility as Laboratory Scientists is to process, stain, examine and carry out other specialized molecular and cell markers-related testing on such bone marrow samples collected by a qualified Pathologist. There is nowhere in the developed world where resident doctors or trainees in Pathology are on the same Medical Laboratory Scientists call duty rota to carry out statutory role of Medical Laboratory Scientist unsupervised. Pathologists are supposed to have their own clinical call duty roster distinct from those of Medical Laboratory Scientists to include these trainee pathologists. Trainee Pathologists are clinicians in training to become Consultants in the various specialties in clinical pathology. They are supposed to work on call under the supervision of their Consultant to manage their clinic patients and patients admitted to wards with conditions in their area of specialty. Pathologist in developed countries plays a very important role in patient care. They often have more than enough work to do (run their once or twice weekly specialty-based clinics, take consults from the clinical colleagues, help in the diagnosis of disease in their area of specialty, offer their specialty-based clinical advice to their clinical colleagues, perform clinical audits, attend multidisciplinary team meeting, be on call to manage their patients on admission as well as to offer their specialty-related clinical advice to their colleagues, training of residents, clinical research and management of the clinical budget). They often have no time interfering or meddling into statutory roles of Medical Laboratory Scientist [16] [17]. Pathologist in Nigeria should learn from these evidence-based best practices. They should concentrate in their clinical roles and leave the day to day running of diagnostic laboratories in the testing of samples and generating of accurate, precise, reproducible and timely laboratory results to the Medical Laboratory Scientist who are the custodians of diagnostic service delivery the world over. For Pathologists in Nigeria to attempt to struggle to render statutory and regulated functions of Medical Laboratory

Scientist is to say the least a waste of human resource particularly at a time when there are thousands of Nigerians out there with pathology-related diseases that require the specialist knowledge, skills and management of Pathologists. Working in the diagnostic laboratory particularly on call is not an easy task [18]. The MLSCN of Nigeria requires that staff who work on call unsupervised in diagnostic laboratories must meet the following minimum requirements; licensed, appropriately qualified, trained, engage in regular professional-related continuous professional development (CPD) and are certified competent by the laboratory manager to carry out task expected of them unsupervised on call. Laboratory Scientists are on call duty rosters to ensure the safe and effective delivery of accurate, precise, reproducible and timely diagnostic-related service. Laboratory staff are trained based on standard operating procedures and operational protocols on the appropriately use of laboratory automation, laboratory information management system and troubleshooting. There is also the requirement for appropriate supervision of laboratory scientist on call by the laboratory manager to offer advice and direction on complex cases and when challenges arise [19]. It is unethical and risky for residents or trainee pathologists who do not meet the above requirements to be allowed to work unsupervised in the diagnostic laboratories. The Nigerian ministry of health, CMD's and boards of teaching and federal medical centers must rise to their responsibilities to ensure that this unethical practice is not allowed to thrive to ensure the safety of Nigerians and to prevent a situation where money meant to provide excellent healthcare service for Nigerians are spent as compensation when these trainee pathologist who are not licensed and competency tested make mistakes for which the hospitals will have to pay compensation [18] [19] [20] [21]. The common mundane excuse for this unethical clamor is the claim that these trainees require requisite training to enable them gain some professional skills, pass their professional examinations and to allow them have a working understanding of the normal functioning of the diagnostic laboratory as well as to facilitate harmony among professionals in the health sectors. These can be achieved without perpetuating this unsafe practice of putting these trainees on the laboratory call duty roster to work unsupervised to perform the task of diagnostic testing of patient's samples and using equipment for which they have not been trained and competency tested. The way forward to prevent this act of quackery is for the supervisors of these pathologists in training to liaise with the director, deputy director or assistant director as the case may be to enable Medical Laboratory Scientist empower them with the relevant laboratory-related practical skills and training they require [22]. Medical Laboratory Scientist in Nigeria has always played and is committed to continuing to play a critical role particularly in enhancing the practical component of the training of Pathologist in Nigeria.

The Federal Ministry of Health (FMOH), other clinicians, other members of the healthcare team and well-meaning Nigerians should join in the evidenced-based advocacy for Pathologist in Nigeria to rise up to their statutory

responsibilities and roles like their counterparts in developed countries and concentrate in running their speciality-based clinics and managing patients with disease conditions in their area of specialization and leave Medical Laboratory Scientists (Laboratory Managers) alone to concentrate in carrying out their statutory and regulated roles of managing diagnostic laboratories and generating accurate, precise and timely diagnostic results to allow for the evidenced-based management of patients.

## 6. Conclusion and Recommendation

Pathology is the bridge between science and medicine (Arias, 1989). It makes sense that the scientific aspect of the bridge is managed and headed by Medical Laboratory Scientist while the clinical aspect is headed and managed by the Pathologist. It is also against the principle of professional autonomy, harmony and holistic care for diagnostic laboratories predominantly staffed by staff regulated by the MLSCN (Medical Laboratory Scientists, Technicians and Attendants) to be headed by another professional who is regulated by a different professional group and who is not privy of the MLSCN requirements and standards required for the training, management and practice of the profession of Medical Laboratory Science. The implementation of these evidence-based best practices is needed to allow for harmony [23] in the diagnostic laboratories in Nigeria and to facilitate the rendering of best and holistic medical care to well-meaning Nigerians.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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