

**EVALUATION OF THE IMPACT OF CLINICAL PLACEMENT  
DURATION ON UNIBEN RADIOGRAPHY STUDENT'S  
PROFICIENCY IN PERFORMING ADVANCED IMAGING  
MODALITIES**

**BY**

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SCHOOL OF BASIC MEDICAL SCIENCES  
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UNIVERSITY OF BENIN CITY  
BENIN CITY**

**OCTOBER 2025**

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**DEPARTMENT OF RADIOGRAPHY,**

**BASIC MEDICAL SCIENCES,**

**UNIVERSITY OF BENIN**

**A PROJECT SUBMITTED TO THE DEPARTMENT OF  
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**SUPERVISOR**

**MRS F.O. IGBENEDION**

**OCTOBER 2025**

## CERTIFICATION

This dissertation by Adeyemi Fadekemi Esther is accepted in its present form as satisfying the dissertation requirement of the degree of Bachelor of Radiography of the School of Basic Medical Sciences, College of Medical Sciences of the University of Benin.

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EXTERNAL EXAMINER

Date

## **DEDICATION**

This dissertation is dedicated to God, my father, Mr Kehinde Adeyemi; my mother, Mrs. Toyin Adeyemi; my brothers, Mr Adekunle and Adedoyin Adeyemi, who made this work a reality.

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## ABSTRACT

Clinical placements form a very integral component of radiography education; it is the link between theoretical knowledge and practical application. In recent years, the advancement in imaging technology such as Computed Tomography (CT), Magnetic Resonance Imaging (MRI), and fluoroscopy amongst many others have required a higher level of technical proficiency from radiographers. This study aimed to evaluate the impact of clinical placement duration on University of Benin radiography students' proficiency in carrying out advanced imaging modalities. A quantitative cross-sectional design was used to collect data from 300lv-500lv Radiography student of the university of Benin who had gone through clinical posting through a structured and validated questionnaire assessing socio-demographics, clinical placement duration, and student's proficiency in performing advanced imaging modalities. Data were analysed using descriptive statistics and inferential tests (Chi-square) with a level of significance set at  $p < 0.05$ . A total of 208 radiography students participated in the study, findings revealed a positive and statistically significant correlation between longer clinical placement duration and higher reported proficiency in CT and MRI ( $p < 0.05$ ), while the association was weaker for fluoroscopy and mammography. Students with  $\geq 12$  weeks cumulative posting in advanced imaging units demonstrated significantly higher confidence and task-execution ability compared to those with shorter exposure. Insufficient hands-on opportunity, equipment downtime and high patient load limiting student participation were reported as major constraints to skill acquisition. The study concludes that the duration and frequency of clinical placement have a significant impact on radiography students' proficiency in performing advanced imaging procedures.

**Keywords:** Clinical placement, Radiography students, proficiency, advanced imaging modalities, duration.

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background of the Study

Clinical placements form a very integral component of radiography education, it is the link between theoretical knowledge and practical application. According to (Chamunyonga et al., 2020) clinical placement is “... *the authentic nature of learning in clinical departments which provides direct observation, hands-on clinical practice and precise feedback from clinical mentors and educators that enables students to acquire relevant knowledge and skills to succeed in the radiography profession*”. These placements bridge the gap between theoretical knowledge and practical application, allowing students to develop the technical competencies and professional attributes required in their future careers (Naylor et al., 2015). Advanced imaging techniques such as computed tomography (CT), magnetic resonance imaging (MRI), positron emission tomography (PET), and interventional radiography demand specialized skills that can only be adequately developed through hands-on clinical experience.

Through monitored exposure in the hospital’s radiology departments, students can gain hands-on experience that is necessary for developing professionalism and expertise in real-world imaging practices. The integration of clinical placement into radiography curricula is very important as it affords students the opportunity to apply their theoretical knowledge into practice. It is designed to improve students’ skill development such as communication skill and patient care, inculcate professional conduct, as well as build confidence in students. Quality practice placement experiences support learning and the delivery of safe, effective patient-centred care.

In clinical placements, participatory learning where students are allowed to be actively engaged in patient care under supervision is highly emphasized to promote deeper learning and skill acquisition, a well extended clinical placement duration allows students to move from initial observation and foundational skills to more complex procedures. For advanced modalities like MRI and CT, students need consistent and adequate exposure to progress from being passive observers to confident, independent operators.

Several factors shape their experience, such as clinical placement duration, access to positive role models, clinical supervision, resources, workload, feedback, and students' readiness for working in the clinical environment. It is important to regularly monitor and evaluate practice placements in a systematic and measurable manner

In recent years, the advancement in imaging technology such as Computed Tomography (CT), Magnetic Resonance Imaging (MRI), and fluoroscopy amongst many others have required a higher level of technical proficiency from radiographers. For students to become proficient in these advanced imaging techniques, they require not only theoretical knowledge on the physics of these modalities but also consistent and immersive clinical training. However, the duration of clinical placements often varies due to institutional differences, resource limitations, and structure of the program. This variation raises questions about how much time is necessary for radiography students to achieve proficiency, especially in complex imaging modalities.

Understanding the correlation between clinical placement duration and practical skill development can help inform curriculum planning, optimize student learning experiences, and ensure that graduates are well-prepared for their professional roles in diagnostic imaging departments. This study was done to evaluate the impact of clinical placement duration on

University of Benin radiography students proficiency in performing advanced imaging modalities.

## **1.2 Statement of the Problem**

While academic learning has been widely reported in the literature to provide benefits to clinical learning, little has been reported with regard to the benefits clinical learning contributes to a students' academic progress. According to Currie,Wheat (2005) one might question whether a reduction in or abolition of clinical placements might have an impact on the understanding a student gains in theoretical learning which, in turn, might undermine clinical skill development. Despite the important role clinical placements play in improving students' radiography program, there is limited empirical evidence assessing how the duration of these placements influences student proficiency, particularly in advanced imaging techniques. Some students may receive extended hands-on training across multiple imaging modalities, while others may have limited access due to shorter placements time, lack of availability of these advanced imaging modality or reduced patient inflow in the hospital. This disparity creates a potential skills gap that may affect diagnostic accuracy, patient safety, and professional readiness.

Thus, it is essential to investigate whether longer clinical placement durations are directly associated with higher levels of proficiency in advanced imaging procedures among radiography students.

## **1.3 Research Question.**

- 1.What is the typical duration of clinical placement for UNIBEN radiography students?
- 2.What level of proficiency do radiography students demonstrate in performing advanced imaging techniques?

3. Is there a significant relationship between clinical placement duration and student proficiency?

#### **1.4 Hypothesis**

Null hypothesis ( $H_0$ ): There is no significant relationship between clinical placement duration and radiography students' proficiency in performing advanced imaging modalities

Alternative hypothesis ( $H_1$ ): There is a significant relationship between clinical placement duration and radiography students' proficiency in performing advanced imaging modalities.

#### **1.5 Aim of Study**

**The aim of the study:**

To evaluate the impact of clinical placement duration on UNIBEN radiography students' proficiency in performing advanced imaging modalities

#### **1.6 Objectives of the Study:**

1. To determine the various duration of clinical placement undertaken by Uniben radiography students.
2. To evaluate the level of student proficiency in advanced imaging techniques CT, MRI, and fluoroscopy.
3. To examine the relationship between clinical placement duration and proficiency in advanced imaging procedures.

#### **1.7 Significance of the Study.**

1. Educational Policy and Curriculum Development: Results from this research can help Heads of Department across all institutions offering radiography programs evaluate and

potentially revise clinical posting schedules to ensure sufficient exposure for competency development.

2. Professional Development: By identifying the minimum duration of placement needed to achieve clinical proficiency, the study can guide students, lecturers, and regulatory bodies in setting realistic expectations for training.

3. Improved Healthcare Quality: Well-trained radiographers contribute to accurate diagnosis, thereby improving patient outcomes, and the overall healthcare service quality. Improving student proficiency before graduation strengthens the radiography workforce.

4. Future Research: This study may serve as a foundation for further studies into clinical education strategies, imaging specialization training, or curriculum review.

### **1.8 Scope of the Study**

This study is limited to University of Benin undergraduate radiography students who have undergone clinical placements in diagnostic imaging departments. It focuses specifically on the relationship between the duration of clinical postings and the students' proficiency in performing advanced imaging examination. The study covered students in their third, penultimate and final years, as they are more likely to have had substantial clinical exposure.

### **1.9 Operational Definition of Terms**

- Clinical Placement Duration:

The total amount of time in months, weeks, days or hours a student spends in hospitals' radiology departments gaining clinical experiences during their training program.

- Proficiency:

The level of expertise or professionalism demonstrated by a student in carrying out advanced imaging techniques, as assessed by self-reports, supervisor evaluations (viva), or practical assessments.

- Advanced Imaging Techniques:

These are specialized radiological procedures that go beyond general X-ray imaging, they include Computed Tomography, Magnetic Resonance Imaging, and fluoroscopy. Computed Tomography and fluoroscopy are characterised by the use of high radiation dose, hence the need for clinical expertise.

- Radiography Student:

An undergraduate individual enrolled in an accredited radiography program, receiving both theoretical and practical training in medical imaging to produce images of high diagnostic value while prioritising their health.

- Diagnostic Imaging:

This is the use of medical imaging techniques to visualize internal structures of the body for the purpose of diagnosis and treatment planning.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Conceptual Review

##### 2.1.1 Clinical Placement in Radiography

The modern healthcare requires more pressure on the undergraduates of the field of radiography to prove their clinical competence. The fast-changing nature of the imaging technology, increasing sophistication of diagnosis procedures, and the entity of significant demands on accuracy of medical imaging makes an educational gap in the education programs to make students attain true proficiency as opposed to hollow familiarity with high tech procedures. Nyoni et al., 2021 postulate that there exist 6 primary clinical placement models. These models differ in their structure, duration, supervision and learning goals. They include:

**Practical-based Block Placement** - The students go to a clinical environment where they spend an uninterrupted time (e.g. 4-8 weeks). The model enables profound learning within the clinical setting, which promotes learning and patient care continuity.

**Integrated Placement** - Experiences in clinics are interspersed during the academic term, with the students spending particular days each week in the clinical setting. This model provides students with the opportunity to commit theoretical classroom knowledge to clinical practice at the same time.

**Collaborative Placement Models** - In this model, more than one student is placed with one clinical educator or facilitator, e.g. 3:1 or 2:1 student-to-educator ratios. This design gives focus to peer learning and encourages other students to work together.

**Longitudinal Integrated Clerkships-** Students have placed during a longer period of time and in more than one discipline of study. This model encourages the advancement of enduring connections with clients and health care staffs, better continuity of care and learning.

**Simulated Clinical Placements** - Students with a simulated clinical experience are able to participate in a simulated realistic clinical scenario. The model is especially effective in cases, where there is a limited access to clinical sites and advanced imaging modalities, so that students could train and acquire new skills in a safe environment.

**Virtual or Remote Placements-** With the help of telehealth and virtual simulations, students can also experience clinical lives distantly. This model has grown to prominence with technological advancements and the requirement to have flexible learning opportunities.

All models of clinical placement have their peculiar benefits and can be used depending on education purposes, availability of resources, and preferences of the institutions. To educators and program directors, these models are often considered to maximize on clinical education and give the students the required competencies.

### **2.1.2 Advanced Imaging Modalities**

There are higher forms of imaging modalities that are also being developed. Medical imaging has dramatically developed, through the use of CT, MRI, PET, and SPECT as devices has become indispensable to diagnosis and treatment follow-up, there is certainly a surge evident over the years. Medical imaging refers to the development of visual images of the tissues and organs in the body in order to facilitate clinical decision making as well as pertaining to the normal and abnormal anatomy and physiology. Medical imaging is both a healthcare pillar today and a broad field, with modalities including the conventional X-ray radiography and computed tomography (CT) and the groundbreaking modalities, such as magnetic resonance

imaging (MRI), positron emission tomography (PET), and single-photon emission computed tomography (SPECT), ultrasound, endoscopy, thermography, digital mammography and some types of electrical and optical imaging.

Both of the imaging techniques have their advantages. As an example, CT offers detailed 3D image at the expense of a higher radiation dose whereas ultrasound has been shown to be safe and effective in soft tissues, MRI is capable of providing high-resolution images without the use of radiation and PET/SPECT utilize radioactive tracers to examine the molecular process.

### **2.1.3 Clinical Posting in Radiography**

Clinical posting is a vital aspect of training in the field of radiography as it provides learners with a chance to deliver the theoretical training under the practice in the environment of the real healthcare context (Nyoni et al., 2021). In the process of the clinical posting, radiography students will work in different units of the radiology department by means of supervised learning and participate in providing care to patients under the supervision of qualified radiographers. These placements act as arenas of professional socialization, skills training and exposure to the dynamics of diagnostic routines of imaging (Wilkinson et al., 2024).

The students are usually assigned to various functional sectors in the radiology department even within the reception department where they get exposure to the administrative side of the business and patient management as well as documentation processes; the diagnostic X-ray room where they take part in normal radiology procedures and special procedures room where they are exposed to contrast-enhanced studies barium studies and hysterosalpingography. Additional placements may be the U-arm unit, commonly utilized in isolating particular orthopedic imaging, the operating theatre and intensive care unit (ICU), and the advanced imaging unit such as the CT scan suite, where they experience cross-sectional imaging done (Smith and Jones, 2020).

Most of the actions that students perform during these postings would involve observing conventional x-ray procedures, helping in patient positioning under the supervision of qualified X-ray radiographers, learning about the proper usage of imaging devices and radiation safety measures (Patel et al., 2009). Students can assist in the diagnostic X-ray room and specials unit, to prepare the patients to undergo the procedures, choosing the exposure factors, and placing the patients at the right positions to capture high-quality diagnostic images. In concentrated or more sophisticated units such as the CT suite, theatre or ICU, the students primarily assume an observational role, becoming accustomed to the protocols, equipment use and aspects of patient care in the more complicated environments (Anayango et al., 2024).

Clinical postings do not only provide students with competence in technical skills, but also promote the sense of managing the flow of work, interdisciplinary communication, and ethical practice in the work of a diagnostic imaging setting (Wilkinson et al., 2024). This progressive exposure to all imaging units improves the preparedness of students to practice, as well as the acquisition of critical thinking and problem-solving skills that are required in radiographic operations (Smith and Jones, 2020).

#### **2.1.4 The Role of Clinical Placement Duration in Radiography**

Radiographers have a significant role in their learning regarding the time spent in clinical exposure. This puts them under the on-job training and real life experiences that will be central in their quest to become professionals. The learning experiences acquired during these clinical placements are one of the primary factors that determine the final attainment of skills, particularly in a resource-deprived setting where it might be highly restricted to access to advanced imaging apparatus during other placements. Clinical placements are timed experiences that directly influence the exposure of the students to advanced imaging

procedures. Shorter placements can discourage the practicality, whereas the longer rotations can give greater exposure to the complicated modalities. It has been shown that it takes repetition practice to help students shift out of the entry-level procedural knowledge to a state of complete competency (Smith and Jones, 2020). This implies that students taking more time in their clinical placements would be more knowledgeable, better performing and skilled in different modalities and managing complex real-life situation.

In a research study on the effects of final-year clinical placements on career choices made by students, Anayango et al., 2024 were interested in exploring the impact of the length of clinical placements in shaping career decisions; these findings found that extended clinical placements played a role in defining career choices by providing new career opportunities, clarifying career plans, and strengthening previous career choices. Further, the experiential learning theory by Kolb assumes that full competence in skill needs the experience to evolve through four stages that include concrete experience, reflective observation, abstract conceptualization, and active experimentation. Created in reference to radiography education, this model indicates that the shortest placements can only allow students to attain the initial stage of learning, namely concrete experience, using the advanced techniques, whereas a longer placement can enable completion of several learning cycles.

The real-life application can be seen through the comparison of diagnostic problem-solving skills in students: the ones who have had longer placements show significantly better capabilities to adjust the protocols of advanced imaging modalities, having ceased being in a memorization phase and moved on to a stage of actual conceptualization.

### **2.1.5 Assessing Student Proficiency in Advanced Imaging Techniques**

It is necessary to ensure that radiography students demonstrate skill and impressive superiority in the utilization of sophisticated imaging methods. In an industry where

competition is stiff, it takes significance that students can learn at a fast rate and can navigate their way around the various modalities so that students can compete with their colleagues all over the globe. Gumrukcuoglu (2016) conducted a study aimed at identifying the knowledge of students on the radiation dose of high technology imaging procedures such as CT. Wilkinson et al., 2024 investigated the effect of more recent changes to the UK Health and Care Professions Council (HCPC) standards of proficiency of diagnostic radiographers. The research found out that there is confusion and perceived barriers to the delivery of effective diagnostic radiography training with the new proficiency standards.

The assessment strategies will play an important role in determining whether the students are prepared to conduct advanced radiographic procedures safely and competently and whether they have a good understanding of the equipment handling. They include;

Formative and Summative Assessments - In radiography education, there are usually several assessments divided and categorized into formative and summative assessment.

Formative Assessments: This refers to continuous assessment to give feedback to the learning learner. They assist in the identification of areas in which the students are wanting and shape up directions of instruction. They can be such things as quizzes, reflective journals, and peer assessments. The formative assessments play a critical role in promoting self-motivation and life-long learning.

Summative Assessments: Summative assessments are organized at the conclusion of instruction sessions and they assess the general performance of the students and their readiness to practice as professionals. These could be end tests, practical demonstrations and extensive projects. Summative assessments play an important role in certification and licensure decisions.

The primary objective of assessment is to find out if the learning objectives established at the beginning of the radiology educational program were achieved and to what degree. Assessment of students assists in determining the areas where students have lagged behind in knowledge, and aspects that the training program has failed to offer the students (Patel et al., 2009).

Objective Structured Clinical Examinations (OSCEs) - OSCEs are considered a common practice in radiography courses and programs, in which the clinical competence is evaluated in a structured and standardized way. They are characterized by a sequence of stations where students can be observed doing certain tasks, e.g., positioning patients or analysing images. Individual stations will test specific skills, which will mean a full evaluation of clinical skills. Osces are appreciated by their objectivity and the fact that they can mimic real-life situations in the clinic (Wikipedia, 2025).

Rubric-Based Assessments - Rubrics offer an in-depth account of how the performance of students may be assessed based on the wide range of criteria. Some competencies in radiography education that are assessed with the help of rubrics include technical skills, communication, and professionalism. They have explicit expectations and grading standards that promote the reliability of the assessments. The rubric-based assessment is quite effective when it comes to the evaluation of complex tasks with subjective judgment (Kilgour, 2011).

Peer and Self-assessment- It is recommended to include strategies of peer and self-assessment so as to make students engage in reflexivity practice and acquire the ability to evaluate critically. Peer assessments require students to assess the performances of their peers and this may offer a variety of perspectives and also make learning collaborative. Self-assessment offers the student to examine his expertise and determine where he needs to improve. These

approaches promote the development of a better sense of professionalism and individual responsibility (Gul et al., 2017).

## **2.2 Empirical Review**

### **2.2.1. Evaluation of Various Durations of Clinical Placement**

The research by Asare (2017) addresses the traditional perceptions of final-year radiography students towards their clinical placements and specifically the effects the clinical learning environment has on the educational achievements of learners. The scholar used quantitative approach and conducted a survey where they used the questionnaire with 19 items with a five-point Likert scale to the 24/27 eligible students with a face-to-face interview. The purposive sampling design also enhanced coverage of the target population whereas data analysis was conducted by using SPSS version 21.0 which was used to produce descriptive statistics. The results showed that clinical placements contributed to improving the skills of students in three primary domains namely; provision of patient-centered care, the ability to build interpersonal communication skills, and clinical competence. One of the aspects that students highly appreciated during their placements was a chance to put the theoretical knowledge into practice. Although the participants largely were satisfied with the amount of supervision provided by the radiographers and believed that this practice helped them meet their learning goals and were pleased to be included in the clinical activities as team members, they saw two glaring areas of weaknesses, namely, a lack of constructive feedback on clinical practice and access to educational seminars. The researchers concluded that even in the light of such challenges, students perceived their clinical learning experience as largely positive and facilitating the process of skills acquisition.

The current survey was the extensive examination of Wilkinson, 2023, who assembled the current clinical placement models that are present in the pre-registration diagnostic radiography training programs within the United Kingdom and Ireland. The research sample consisted of online survey distributed by the research team to those institutions of higher education offering such programs using both closed and open-ended questions in order to acquire both quantitative and qualitative information. Interpretation of the responses made by 24 programs across 17 institutions showed that there were three major reasons behind placement structures; limits on clinical capacity, an escalating number of students enrolling in an institution and necessity to deliver the stipulated learning outcomes. The research revealed significant difference in the period of clinical practice hours and implementation of simulation-based nursing education in various programs. A number of the respondents suggested another possible solution of placing opportunities in specialized imaging modalities and other healthcare settings to deal with capacity constraints. The research team proposed that setting more specific requirements on the number of clinical hours may encourage more homogeneous training systems, and at the same time indicate that new methods of assessment will have to be developed to measure the student skills in a variety of learning settings. The results emphasized that there is a need to have collective action between the academic institutions and clinical partners in coming up with sustainable models that will meet the current workforce needs without compromising on the quality of education.

Ago et al., 2025 adopted interpretive phenomenological methodology to examine the effects clinical learning environment had on the placement experiences of radiography students in Ghana by using BPCLE framework to guide their research. The research team held 3 focus group discussions with the purposely sampled third and fourth year students through the use of convenience sampling in order to have a varied representation. NVivoM14 was used to analyze the qualitative data, and a themed approach to it led to multiple core conclusions.

Respondents had an overall favorable experience of team dynamics and work climate in place locations, with some also having negative experiences of radiographers being harshly judgmental or lacking in receptiveness to teaching. The analysis established a distinct opposition between the positive learning conditions (BPCLEs) that positively influenced student motivation and improvement of clinical skills and the less positive ones that influenced wellbeing and empirical training negatively. Access to resources and quality of supervisory support turned out to be the crucial elements that contribute to satisfaction in the placement, and students noted the equipment issue and an irregular mentorship as some of the most important limiting factors to the most effective learning. The researchers concluded that although their clinical placements could be valuable to many students, overhaul changes in the system were necessary to mitigate the lack of resources and advance more standardized and supportive supervision practices at training locations.

### **2.2.2. Evaluation of the Level of Student Proficiency in Advanced Imaging Techniques**

The article by Ehigiomisoe & Ighodaro 2021 is a cross-sectional study which conducted awareness and knowledge assessments of the Nigerian medical students about interventional radiology after their radiology rotations. The research team utilized a 16-item questionnaire that was distributed among final-year and penultimate students of the University of Benin; the sample was quite large thus the research was conducted with the help of SPSS version 23. Although a positive 90.5% of the respondents were able to define interventional radiology correctly, a more in-depth analysis of the data showed that 69.4% of them had a basic understanding of this specialty. The survey has revealed multiple knowledge gaps: about 30 percent of students were not aware that IR patients could be hospitalized, whereas 22 percent were not aware that the ward rounding is performed by the IR specialists. Interest in the field was low (25.3%), and a large proportion of the respondents specifically stated that they did

not want to consider IR as a specialty in the future due to merely not being interested. The researchers indicated that the findings may not be nationally representative and suggested wider researches in various institutions in Nigeria to know more about the awareness and the possible interventions to boost participation of the students in studying this new specialty.

Chauhan et al., 2023 were the ones to come up with prospective research undertaken to assess the knowledge among radiography students on appropriate handling and maintenance of radiographic equipment at various levels of study. In this study, they had 94 respondents consisting of undergraduate (BSc 2nd/3rd year) and postgraduate (MSc 1st/final year) students and used simple statistical tools such as means, averages, and percentages to analyze the data. Findings revealed serial acquisition of knowledge among third year BSc students as they exhibited the highest levels of competency levels (18.54 percent) against their second year students (16.80 percent). It was found that the gender distribution was close and equal 52.1% and 48.9% of male and female participants respectively. In addition to the examination of the level of understanding, the research gave special importance to complete training of the equipment, in terms of safety measures, and emergency response. Scientists suggested regular refresher training on the students and clinical employees to sustain a high-level of safety, adequate use of equipment, and avoid the destruction of delicate equipment. The results indicated the need to continue education during training and practitioner activities of the radiographers to maximize both patient care and equipment life in.

The Masthoff et al., 2025 comparative study assessed the perception of medical students regarding a newly designed radiology curriculum on abdominal diagnostics in comparison with the previous form of instruction, which was based on lectures. The study sample surveyed 235 students (72.3% female, mean age of 23.5 years) prior to the implementation of the new case- and competency-based format, and had an outstanding response rate of 93.3%. The restructured course entailed the use of technology-enhanced independent case work,

small groups discussions and focused mini-lectures instead of the traditional ways of teaching. The pre-course surveys created solid student agreement regarding the relevance of radiological knowledge to clinical practice, whereas post-course testing showed significant gains in self-reported competencies, specifically in the area of modality choice (CT/MRI) and pathological interpretation. Though the innovative format was rated more highly than traditional methods based on the comparisons made with 169 lecture attendees and 234 seminar participants in the previous cohorts with regards to engagement rates and pedagogical effectiveness, it did not have an impact on career interest in radiology. The researchers concluded that active, case-based learning techniques might have a significant positive impact on learning skills and retaining knowledge in the field of medical imaging education, and might lead to the fact that better-prepared clinicians are produced no matter what ultimate specialty they select. These results endorsed continuous changes in curricula that focus on practice and competency building in undergraduate medical education.

### **2.2.3. Relationship between Clinical Placement Duration and Proficiency in Advanced Imaging Procedure**

Gonzalez-Garcia, 2021 used a secondary analysis of the European nursing education data to explore the impact of the length of the clinical placement on the level of training satisfaction, and especially the mediation of these factors by the quality of supervision and the quality of the learning environment. The researchers conducted an analysis of the responses of 1,903 pre-registration students in 17 institutions in nine countries with the help of the Clinical Learning Environment, Supervision and Nurse Teacher scale. The mediation analysis showed that both learning environment quality and supervisory relationships were of significant mediation between placement duration and overall satisfaction. Extended placements (an average of seven weeks in each setting) were always associated with greater levels of

satisfaction, although this was highly contingent upon good experiences with supervision and positive learning conditions. The study provided empirical information that long clinical training periods have the most educational benefits as associated with high-quality mentorship and well-structured practice environments. These results provided useful information to instructors in the development of clinical curricula as they indicated that the best place of timing should take into consideration both time-related and quality-related elements to ensure that the students achieve maximum learning.

#### **2.2.4. Challenges Students Face during Short Duration Clinical Placement**

A quantitative descriptive survey of students of the University of Ghana done by Kyei et al., 2015 revealed that radiography students experienced major challenges during clinical training. The sample considered was 42 300 and 400 level students whereby data were gathered through questionnaires which were later analyzed using SPSS version 16.0. Significant problems were noticeable gaps between theory and practice, a lack of exposure to special imaging processes, and the inadequate amount of time spent in each treatment room during rotations. The shortage of equipment and poor film/cassettes supply were also noted by students as impediments to positive learning. The challenge notwithstanding, the participants understood the inherent worth of clinical training, which implied that a better resource distribution, broader clinical focus, and increased overlap of theory and practice may help improve the learning process considerably. The results highlighted the importance of academic programs to constantly review and change the elements of clinical training to suit the needs and current demands of the students and develop with the changing standards of the profession.

Chinene et al., 2023 used qualitative phenomenology to investigate the issues of radiography students in exposed environments based on three focus group discussions with students in

their second, third, and fourth years of learning. Six emergent themes were discovered using Giorgi phenomenological approach and NVivo 12 to manage the data, namely, financial constraints, equipment inadequacies, suboptimal supervision, behavioural issues, COVID-19 impacts, and systemic lack of support. The research gave a subtle insight into the way these inter-connected issues prevented successful clinical learning, and the participants reported accumulative impacts on their learning and wellbeing. The researchers highlighted that specific interventions that do not only focus on the lack of material resources but also touch on the human side of the clinical training were necessary to enhance the experience of the placement in the resource-constrained setting.

Kumsa et al., 2022 qualitatively examined the radiography educational issues in Ethiopia by employing focus groups of 14 students and interviews of 15 educators working in four university hospitals. Thematic analysis has demonstrated deficiencies in the curriculum, the imperfection of its implementation, insufficiency of the resources, and the absence of advanced training opportunities as the major obstacles. Those who participated explained that the lack of infrastructure and outdated equipment interfered with the development of the required skills, and the lack of modern technologies such as simulation limited the learning process further. The research noted that the international support and curriculum modernization was urgently required to take the clinical training standards a step closer to the global standards especially in developing countries with similar constraints of resources.

Akpaniwo et al., 2018 prospectively examined the issues associated with long vacation clinical postings based on radiography among students of Usmanu Danfodiyo University. In a study of 300 and 400 level students based on a 14-item questionnaire, researchers have found that there are a number of systemic problems: insufficient rotation time in more advanced modalities (CT 26%), limited exposure to the ward/theater (84%), and lack of hands-on experience in more specialized techniques such as mammography (6%), or mandible imaging

(4%). Other issues were shortages of radiographers (20 percent), absent continuing education (44 percent) and remote housing (48 percent). Although 68 percent of students rated the posting as beneficial to their education, the research study brought out substantial discrepancies between expectations of the curriculum and the real clinical opportunities, and this indicates that there should be improvement in planning of the training programs, personnel staffing, and access to modern imaging technologies.

## **2.3 Theoretical Review**

### **2.3.1 Kolb's Experiential Learning Theory**

This theory proposes a 4-stage cyclical learning process namely; concrete experience, reflective observation, abstract conceptualization and active experimentation.

Application to Study:

Clinical Placement Duration directly affects the number of cycles completed. Longer placements allow repeated exposure (Concrete Experience) to advanced techniques (CT/MRI), time for reflection on performance gaps, theoretical reinforcement (Abstract Conceptualization), and iterative practice (Active Experimentation). Students with extended placements would demonstrate higher proficiency as they complete more learning cycles with advanced modalities.

### **2.3.2. Bandura's Social Cognitive Theory**

It emphasizes reciprocity between personal factors, behavior, and environment, with self-efficacy as a key mediator of skill acquisition.

Application to Study:

Placement Duration influences mastery experiences (successful practice with advanced equipment) and vicarious learning (observing expert radiographers), both critical for building self-efficacy.

### **2.3.3 Dreyfus Model of Skill Acquisition**

It describes five progressive stages of competence:

Novice → Advanced Beginner → Competent → Proficient → Expert.

Application to Study:

Placement Duration determines the stage attainable. Advanced techniques require more time to progress beyond "Advanced Beginner" (rule-based performance) to "Competent" (contextual decision-making). Short placements may only allow rule-following (e.g., protocol memorization for MRI). Extended placements enable holistic understanding (e.g., adjusting parameters for patient-specific cases).

### **2.3.4 Lave and Wenger's (1991) Theory of Situated Learning and Communities of Practice**

This perspective emphasizes that learning is fundamentally social and occurs through "legitimate peripheral participation" in communities of practice. In advanced imaging contexts, students gradually move from peripheral to central participation as they develop expertise and professional identity.

This theory suggests that longer clinical placements facilitate this progression by:

1. Allowing students to establish meaningful relationships with the clinical team
2. Providing opportunities to observe the tacit knowledge and informal norms of the workplace

3. Enabling progressive participation in increasingly complex activities
4. Supporting the development of a professional identity as an imaging practitioner

### **2.3.5 White and Ewan (2018)**

This framework was specifically applied to radiography education, arguing that short rotations may keep students perpetually at the periphery of the community, limiting their ability to engage meaningfully with the sociocultural aspects of the profession.

Ericsson's (2008) theory of deliberate practice offers a complementary perspective, focusing on how expertise develops through specific, structured practice activities rather than mere experience. This theory suggests that proficiency in advanced imaging techniques requires:

1. Clear performance goals with focused attention on specific aspects of performance
2. Immediate and informative feedback from qualified supervisors
3. Opportunities for repetition and refinement of skills
4. Progressively challenging tasks that build upon established competencies

From this theoretical standpoint, the value of clinical placement duration depends on how effectively the time is structured to support deliberate practice. Extended placements may be beneficial so as they provide more opportunities for deliberate practice cycles, particularly for complex procedures that arise infrequently in clinical settings.

### **2.3.6 Sweller's Cognitive Load Theory (1988)**

This explains how cognitive resources are allocated during learning tasks. In the context of advanced imaging education, this theory suggests that novice students initially experience

high cognitive load when performing complex imaging procedures due to limited schemas in their long-term memory.

Longer clinical placements may facilitate proficiency development by:

1. Allowing for the gradual automation of basic procedural aspects
2. Reducing extraneous cognitive load through familiarity with equipment and workflows
3. Enabling students to focus cognitive resources on more complex aspects of imaging
4. Providing time for schema development and consolidation

#### Integration and Synthesis

Synthesizing the conceptual, empirical, and theoretical perspectives reviewed above, several key insights emerge regarding the relationship between clinical placement duration and student proficiency in advanced imaging techniques:

1. **Threshold Effect:** Evidence suggests a threshold effect rather than a simple linear relationship between duration and proficiency. Placements below certain durations (approximately 8-10 weeks per modality) appear insufficient for meaningful competency development, while extremely long placements show diminishing returns.
2. **Quality-Duration Interaction:** The impact of duration appears to be moderated by qualitative aspects of the placement experience, including supervision quality, case diversity, and structured learning opportunities. High-quality shorter placements may outperform longer but less structured experiences.
3. **Modality-Specific Requirements:** Different advanced imaging modalities likely require different optimal durations based on their technical complexity and the frequency of learning

opportunities. MRI and interventional techniques may require longer immersion periods compared to more routinely performed modalities.

4. Individual Differences: Student characteristics, including prior experience, learning style, and self-efficacy, influence how efficiently they develop proficiency during clinical placements. This suggests that flexible, competency-based approaches may be more effective than rigid time-based requirements.

5. Theory-Practice Integration: Extended placements appear particularly valuable for developing the ability to integrate theoretical knowledge with practical application, especially for complex protocols requiring adaptation to unique patient factors.

6. Progressive Responsibility: Longer placements facilitate the gradual transfer of responsibility from supervisor to student, supporting the development of autonomous practice capabilities and clinical decision-making skills.

This literature review demonstrates that clinical placement duration significantly impacts students' proficiency in performing advanced imaging techniques, though this relationship is complex and moderated by numerous factors. While the evidence generally suggests that extended placements support deeper learning and more comprehensive skill development, the optimal duration likely varies based on modality, student characteristics, and placement quality.

From a theoretical perspective, extended placements appear to better support the cyclical nature of experiential learning, facilitate legitimate peripheral participation in communities of practice, enable deliberate practice opportunities, and allow for the development of cognitive schemas that reduce cognitive load during complex procedures.

Future research should focus on identifying the specific mechanisms through which placement duration affects learning outcomes and developing evidence-based guidelines for optimal placement structures across different imaging modalities. Additionally, more attention should be given to how individual student factors interact with placement duration to influence proficiency development.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

In this chapter the research methodology used in evaluating the Impact of Clinical Placement Duration on Student Proficiency in performing Advanced Imaging Techniques is appropriately outlined. It included the research design, population of the study, sampling size and technique, research instrument, data collection and analysis methods, and ethical considerations.

#### **3.2 Research Design**

This study adopted a quantitative, correlational, cross-sectional survey design. The choice of this design was informed by the need to gather data from a sample of radiography students at a single point in time to examine the relationship between the duration of their clinical placement and their proficiency in performing advanced imaging techniques. The design allowed for the collection of standardized data through a structured questionnaire.

#### **3.3 Population of the Study**

The population of this study comprised of undergraduate radiography students in their clinical training class in the University of Benin. These students were chosen because they have had varying durations of clinical exposure and were expected to be familiar with advanced imaging modalities. Inclusion criteria included students who had completed at least one clinical placement, while students in their pre-clinical years were not used in this study.

### 3.4 Sample Size and Sampling Technique

A sample size of a study is a subset of a population selected to participate in research. For this study, all UNIBEN radiography student in their clinical year i.e 300 level, 400 level and 500 level were considered in this study using a stratified random sampling technique. The exact number was estimated using the Taro Yamane's (1967) formular

Where;

N=Population size

n= Sample size

e= level of Precision (Confidence interval)

e= 0.05

N= 435

Yamane Formular

$$n = \frac{N}{1 + N(e^2)}$$

$$n = \frac{435}{1 + 435(0.05^2)}$$

$$n = \frac{435}{2.0875}$$

$$n = 208$$

**Table 3.1 Allocation of Students in the different levels**

<b>Academic Level</b>	<b>No of Students</b>	<b>Sampled Students</b>
300	154	74
400	153	73
500	128	61
<b>Total</b>	<b>435</b>	<b>208</b>

### **3.5 Research Instrument**

The main instrument used for data collection was a self-administered structured questionnaire which was proven with Yamane formula. The questionnaire consisted of three sections:

- Section A: Demographic Information (age, gender, academic level, etc.)
- Section B: Clinical Placement Information (duration, frequency, modality exposure)
- Section C: Proficiency Metrics (number of modalities they have knowledge in, confidence in operating equipment, accuracy in positioning, familiarity with protocols, etc.) The questionnaire included closed-ended and Likert-scale questions.

### **3.6 Reliability of Instrument:**

The reliability of the questionnaire was tested to ensure the consistency of the questionnaire; a pilot study was conducted with a small group of radiography students who were not part of the main sample. The responses from this group were analysed using Cronbach's Alpha, a statistical tool that measures internal consistency. The questions were also carefully structured to reduce ambiguity and ensure that all respondents interpret them in the same way.

### **3.7 Validity of Instrument:**

The validity of the research instrument was established through expert review. Experienced lecturers and clinical instructors in radiography were asked to assess the questionnaire to ensure it accurately measured what it was intended to. Content validity was confirmed by ensuring that the questions covered all important areas of the study, including clinical placement duration, exposure to imaging modalities, and student proficiency. Face Validity was also addressed by ensuring the questionnaire appeared logical and relevant to the study's objectives

### **3.8 Inclusion and Exclusion Criteria**

Inclusion Criteria:

1. Radiography students in 300-500 Level of the University of Benin.
2. Students who have completed at least one full clinical posting.
3. Students who consent to participate in the study.
4. Students who have been actively involved in clinical practice during placement.

Exclusion Criteria:

1. Students in lower academic levels (100–200 level) and are not student of the University of Benin.
2. Students who have not completed any clinical placement.
3. Students who decline to give consent for participation.
4. Students who were absent for most of the clinical placement period due to personal or medical reasons.

### **3.9 Method of Data Collection**

Data was collected through physical and online distribution of questionnaire. The data collection lasted for four weeks. All participants were briefed on the purpose of the study and assured of confidentiality.

### **3.10 Method of Data Analysis**

Data was analysed using the Statistical Package for Social Sciences (SPSS) version 27. Descriptive statistics such as frequencies and percentages were used to summarize demographic data. Inferential statistics, specifically chi-square tests, was employed to examine the relationship between clinical placement duration and proficiency in advanced imaging techniques. Results were presented using tables.

### **3.11 Ethical Consideration**

Ethical approval for this study was sought and obtained from the University of Benin (UNIBEN) Research Ethics Committee (CMS/REC/2025/783).

## CHAPTER FOUR

### DATA PRESENTATION AND DISCUSSION OF FINDINGS

#### 4.1 Data Presentation

**Table 4.1: Socio-Demographic Characteristics of Respondents (n = 208)**

<b>Variable</b>	<b>Frequency (n)</b>	<b>Percentage (%)</b>
Age		
Under 20 years	27	13.0
20–25 years	156	75.0
Above 25 years	25	12.0
Gender		
Male	95	45.7
Female	113	54.3
Level of Study		
300 Level	74	35.6
400 Level	73	35.1
500 Level	61	29.3
Total Respondents	208	100

According to Table 4.1 most respondents (75.0%) were aged 20–25 years. Females (54.3%) slightly exceeded males (45.7%). The majority were in 300–400 level (70.7% combined), reflecting a cohort in core clinical-training years.

**Table 4.2: Duration of Clinical Placement Among Respondents (n = 208)**

<b>Duration of Clinical Placement</b>	<b>Frequency (n)</b>	<b>Percentage (%)</b>
Less than 4 weeks	10	4.8
4–8 weeks	38	18.3
2–3 months	54	26.0
More than 3 months	106	50.9
Total	208	100

As shown in Table 4.2, nearly half of students (50.9%) spent more than three months on clinical placement, while only 4.8% had less than four weeks.

**Table 4.3: Modalities Exposed To During Clinical Placements (n = 208)**

<b>Imaging Modality</b>	<b>Frequency (n)</b>	<b>Percentage (%)</b>
General Radiography	208	100.0
Fluoroscopy	15	7.2
Computed Tomography (CT)	85	40.9
Magnetic Resonance Imaging (MRI)	50	24.0
Ultrasound	68	32.7
Mammography/Special Studies	9	4.3

As shown in Table 4.3, exposure was universal for general radiography (100%) but limited for advanced modalities such as CT (40.9%), MRI (24.0%), and Fluoroscopy (7.2%).

**Table 4.4: Level of Confidence in Performing Advanced Imaging Procedures (n = 208)**

<b>Modality</b>	<b>Not Confident</b>	<b>Slightly Confident</b>	<b>Moderately Confident</b>	<b>Confident</b>	<b>Very Confident</b>
Fluoroscopy	198 (95.2%)	6 (2.9%)	2 (1.0%)	2 (1.0%)	0 (0.0%)
Computed Tomography (CT)	75 (36.1%)	68 (32.7%)	42 (20.2%)	23 (11.1%)	0 (0.0%)
Magnetic Resonance Imaging (MRI)	180 (86.5%)	15 (7.2%)	8 (3.8%)	5 (2.4%)	0 (0.0%)

As shown in Table 4.4, confidence is highest for CT moderately confident 42 (20.2%) and confident 23 (11.1%) while most students report not confident in MRI 180 (86.5%) and Fluoroscopy 198 (95.2%).

**Table 4.5: Familiarity with Protocols in Advanced Modalities (n = 208)**

<b>Modality</b>	<b>Not Familiar</b>	<b>Slightly Familiar</b>	<b>Neutral</b>	<b>Very Familiar</b>
Fluoroscopy	190 (91.3%)	10 (4.8%)	4 (1.9%)	4 (1.9%)
Computed Tomography (CT)	72 (34.6%)	60 (28.8%)	45 (21.6%)	31 (14.9%)
Magnetic Resonance Imaging (MRI)	176 (84.6%)	18 (8.7%)	8 (3.8%)	6 (2.9%)

As shown in Table 4.5, familiarity with CT protocols is comparatively higher (very familiar 31 (14.9%)), while MRI 176 (84.6%) and Fluoroscopy 190 (91.3%) are predominantly reported as not familiar.

**Table 4.6: Ability to Accurately Position Patients in Advanced Imaging Modalities**

**(n = 208)**

<b>Modality</b>	<b>Poor</b>	<b>Fair</b>	<b>Good</b>	<b>Very Good</b>	<b>Excellent</b>
Fluoroscopy	188 (90.4%)	10 (4.8%)	5 (2.4%)	5 (2.4%)	0 (0.0%)
Computed Tomography (CT)	66 (31.7%)	58 (27.9%)	42 (20.2%)	30 (14.4%)	12 (5.8%)
Magnetic Resonance Imaging (MRI)	110 (52.9%)	70 (33.7%)	20 (9.6%)	8 (3.8%)	0 (0.0%)

As shown in Table 4.6, positioning ability is strongest in CT (very good 30 (14.4%), excellent 12 (5.8%)) compared with MRI (poor 110 (52.9%)) and Fluoroscopy (poor 188 (90.4%)).

**Table 4.7: Competence in Operating Advanced Modalities (n = 208)**

<b>Number of Modalities (CT, MRI, Fluoroscopy)</b>	<b>Frequency (n)</b>	<b>Percentage (%)</b>
None	80	38.5
One	64	30.8
Two	40	19.2
Three	20	9.6
All Four	4	1.9
Total	208	100

As shown in Table 4.7, most respondents reported competence in one or no modality (69.3% combined), highlighting limited multi-modality proficiency.

**Table 4.8: Relationship Between Placement Duration and Proficiency (Chi-Square Test)**

<b>Variable Pair</b>	<b><math>\chi^2</math> (Chi-square)</b>	<b>df</b>	<b>p-value</b>	<b>Decision</b>
Placement Duration $\times$ Proficiency Level	16.72	3	0.001	Reject $H_0$

As shown in Table 4.8, the relationship between placement duration and proficiency is statistically significant ( $\chi^2=16.72$ ,  $p=0.001$ ), hence the null hypothesis is rejected.

## **4.2 Discussion of Findings**

**To determine the various duration of clinical placement undertaken by UNIBEN radiography students.**

The statistical results presented in Table 4.2 show that 47.1% of respondents had spent more than three months on clinical placement, while 28.8% had between two and three months, and 19.2% spent four to eight weeks. Only 4.8% of students reported clinical exposure of less than four weeks.

These statistics clearly demonstrate that the majority of radiography students at the University of Benin (UNIBEN) have had substantial and recurring clinical exposure. This pattern suggests a well-structured clinical placement schedule that provides sufficient opportunities for students to integrate theoretical knowledge into practical skills. Extended placement duration also increases familiarity with different imaging environments, patient types, and procedural demands essential components of professional growth in radiography. Longer placement periods naturally promote deeper learning because repeated contact with imaging equipment and patient interaction refines technical competence and confidence. Moreover, multiple postings across different departments expose students to various radiological procedures, broadening their diagnostic and interpretive experience. This finding confirms that UNIBEN's training program encourages a progression from basic to advanced clinical competencies as students advance in level.

The current findings are consistent with those of Asare (2017), who found that longer and well-organized placements significantly enhanced students' clinical competence and ability to provide patient-centered care. Asare emphasized that extended practical exposure allowed students to translate classroom knowledge into professional practice, a trend mirrored in this study where most respondents spent several months in real clinical settings. The shared implication is that adequate duration reinforces learning retention, procedural accuracy, and

independent decision-making during radiographic procedures. However, this study's findings diverge partly from Ago et al. (2025), who observed that even when placement duration was extended, poor supervision, inadequate mentorship, and limited resources negatively affected learning outcomes. Their study stressed that duration alone does not guarantee competence; rather, the learning environment and quality of supervision determine how effectively students utilize their time. In comparison, the UNIBEN data suggest that while placement duration is largely sufficient, quality factors such as mentorship style, access to imaging equipment, and constructive feedback remain crucial to fully translating time spent into measurable proficiency.

The implication of these results is that the radiography training structure at UNIBEN provides a solid temporal framework for practical education. Nevertheless, the effectiveness of these placements depends on how the available time is used. Ensuring consistent supervision, incorporating simulation sessions for underexposed modalities, and promoting reflective feedback after each posting would strengthen competency outcomes. Hence, while the duration of clinical postings appears adequate, optimizing the quality of the learning experience will better align student preparedness with professional expectations in modern radiographic practice.

**To analyze how well the students have acquired the skills of advanced image techniques (CT, MRI, and Fluoroscopy).**

Table 4.4 results indicate that the confidence levels of the students with regard to advanced imaging modalities were different among students. In the case of Computed Tomography (CT), 75 (36.1) respondents were not confident, 68 (32.7) seemed to be slightly confident, and 42 (20.2) were moderately confident. The number of students who declared themselves as confident was 23 (11.1%). In the case of Magnetic Resonance Imaging (MRI), the confidence levels were lower 180 students (86.5) indicated that they would not be confident

with only 5 students, however, stating that they were confident (2.4). On the same note, Fluoroscopy was lowest in the rate of confidence with 198 respondents (95.2) not confident at all with only 4 respondents (1.9) exhibiting even moderate levels of confidence.

Similar trend was observed in familiarity with imaging protocol in Table 4.5. Majority of the students claimed they were unfamiliar with MRI (84.6 percent) and with Fluoroscopy (91.3 percent) protocols, and a reasonable number of respondents expressed moderate familiarity with CT (21.6 percent). The findings provided in Table 4.6 also depicted deficiencies in the positioning skill of the students in procedures. Competency in CT positioning only 20.2 percent reported themselves as very good or excellent, with more than 90 percent acknowledging their low or fair capability in Fluoroscopy and MRI. Combined, these figures depict a distinct trend in radiography student at UNIBEN a moderate level of proficiency in CT, low level of competency in MRI and insufficient confidence in Fluoroscopy. These results indicate that there is presence of clinical exposure but is not distributed equally through modalities. The students seem to interact more with CT, and it is probably because of the availability and use of the CT in clinical environments, more often than Fluoroscopy and MRI, they might be not accessible which limits experiential learning.

This finding correlates with that of Chauhan et al. (2023), who found out that, with more exposure and training time, the practical knowledge and work with radiographic equipment are improved over a time. Their experiment showed that the regular practical interaction played an important part in developing the technical expertise and confidence in the upper level students as in the case of the UNIBEN population, students were more familiar with CT protocols and positioning methods. The two studies confirm that the structured and repetitive exposure has a direct conversion to increased competence in advanced imaging processes. Nevertheless, the current results are opposed to Ehigiomisoe and Ighodaro (2021), who showed higher levels of proficiency in medical students following their radiology practices.

Their participants were also more aware of the interventional radiology, as opposed to the UNIBEN students, which reflects institutional focus on diversity of imaging. The difference can be due to contextual difference: in Nigeria, high-tech imaging like MRI and interventional suites are not evenly distributed across the teaching hospitals and might not provide exposure to the students consistently.

The results suppose that the students of UNIBEN do gain the certain degree of technical skills, especially in CT, yet there is vast gap in proficiency in MRI and Fluoroscopy. It highlights the necessity of higher levels of access to more modern imaging technology, better clinical appraisals, and potential remedies the development of underrepresentation modalities through simulation training. These gaps can be closed in order to ensure that the radiography program also yields graduates who are more suited in the technological requirement of the newer diagnostic imaging. Additionally, providing students with a balanced exposure on all modalities will broaden the confidence and employability of students in competitive clinical setups.

**To test the correlation between the length of clinical placement and advanced imaging procedure proficiency.**

The Chi-square test was used to statistically determine the relation between clinical placement time (duration) and the level of the students in executing advanced imaging processes (Table 4.8). The outcome had a Chi-square of  $\chi^2 = 16.72$  and 3 degrees of freedom ( $df = 3$ ) and the p-value = 0.001. Because the result of the calculation of p-value is lower than the significance level of 0.05, the null hypothesis ( $H_0$ ) that there is no significant correlation between clinical placement time and student proficiency was discarded. This observation substantiates statistically significant relationship between the duration of time spent on clinical placement and the proficiency levels on the ability of the student to carry out advanced imaging modalities like CT, MRI and Fluoroscopy.

Additional descriptive findings as presented in Table 4.7 support this conclusion stating that just 1.9% of the respondents experienced a sense of competence in all modalities, with most (69.3) indicating one or no competence. This observation implies that shorter or intermittent placements may restrict exposure of students to different types of imaging technology, whereas longer and more frequent clinical rotations allow students more hands-on experience and development of confidence. The statistical analysis more than points out that time of clinical placement is decisive in skills learning. Greater exposure gives the students time to synthesize theoretical knowledge and form procedures accuracy and greater interpretative skill. The general observation made throughout this research is that sufficient practice in the clinical setting does not only increase competence in CT where access and direct involvement is greater but also has a slowing effect on confidence in modalities that are not easily available like MRI and Fluoroscopy.

This result correlates well with Gonzalez-Garcia (2021), who found out that the long periods of placement not only intensified the satisfaction of the students and the acquisition of skills but also did it at a significant level under the conditions of quality supervision and favorable learning conditions. Similar to the research by Gonzalez-Garcia, the current finding emphasizes the direct influence of the period of placement on the results of education since the longer the period, the higher levels of familiarity with the procedures, interaction with the patients, and radiographic decisions. The two studies arrive at the same conclusion, as adequate clinical immersion enables the consolidation of skills, as well as enhancement of the transition between student and professional practice. The given outcome, however, partially contradicts the findings of Kyei et al. (2015) who determined that although short clinical postings are useful, they usually did not lead to sufficient hands-on experience due to the lack of equipment, excessive supervision, and insufficient practice hours. They found that their placements had a significant theoretical value, although their participants reported

considerable learning barriers. The variation is probably due to situational factors. The somewhat systemic and repeated posts of UNIBEN seem to soften some of these limitations enabling students to have more and more prospective interaction with clinical procedures.

These findings imply that the duration of clinical placement does not simply qualify as a formality of schedule but a form of professional competence. The significance of the statistically significant correlation between the length of placements and the proficiency refers to the importance of providing students with sufficient and properly supervised time of working in the clinical setting.

The implication of these findings is that extending clinical placement duration is not merely a scheduling formality but a determinant of professional competence. The statistically significant relationship between placement length and proficiency highlights the importance of ensuring that students spend adequate, well-supervised time in the clinical environment. Training institutions should therefore prioritize longer, structured placements integrated with mentorship and feedback systems. Furthermore, policymakers and academic coordinators must ensure that clinical rotations are evenly distributed across all imaging modalities to guarantee comprehensive competence. In essence, strengthening the quality and duration of placements will bridge the skill gap observed in advanced imaging modalities and prepare radiography graduates for the complex demands of modern diagnostic practice.

## CHAPTER FIVE

### CONCLUSION AND SUGGESTION OF FINDINGS

#### 5.1 Conclusion

The paper meets its conclusions at the observation that the length of clinical placement and their frequency are key determinants of how effective radiography students are in executing highly advanced imaging procedures. Prolonged clinical exposure improves confidence, technical expertise and knowledge of imaging protocol, especially in modality like CT. Nevertheless, available unequal access to MRI and Fluoroscopy units restricts equal competence in all of the more advanced imaging modalities. The findings prove that sufficient clinical exposure along with formal mentorship and access to equipment is one of the strongholds of professional radiography training. Therefore, academic institutions and the clinical partners should focus on quality and continuity in clinical education so as to have well-rounded practice ready radiographers.

#### 5.2 Recommendations

Based on the findings of the study the following recommendations can be given:

1. Make clinical placements longer and standard: Universities are supposed to make sure radiography learners go through a minimum of six months of clinical placements in all years of training to support learning outcomes.
2. Empower supervision and mentorship: Clinical supervisors ought to be trained on the common matters of student assessment, communication, and providing feedback regularly to enhance the level of learning.

3. Open the high-level imaging space: There should be an increase in collaboration between universities and hospitals to introduce students to MRI and Fluoroscopy space, so they can be presented with a wide range of exposure.

4. Incorporate learning by simulation: Seated equipment In settings where equipment is scarce they should develop simulation laboratories to mimic CT, MRI and Fluoroscopy techniques so that skills can be practised.

5. Ongoing assessment and review: We should introduce ongoing reviews and the feedback of the performance during the practice periods to determine areas of improvement and ensure the progress of the students.

### **5.3 Suggestions for Further Studies**

Future studies ought to be conducted to investigate the mediation effect of the relationship between the duration of placement and proficiency amidst radiography students by supervision quality.

It is possible to compare the results of multiple universities in Nigeria and learn more about the national standards of training and differences.

The research on the efficacy of simulation training as an adjunct to clinical postings might assist the facilities in maximizing the learning within a setting with limited resources.

Longitudinal study may be used to investigate the effects of the duration of placement on the outcomes of the post-graduation and the integration of the new graduate into work environment.

## **5.5 Limitations of the Study**

1. The study was limited to radiography students of the University of Benin, which may restrict the generalizability of the findings to other institutions.
2. The research relied on self-reported data, which may be subject to personal bias or overestimation of proficiency
3. Limited access to some advanced imaging modalities (especially MRI and Fluoroscopy) may have affected students' exposure and the accuracy of self-assessment.
4. The study design was cross-sectional, capturing a single timeframe, and therefore cannot establish causality over time.

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## APPENDIX I

Questionnaire: Impact of Clinical Placement Duration on UNIBEN Students' Proficiency in Advanced Imaging Modalities

### INFORMATION FOR RESPONDENTS

Dear Respondent,

You are invited to participate in a study on how clinical placement duration affects students' proficiency in performing advanced imaging modalities. Your responses are confidential and will be used solely for research and improvement of clinical training.

Kindly respond as honestly as possible. Thank you.

### SECTION A: DEMOGRAPHIC INFORMATION

A1. Age (tick one)

- Under 20    20–25    Above 25

A2. Sex (tick one)

- Male    Female

A3. Level (tick one)

- 300    400    500

### SECTION B: CLINICAL PLACEMENT INFORMATION

B1. Total duration spent in clinical placement so far (tick one)

- Less than 4 weeks  
 4–8 weeks ( $\approx$ 1–2 months)  
 2–3 months  
 More than 3 months

B2. Modalities you were exposed to during placements (tick all that apply)

- General Radiography    Fluoroscopy    Computed Tomography (CT)  
 Magnetic Resonance Imaging (MRI)    Ultrasound    Other: \_\_\_\_\_

B3. Modality (or modalities) in which you spent the most time (tick all that apply)

- General Radiography    CT    MRI    Fluoroscopy    Ultrasound    Other:  
\_\_\_\_\_

B4. Frequency of exposure during clinical placement (tick one per row)

	Never	Rarely	Sometimes	Often	Very Frequently
Fluoroscopy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Computed Tomography (CT)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Magnetic Resonance Imaging (MRI)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ultrasound	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**SECTION C: STUDENT PROFICIENCY IN ADVANCED IMAGING**

**C1. Confidence in performing procedures (tick one per row)**

	Not Confident	Slightly	Moderately	Confident	Very Confident
CT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MRI	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ultrasound	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fluoroscopy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**C2. Familiarity with protocols (tick one per row)**

	Not familiar	Slightly familiar	Neutral	Very familiar
CT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MRI	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fluoroscopy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ultrasound	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**C3. Ability to accurately position patients (tick one per row)**

	Poor	Fair	Good	Very good	Excellent
CT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MRI	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fluoroscopy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ultrasound	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**C4. How many of the four modalities (CT, MRI, Fluoroscopy, Ultrasound) do you feel competent operating? (tick one)**

None  One  Two  Three  All four

**C5. Do you think longer clinical placements improve proficiency in advanced imaging? (tick one)**

Yes  No  Not sure

**C6. Overall impact of clinical placement duration on your skill development in advanced imaging (circle one)**

1 2 3 4 5

(Very low)

(Very high)

SECTION D: PERCEPTIONS & RECOMMENDATIONS

D1. Major challenges faced during clinical placements in learning advanced imaging techniques:

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D2. Suggested improvements to clinical placement duration or structure:

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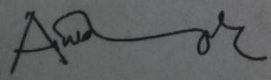
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Thank you for your participation.

## APPENDIX II

	<b>RESEARCH ETHICS COMMITTEE</b> COLLEGE OF MEDICAL SCIENCES UNIVERSITY OF BENIN, BENIN CITY, NIGERIA.	
<b>Chairman:</b> Prof. F. A Imarhiagbe MBChb, FMCP Cert Clin Res and ethics (NIH), MD. 0803449092	<b>Email:</b> researchethics.cms@gmail.com	P.M.B 1154, BENIN CITY
<b>Our Ref:</b> CMS/REC/01/VOL.2/783	<b>Date:</b> 18 <sup>th</sup> September, 2025	
<b>Re: EVALUATION OF THE IMPACT OF CLINICAL PLACEMENT DURATION ON UNIVERSITY OF BENIN STUDENT'S PROFICIENCY PERFORMING ADVANCED IMAGING MODALITIES</b>		
<b>Name of Principal Investigator:</b>	<b>ADEYEMI FADEKEMI ESTHER</b> Department Of Radiography, School of Basic Medical Science College of Medical Sciences, University of Benin	
<b>REC Approval No: CMS/REC/2025/783</b>		
<p>This is to inform you that the research described in the submitted proposal, the Informed Consent Forms and other participant information materials have been reviewed and approved by the College Research Ethics Committee, University of Benin.</p> <p>This approval dates from <b>18<sup>th</sup> September, 2025 to 19<sup>th</sup> September, 2026</b>. In multi-year research, Endeavour to submit your annual report to the REC early in order to obtain renewal of your approval and avoid disruption of your research.</p> <p>The National Code of Health Research Ethics requires you to comply with all institutional guidelines, rules and regulations and with the tenets of the code including ensuring that all adverse events are reported promptly to the REC. No, changes are permitted in the research without prior approval by REC except in circumstances outlined in the code. REC reserves the right to conduct compliance visit to your research site without prior notice. Thank you.</p>		
		
<b>PROF. F.A IMARHIAGBE</b> Chairman, REC		
<i>Promoting best ethical &amp; scientific standard for research in Nigeria</i>		