EVALUATION OF THE KNOWLEDGE AND AWARENESS OF PSYCHOLOGICAL EFFECTS OF RADIATION EXPOSURE AMONG PATIENTS IN UNIVERSITY OF BENIN TEACHING HOSPITAL

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CERTIFICATION

This is to certify that this research project by EBOIGBE PRECIOUS OMOYE with a Matriculation Number of BMS2005183 has been examined and approved for the award of Bachelor's of Radiography in the Department of Radiography; School of Basic Medical Science, University of Benin, Edo State.

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EXTERNAL EXAMINER

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DEDICATION

This project is dedicated to God Almighty, My Family and as many that stood by and supported me in the course of my academic journey.

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My profound gratitude goes to God Almighty, for his never ending Favour, Grace, wisdom and direction throughout every stage of this project and my academic journey.

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ABSTRACT

The study tested the level of knowledge and awareness of psychological impact of radiation exposure in the patients undergoing the diagnostic imaging at the University of Benin Teaching Hospital (UBTH). The convenient sampling was carried out using a descriptive cross-sectional survey design where 127 adult patients who had X-ray and CT scan procedures were sampled. The structured questionnaire was used to gather data, and it was analyzed with SPSS version 25.0. The findings revealed that respondents were ill-informed on the psychological impacts of radiation exposure with 58.3 percent being poor awareness and 62.2 percent being low awareness. Most patients (71.7) said that they became anxious or feared at the time they were told about radiation-based imaging, and 68.5% voiced their concern about long-term psychological impacts. The degree of knowledge of radiation exposure and the response of the patient to it were significantly related ($kh2 = 18.42$, $p = 0.001$). The most important results in the scope of the research were that 76.4 percent of patients were never informed of psychological impacts by medical professionals, and 83.5 percent would like to be informed prior to their surgeries. The level of education and past imaging experience also had significant impact on the level of knowledge ($p < 0.05$). The research finds out that there are gaps in knowledge and awareness which are some of the contributory factors of psychological suffering among the patients at UBTH. Radiographers are advised to involve the use of patient-centered communication techniques to enhance the overall patient experience during radiation-based diagnostic imaging, create educational resources in the area of psychological effects, and acquire training in empathetic counseling.

Keywords: Radiation exposure, psychological effects, patient knowledge, patient awareness, diagnostic imaging, UBTH.

CHAPTER ONE

INTRODUCTION

1.1 Background of Study

Radiation has become an essential part of the contemporary medical environment and has brought invaluable benefits to the present-day healthcare services (Busey et al., 2013). Radiation-based imaging offers clinicians the power to see inside the body, identify abnormalities at an early stage, and direct treatment procedures with accuracy, whether it is a simple chest X-ray or a multi-phase CT scan (Ribeiro et al., 2020). In spite of these developments, most patients feel uncertain and anxious about the process of radiological examination (Rampersad et al., 2024). To some, walking into an imaging suite is going into uncharted waters, where there are advanced, high-tech machines, and high-speed orders and methods that have not been well-informed of their purpose or dangers (Kolsur, Mamtha, 2024).

The discussions that usually prevail in radiology departments are oriented to the technical excellence of the equipment the quality of images, the expediency of the diagnostic procedure, and the accuracy of targeting therapy (Aldahery, 2023). Nonetheless, a less conspicuous yet no less significant story is the emotional and psychological experience of the patient (Ribeiro et al., 2020). Patients often experience imaging exposing them to ionizing radiations without much understanding of why they are required, what is done to protect them, and how much risk they are taking (Busey et al., 2013). The absence of patient-centered communication, which is easily available, provides an excellent breeding ground that encourages fear, anxiety, and misperceptions that may have far-reaching consequences on the mental well-being (Rampersad et al., 2024).

It is stated that a significant percentage of patients are not aware of the amount of radiation they are exposed to when they are performing routine diagnostic procedures, and most patients lack the ability to discriminate high-dose procedures like CT and lower-dose procedures like plain radiography (Busey et al., 2013). The lack of this knowledge is not merely a technical issue, but it does have emotional and psychological implications because patients will either be too complacent about the risks or have a disproportionate fear (Kolsur & Mamtha, 2024). Ribeiro et al., (2020) emphasized that even standard imaging may cause long-term discomfort even in patients who experience a lack of information, or helplessness in the process.

The problem is especially severe in the vulnerable groups, such as pregnant women, children, and patients with chronic illnesses that have to undergo repeated imaging (Rampersad et al., 2024). These populations usually experience multiple emotional strain, juggling the necessity to be diagnosed and the fear of accrued radiation dosage (Ribeiro et al., 2020). The social factors also complicate the situation because family members or cultural beliefs can impact decisions, and add complications of guilt, confusion, or hesitation (Kolsur & Mamtha, 2024). In other instances, patients do not take necessary imaging promptly or evade it out of fear which may compromise their health (Busey et al., 2013).

Interestingly, the knowledge and communication gaps cannot be attributed only to patients. As noted by Aldahery (2023), despite the fact that radiographers are the professionals who ensure the safety of patients and proper imaging, there are instances when these professionals do not possess sufficient knowledge about diagnostic reference levels or confidence in discussing the risks of radiations. Such a professional gap may lead to a decrease in effectiveness of patient counseling, not resolving the unanswered questions or increasing anxiety levels (Aldahery, 2023). In cases when the technical professionals themselves lack full qualifications to make clear and

empathetic explanations, the psychological burden of the patient is bound to increase (Ribeiro et al., 2020).

Although these are complicated dynamics, a lot of the radiation exposure discussion is rooted firmly in technical parameters dose thresholds, image optimization, and physical safety (Rampersad et al., 2024). Although these are certainly essential, they are only a partial reality. The phylogic burden, the feeling of helplessness, and the social issues related to exposure to radiation are hardly implemented into everyday practice (Busey et al., 2013). However, as Kolsur and Mamtha (2024) claimed, such less noticeable impacts have a significant influence on how patients view the healthcare systems and how they decide to pursue future care.

Moreover, cultural beliefs and narratives within the society make it even complicated. In most societies, radiation is linked to a sense of contamination, invisibility, and incurable damage best conceived historically, through media, and folklore than through medical fact (Ribeiro et al., 2020). These fears can be kept secret, especially in a culture that does not encourage the interrogation of the medical profession (Rampersad et al., 2024). Emotional strain can be exacerbated by the social situation, particularly when patients are torn apart by medical recommendations and the views of the family or friends (Kolsur & Mamtha, 2024).

Another important variable that determines the way patients react to radiation-based imaging is health literacy. Low health literacy patients can find it easy to be uncertain about the intention, risks, or advantages of radiological processes, and they are exposed to fear and misunderstanding (Busey et al., 2013). Although information is available, when it is not adapted to the appropriate level of understanding of the patient, it cannot ensure the elimination of anxiety or the dispelling of misunderstandings (Aldahery, 2023). Rampersad et al. (2024) have stressed that the method of

handling health literacy is necessary to not only enhance patient knowledge but to also reduce the amount of unnecessary psychological distress.

The radiographers and other members of health care community can fill these gaps with the help of communicating with a compassionate and clean mind. However, as Aldahery (2023) mentions, radiographers are not well supported in this role, and the majority of training is done to develop technical competence, but not to interact with patients. This imbalance leads to the development of a system in which patients can feel dehumanized or disregarded, which increases the psychological effect of their experience (Ribeiro et al., 2020). An overhaul of the emotional situation in radiological care can occur with minor steps, like taking time to explain the procedures, recognizing patient fears, and answering the questions in simple language (Kolsur & Mamtha, 2024).

1.2 Statement of the Problem

Radiation diagnostic imaging has been adopted as a common useful tool in contemporary medical practice that provides useful and clear images of internal body structures to aid in early diagnosis and guide treatment (Busey et al., 2013). Radiation in clinical environments is maintained at safe levels when well controlled and laid down procedures are in place aiming to protect the patient and provide the requisite diagnostic data (Aldahery, 2023). Such patients who are subjected to such procedures ought to have the purpose, risks, and safety related to radiation exposure clearly explained to them so that they can have trust and understanding (Rampersad et al., 2024). Within this utopian environment, the communication between the radiographers and patients would not only discuss the technical aspects of the case but also alleviate the emotional aspects, leaving the patients satisfied and informed (Kolsur & Mamtha, 2024).

Nevertheless, the present state of affairs particularly during peak time in tertiary institutions such as the University of Benin Teaching Hospital (UBTH) is usually not as ideal as this. Research has indicated that most patients are taking the radiation-based imaging without clear knowledge regarding the risks, benefits, and the psychological impact involved (Busey et al., 2013). This lack of knowledge leaves an opportunity to experience anxiety, fear, and emotional distress since patients have to provide their own answers to the gaps by assumptions or cultural beliefs (Ribeiro et al., 2020). Especially at risk of being exposed to increased psychological strain are vulnerable populations, including pregnant women, children, and patients requiring frequent imaging (Rampersad et al., 2024). Simultaneously, radiographers, who are probably most equipped to offer information and reassurance, might not be properly trained in communication with the patients or have enough understanding of diagnostic reference levels, further expanding the gap between the technical care provision and patient-based care (Aldahery, 2023). Although the risks of bad radiation awareness are evident both emotionally and socially, the discourse on radiation exposure in our environment is still very technical, and very little focus is on the mental and emotional impact of such procedures on patients (Kolsur & Mamtha, 2024).

This research, thus, intends to fill this gap by assessing the amount of knowledge and awareness the patients of UBTH have on the psychological impact of radiation exposure. The study aims to enlighten better communication habits and help improve a balanced and holistic approach to patient-centered radiology service at UBTH by throwing light on what patients have already known, what they mislead on, and how it affects their emotional status.

1.3 Research Questions

1) What is the level of patients' knowledge of the psychological effects of radiation exposure?

2) What is the level of patients' awareness of the psychological effects of radiation exposure?

3) What elicit patients' perception of the psychological effects of radiation exposure?

1.4 Research Hypothesis

Null Hypothesis (H_0): There is no significant relationship between patients' knowledge of radiation exposure and their psychological response (such as anxiety or emotional distress) during diagnostic imaging at UBTH.

Alternative Hypothesis (H_1): There is a significant relationship between patients' knowledge of radiation exposure and their psychological response (such as anxiety or emotional distress) during diagnostic imaging at UBTH.

1.5 Research Aim

The aim of this study is to evaluate the knowledge and awareness of the psychological effects of radiation exposure among patients undergoing diagnostic imaging at the University of Benin Teaching Hospital (UBTH).

1.6 Research Objectives

1. To assess patients' knowledge of the psychological effects of radiation exposure.
2. To evaluate patients' awareness of the psychological effects of radiation exposure.
3. To elicit patients' perception of the psychological effects of radiation exposure.

1.7 Significance of the Study

This research paper is relevant to health as it shows the necessity to treat not only the physical safety of patients when conducting diagnostic imaging, but also their psychological and emotional state. The study should encourage more holistic care by assessing the level of knowledge and awareness of the psychological impact of exposure to radiation to achieve the

elimination of anxiety, enhanced cooperation during imaging processes, and overall mental well-being. The results have the potential to provide more effective patient outcomes by promoting practices to reduce the level of emotional discomfort and increase patient trust in medical services.

This study has relevance to the field of radiography, as it highlights the importance of radiographers in the educational process of patients and emotional support. The paper has stressed how radiographers must not only be technically excellent but also practice clear and compassionate communication with patients about radiation exposure and its psychological effects. The findings may inform professional development initiatives, promote the integration of skills in patient-centered communication in the training of radiographers, and influence the sense of professional identity of radiographers as champions of physical and mental safety.

To the society, the study provides meaningful information that can contribute to creation of more social trust towards medical imaging services. The research aids in the dissemination of valid information to the population by illuminating on the false beliefs and emotional issues that patients have about radiation exposure. It can be used to eliminate myths, minimize unwarranted fear and make people pursue medical imaging when they need it without the worry of having to accept it with a lot of anxiety. Finally, the research will help to make society health-aware and educated on the advantages of the new diagnostic technologies as well as the psychological factors involved.

1.8 Scope of the Study

This paper will aim at patients who are subjected to diagnostic imaging procedures that expose radiations at the University of Benin Teaching Hospital (UBTH). It can only assess the level of

knowledge and awareness of the patients on the psychological impacts of radiation exposure, and also determine the prevalent misconceptions held by them.

1.9 Operational Definition of Terms

Radiation Exposure: Radiation exposure in this paper is the exposure that a patient receives in the form of ionizing radiation during diagnostic imaging like X-rays and computer tomography at UBTH.

Psychological Effects: In this study, psychological effects are emotional and mental reactions like feelings of anxiety, fear, stress, or confusion by patients due to the process of undergoing radiation-based imaging processes.

Knowledge: Known as the right information and knowledge that patients possess regarding radiation exposure, how it can be used in diagnostic imaging and the potential psychological effects.

Awareness: The awareness is the level of consciousness of the patients or information that has been provided on the psychological effect that can be created by exposure of radiation during the diagnostic procedures.

Misconceptions: Misconceptions in this study are the false beliefs or mistaken ideas that patients can have about radiation exposure and its psychological or physical risks.

Diagnostic Imaging: Diagnostic imaging Diagnostic imaging is a medical term that involves the use of radiation (i.e., X-rays and CT scans) to create images of structures within the body with which they can be diagnosed.

Radiographers: Radiographers in the present case study will be defined as the medical practitioners who will carry out diagnostic radiologic tests which will involve exposure to radiation.

CHAPTER TWO

LITERATURE REVIEW

2.1 Conceptual Review

2.1.1 Medical Radiation: What Patients Usually Know

When patients hear the word “radiation” in a medical setting, their immediate thoughts are often a mix of uncertainty, worry, and vague assumptions. In fact, asking the average patient to describe what medical radiation is or how it works usually leads to incomplete or confused responses. Many can recognize that radiation is used in imaging tests like X-rays or CT scans, but far fewer can explain what radiation actually means, how it helps doctors, or what risks if any it might carry. The very mention of the word radiation will cause fear in some patients. It can trigger strong associations of nuclear catastrophes, cancer or insidious damage, as opposed to extremely selective and limited doses utilized in medicine (Busey et al., 2013).

This difference between what the patients know and what they need to know is not unusual. Medical radiation may appear as an abstract and very technical term and an explanation that is easily understood by the patient is something that most patients never got. Busey et al. (2013) suggest that many patients do not know or have little knowledge about the dose of radiation that the people undergo during radiological imaging. Some cannot distinguish between high dose tests such as CT scan and lower dose tests such as simple X-rays. Worse still, patients are not aware of 100 percent of the tests using ionizing radiations.

Interestingly, patients can be ignorant of certain things, but they tend to trust the healthcare system so much. They accept imaging tests hoping that this will help to answer or solve the problem. And this trust can be followed by a certain anxiety, unspoken. Rampersad et al. (2024) found out that a significant proportion of patients in tertiary hospitals have significant

misperceptions regarding the use of ionizing radiation. Others overrate the risks and believe that being exposed to anything is very harmful and should be kept to the minimum cost. The others fail to recognize the risks, as they think that the routine medical tests cannot be anything wrong since they are usually so.

Such misconceptions are seldom the result of the ignorance in the literal meaning of it. Rather, they mirror the fact that most healthcare discussions are all about speed and efficiency wherein they have little room to impart deep and personalized learning. As noted by Kolsur and Mamtha (2024), in the environment when patients may be fairly well-educated, there is little or no provision of simple, structured explanations regarding the radiation safety, dose levels, or possible psychological effects by healthcare providers. The outcome is that factual information on medical radiation is less informed by the patients than fear, pop culture and personal suppositions.

It is such limited awareness that is very important, particularly in psychological good health. Patients, who do not have a full understanding of radiation, have higher chances to either undergo emotional stress or worry about perceived threats or simply feel overwhelmed with the recurring scans. To some, the uncertainty it comes with radiation may be more difficult to deal with as compared to the actual procedure. Patients understand or do not understand something, which is not a mere technical problem. It is an issue of humanity, an issue that addresses the pressing desire of the improved, gentler, and more understandable communication.

2.1.2 The Overlooked Psychological, Emotional, and Social Impacts of Radiation Exposure

When medical imaging is brought up, the focus is usually directed to the physical aspect of radiation exposure tissue sensitivity, cumulative dose, cancer hazard, etc. And though these are

doubtless vital issues they are only half the tale. What lurks in the darkness are the mental, emotional, and social consequences of radiation dose or even the concept of the radiation. To most patients, hearing the very word radiation evokes more than interest in what the test is; it evokes real fear and concern (Ribeiro et al., 2020).

This fear is hardly based on the profound grasp of medical facts. It is more commonly influenced by the cultural discourse, self-convictions, or the lack of definite information. Indeed, Ribeiro et al. (2020) have observed a significant portion of this patient anxiety is based on the lack of understanding. Being left with blank spaces in their knowledge, some patients manage to fill in gaps themselves by sometimes coming up with worst-case scenarios that lead to them developing unwarranted distress. This uncertainty is sometimes overwhelming as a source of emotional distress than the medical procedure itself.

Others are more burdened by this than are some of the groups. Parents are one example, who may develop deep feelings of guilt and indecisiveness when their child goes on to have a CT scan. They are in a dilemma of whether to look after their child and keep him/her alive or to act as medical personnel advise. Equally, patients with cancer who repeatedly receive imaging or radiotherapy commonly report an emotional load, a sense of vulnerability, fear of pollution, or isolation (Rampersad et al., 2024). All these emotional responses are not merely a question of personal temperament of how closely radiation is symbolically associated with danger in the popular mind.

Notably, these concerns and worries do not remain trapped within the patient. They may overflow into relationships and life. A woman that has to undergo multiple scans during pregnancy, e.g., will experience the added stress of having to navigate advice (and even criticism)

of the concerned family members or friends. Her inner doubts can be exacerbated under social pressure and her feelings can be left drained or even paralysed by indecision. In other instances, the result of this emotional burden is that a patient will avoid or even defer the crucial imaging in general not due to fear of the unpleasantness of the scan itself but due to fear of the concept of radiation itself (Ribeiro et al., 2020).

But in fact, these invisible impacts are usually neglected by the healthcare system. As Aldahery (2023) observed, although radiographers receive adequate training on technical matters such as dose optimization, not many are taught how to identify or alleviate anxiety among patients in the imaging process. This loophole will imply that emotional needs may remain unmet, although they do have practical implications. Stressful situations prior to a scan or during a scan may increase stress, disrupt the cooperation in the course of the scan, and influence the quality of care overall (Aldahery, 2023).

These psychological and social impacts are not merely a bonus it is also an essential aspect of patient-centered care. The exposure of radiation during medical imaging is not to be regarded as an ordinary technical occurrence, it is an experience that involves the patient on various dimensions. Understanding and managing the emotional aspect of radiation exposure is eventually a necessary measure towards a truly holistic healthcare.

2.1.3 Communication Gaps in Clinical Practice and the Role of Radiographers

Efficiency can be a dominant factor in the current medical world where time is a precious asset. The imaging departments, particularly those of large hospitals are meant to pass the patients through the scheduling, scanning, and reporting stages at a high rate. This system is wonderful in terms of throughput but there is one thing that is often left behind meaningful communication. To most patients, the process of imaging is like being put into a conveyor belt. They go over the

steps sequentially and receive minimal instructions, a small chance to question them, and they have small time to digest what is going on (Busey et al., 2013).

This communication failure is not a trifling oversight that has no effects. Busey et al. (2013) determined that patients frequently walk out of imaging departments with no definite idea of what procedure was performed, why it was required and what risks (or not) were involved in terms of radiations. This confusion gives rise to panic, misunderstanding and mistrust in some instances. During the scan, patients can be responsive to the instructions given by them but leave with unresolved uncertainties or fears particularly where there is radiation exposure.

Radiographers play a very key role in this dynamic. They are the front line employees who are in the intersection of technology and the patient experience. Radiographers are not simply the operators of multifaceted machines; they are the human face of the medical imaging. This privileged situation gives them a great chance and responsibility to close their communication barriers. The thing is though that this potential is not always so real. Aldahery (2023) also cited that the radiographers themselves do not know much about diagnostic reference levels (DRLs) and radiation doses, which may complicate them explaining the risks to patients and assuring them.

Radiographers either leave patients to cope with fears and questions by themselves when they are in doubt or when they become hasty or too technical in their conversations. This breakdown does not only increase the level of distress but it may also lead to a lack of confidence in the healthcare system in the long run. Ribeiro et al. (2020) emphasized the importance of a few minutes of transparent and understanding communication as a way to transform the attitude and

perception of radiation-related procedures by patients. And it is not just the question of what is said, but the manner and the time when it is said that counts.

Unluckily, the provided information is usually either over complicated or presented at too high a rate to be helpful, as Kolsur and Mamtha (2024) stated. Patients can nod with politeness without necessarily knowing because they do not want to sound ignorant or slow. This may make them feel alienated or dehumanized like they are being handled as an object of a machine instead of a suffering professional.

The positive side of the matter is that these communication gaps do not need to be bridged with enormous changes in the system. It needs a paradigm shift whereby it is acknowledged that each scan is associated with an individual, who has a right to know what is being done to their body. Through these little yet deliberate attempts at informing and reassuring the patients, radiographers will be able to revolutionize the patient experience. By doing this, they not only take a picture but they are also promoting the idea of humane and patient-centered care.

2.1.4 Health Literacy and Radiation Risk Awareness

The issue of health literacy has an unspoken role in influencing the learning and reaction of medical radiation by patients. In simple terms, health literacy is the capacity of a person to obtain, process and interpret health related information in a manner that will enable them to make decisions which are informed. In situations where health literacy is minimal such as the case with complex subjects such as radiation patients become the target of fear, confusion and making poor decisions. This is more crucial in such a facility as UBTH where there is a broad diversity of patient population in terms of educational and cultural backgrounds.

It is also a fact that most patients who are subjected to imaging tests have never had a patient friendly explanation of what radiation is, what it does and the risks and benefits associated with it. They are instead mostly left to guess, gossip or bits and pieces of information they get through the media or personal contacts. Even a well-informed patient might not have simple knowledge about which tests require the use of ionizing radiation and the differences in dose between two otherwise similar tests, as Busey et al. (2013) emphasized, such as a CT scan and a simple X-ray. This gap can also be increased by the technical language that is employed in hospitals.

Less healthy patients are not always able to ask questions or communicate their concerns because of their low health literacy. They can be quiet throughout the consent process or nod their heads all along the explanation of which they do not understand, just because they do not want to appear ignorant or become a source of delay. Rampersad et al. (2024) discovered that this dynamic has the capability of supporting quiet anxiety. Patients can walk out of the imaging department without understanding what exactly has been performed on them and are likely to be frightened about the possible outcomes actual or perceived.

Consequently, the health literate patients are more likely to have greater confidence in their care. They are, in a better position to balance risks and benefits, be able to ask good questions, and make decisions that embody both medical and personal values. Kolsur and Mamtha (2024) noted that patient anxiety can be significantly decreased and trust in the medical process can be enhanced by enhancing patient education, even in short journeys or in the simplest educational aids.

Health literacy does not only affect the knowledge that patients have of radiation; it also affects the attitude that patients would have towards radiation. When the individuals are not aware of

what is going on, gaps are filled by uncertainty. And, as any patient-centered care provider is aware, uncertainty may be more disturbing or even more unpleasant than the exposure itself. The acknowledgment of the importance of health literacy provides us with a key to the solution to the psychological distress in the realm of medical radiation: the more we can help patients understand their medical care, the more empowered and comfortable they would feel.

2.1.5 Cultural Beliefs and Social Context in Radiation Anxiety

The reaction of the patients towards medical radiation is not created in isolation. There is the great influence of cultural beliefs, social values and common narratives on the perception of radiation and the resulting emotional reactions of patients to radiation. To most people especially in those areas where traditional beliefs and modern medicines co-exist, radiation is not only a medical instrument, but something mysterious or even feared. This attitude is usually defined by the news about disasters of nuclear power or by the words of parents or grandparents or family warnings. The outcome is a deep-rooted fear which is not always easy to eliminate even when facts are present.

Rampersad and colleagues (2024) noted that within certain groups of people, patients enter the hospital with a substantial amount of pre-existing anxiety regarding radiation anxieties, which are more of a cultural recollection and even a societal narrative, rather than of any medical risk. In the case of radiation, therefore, contamination or invisible harm or long-term damage may be relevant, no matter how controlled, low-dose diagnostic imaging is. According to Ribeiro et al. (2020), such symbolic weight of radiation has the potential to make patients exaggerate risks or experience a feeling of fear that is much more significant than the clinical truth.

These perceptions of cultures can have strong effects on decision-making. An example is a woman who requested to receive a number of scans during pregnancy, where she will be torn between doctors on one hand and the relatives who are of strong opinion that she should not be subjected to any radiation. Likewise, patients can push off or even refuse the required imaging engagements in the fear that they would be hurt or weakened by invisible rays. Such an internal conflict between the trust to healthcare providers and loyalty to cultural beliefs may result in the straining emotions and may lead to the inability to make any decision.

It is also important in terms of social context. In societies where medical procedures are not openly discussed, the patients tend to be afraid to speak out or to clarify on something. Instead, they can silently bring their concerns, which can increase psychological distress before, during, and after the procedure. The social pressure to go with what is prescribed as Kolsur and Mamtha (2024) emphasized may cause people to feel isolated or helpless even in the environment, where the level of patient education is relatively high.

The resolution of the radiation anxiety issue takes the form of more than technical explanations. It requires culturally sensitive care that respects the background, beliefs and fears of the patients. Radiographers and other healthcare professionals can play a significant role in filling this gap not by disregarding cultural issues but by providing guidance to them in a gentle manner that will help patients understand and be reassured. By taking the time to listen and responding with empathy, the providers do not merely deliver a service, but they contribute to alleviating the invisible emotional loads that tend to come in hand with medical imaging which involves radiation.

2.2 Theoretical Review

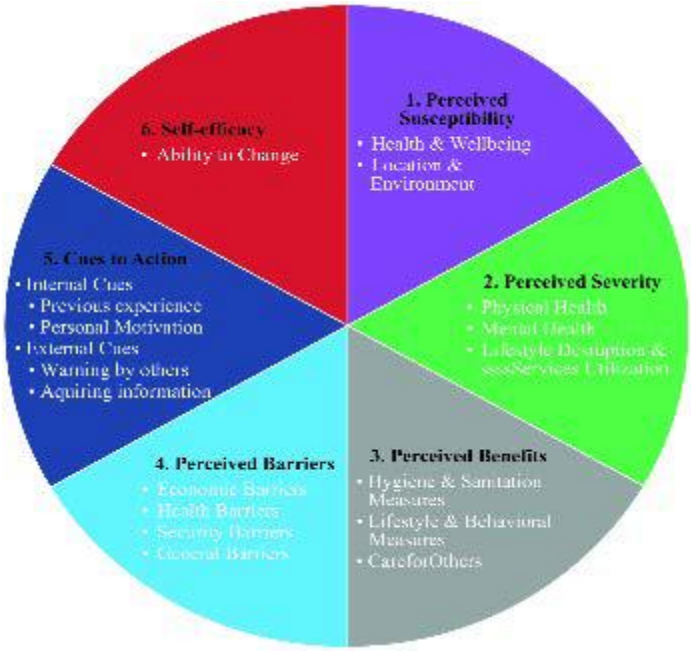

Figure 2.2.1 The Health Belief Model (HBM)

One of the most common theoretical models that are applied to the comprehension of the way in which people decide about their health is the Health Belief Model (HBM). The HBM was developed during the 1950s by the social psychologists at the U.S. Public Health Service and aims at explaining the reasons why individuals take or fail to take specific health-related behaviors particularly during the prevention or early detection of diseases (Anuar et al., 2020).

The fundamental assumption of the model is that health behaviors are determined by the beliefs of a person in four major ways:

Perceived susceptibility: Assessment of individual risk of having a health problem.

Perceived severity: The perception regarding the severity of the consequences of the health problem.

Perceived benefits: It is an opinion that performing a certain action (e.g. a medical test) will help to decrease the risk or the severity.

Perceived barriers: The thought on what gets in the way (emotional, financial, social or physical) of action.

Subsequent developments of the HBM incorporated two additional significant factors:

Cues to action: Conjunctions or cues that make people act in relation to their health.

Self-efficacy: The belief that he can accomplish the action successfully.

The model has been widely used in vaccination uptake, cancer screening as well as health promotion activities. It highlights that the knowledge, attitudes, and beliefs of the people determine their responsiveness towards medical advice, test as well as treatment.

Application of the Health Belief Model to This Study

The Health Belief Model is an excellent tool to explain the knowledge and awareness of patients on the psychological impact of radiation exposure. As applied to this study at UBTH, the model can be used to explain the effect of beliefs on patients in terms of emotional reactions and decisions regarding imaging procedures that involve radiations. To take a case in point, the perceived vulnerability of a patient might determine the amount of anxiety that a person who holds the view that even the minimal dose of radiation exposes them to a high risk of developing cancer is bound to undergo more psychological distress. Likewise, their notion of how severe the possible damage is may result in increased fear, refusal to undergo essential imaging, or pre- and post-procedure excessive anxiety. Perceived benefits and perceived barriers are also mentioned in the HBM. Someone who realizes the diagnostic usefulness of imaging (perceived benefit) will

feel reassured and more open to the procedure, whereas someone who tends to think about their perceived obstacles to the procedure will hold back or experience great emotional distress.

Notably, the model focuses on the role of action cues (such as clear explanations provided by radiographers or teaching resources) that contribute to making patients more confident and less anxious about some issues. Similarly, self-efficacy is at the core of this: informed patients who believe that they can ask questions or want to inquire about something better have a higher chance to experience radiation-related procedures in a psychologically healthy manner.

This study is based on the Health Belief Model, which helps understand how the lack of knowledge, communication, and cultural context leads to the psychological experience of patients at UBTH. The model helps in the notion that enhancing awareness and misperceptions does not only occur by provision of information but enabling the patient to feel safer, more empowered and confident in their healthcare process.

2.3 Empirical Review

The systematic review by Samaila et al. (2024) examined what implications the exposure to ionizing radiations has on the mental health of its patients during diagnosis and treatment. The study was informed by increasing worries that, although the physical dangers of such radiation exposure have been widely investigated, the psychological and emotional impacts have hardly been considered especially in clinical practice. The authors sought to summarize and synthesize current evidence as to the impact of radiation exposure, or perception of it on mental health outcomes including anxiety, fear and emotional distress in various patient groups. The authors chose a systematic review design, which involved the collection of evidence on the topic using various peer-reviewed articles published in 2010-2023. They encompassed the articles that

particularly studied the mental health outcomes in diagnostic and therapeutic radiation exposure. Relevant studies were identified through a rigorous screening process and data were extracted and synthesized thematically. The results showed that the patients are often affected psychologically in a significant way associated with radiation exposure that can be acute anxiety before the procedure to long term emotional distress especially to patients who undergo repeated scans or radiotherapy. The review also pointed out that such effects were usually exaggerated in patients whose knowledge was limited or who had inadequate information regarding the procedures. In addition, the scientists have mentioned that inadequate communication among medical experts was one of the primary factors that added stress to patients. Finally, Samaila et al. (2024) also highlighted that additional patient-centered communication strategies are urgent to eliminate the psychological effects of radiation exposure. They pushed the need to incorporate mental health support in imaging and treatment procedures, particularly in vulnerable groups. This research is very useful to the present study at UBTH as it offers a compelling argument to demonstrate that enhancing patient education and solving emotional issues is essential to the holistic care.

According to a study by Ramperstad et al. (2024), their study examined the knowledge, understanding, and perception of ionizing radiation of medical imaging among patients in a tertiary care facility in an individual belonging to a West Indian population. The rationale behind the study was the fact that although diagnostic imaging plays a crucial role in the contemporary medical practice, there is usually a gap in the issue of acceptability of the patients with respect to imaging and the real knowledge of the radiation hazards. The purpose of the authors was not only to determine the level of knowledge of the patients but also to determine how this level impacted their psychological response, such as anxiety and fear. The authors used the cross-

sectional descriptive design, aiming at adult patients who were referred to different radiological tests in a big hospital with tertiary status. The data have been gathered by way of structured questionnaires that were filled at the start and end of the imaging processes. The questionnaires evaluated the patients on their background knowledge regarding radiation exposure, their perception towards risk and their emotional reaction to the entire process of the imaging. The major results found that many patients possessed insufficient knowledge on the subject of ionizing radiation and its hazards. Most participants failed to distinguish the difference between the mode of imaging that used radiation and the ones that did not. The research also established that false beliefs regarding exposure to radiations were also a cause of anxiety and fear, particularly in the case of first-time patients or patients receiving high doses of radiations like CT scans. Notably, the study was very keen to emphasize the fact that anxiety levels of patients reduced greatly when they were well-explained by radiographers or radiologists. According to Rampersad et al. (2024), closing the knowledge gap of patients and enhancing the communication of the radiation exposure are the key steps to reduce the needless mental pain. The research proves the assumption that educated patients can approach imaging examinations with confidence and reduced emotional stress. The results are quite close to the aims of the present study at UBTH as it is necessary to focus on the education of patients as a part of the regular radiological practice.

The study conducted by Alawad and Abujamea (2021) was aimed at the awareness of patients about radiation hazards in radiology departments. The research was inspired by the fears that although patients often go through testing imaging processes, most do so without having adequate information on the possible dangers of doing so. The authors also tried to measure the overall awareness of patients about radiation hazards and the factors that can be related to the

differences in the awareness levels. The research design was the descriptive cross-sectional survey study, which involved a sample population of patients who visit the radiology departments to carry out different imaging tests. The questionnaire used was structured and included questions on the basic knowledge of radiation, perceived risk, and attitudes towards the safety measures in the collection of the data. A sample was a heterogeneous population of patients with regard to age, gender, and education level, and it was possible to examine Demographic effects on awareness. The findings indicated that although some patients knew that some imaging procedures emit radiations, a high number of them had little information regarding the risks involved in exposure to radiations. There were many patients who were not sure of the imaging modalities that involved the use of ionizing radiation and minimized or exaggerated the risks. This paper also discovered that more educated patients tended to be more knowledgeable on issues of radiation risks as opposed to less educated patients. Secondly, there was no clarity in the communication that healthcare providers used, and it was identified as one of the key factors that led to the insufficient awareness. Finally, Alawad and Abujamea (2021) emphasized that it is crucial to enhance patient education on radiation hazards to avoid unjustified fear and sign an informed consent. They suggested that diagnostic imaging departments should adopt organized patient education programs to create awareness and encourage safer and more confident involvement in radiology. The present study has a strong applicability to the existing study at UBTH since it highlights the relationship between gaps in knowledge and psychological impact like anxiety and misconception during imaging study.

The review study by Ribeiro et al. (2020) was aimed at examining the awareness and lack of awareness of patients about the medical imaging-related levels of ionising radiation exposure, as well as the role of the knowledge gap in psychological reactions. The rationale behind the study

was the increasing body of evidence that although, diagnostic imaging is being increasingly utilized in contemporary medicine, patients in most cases lack basic knowledge on the exposure of radiations and this may cause fear, anxiety and even avoidance of the required imaging. The authors themselves took a narrative review format, where the information of an extensive array of primary research (carried out in various populations and in various healthcare settings) is combined. The review had analyzed the level of patient knowledge on the radiation doses, differences in imaging modalities, and risks they had about diagnostic imaging. The most important results included the fact that the level of patient knowledge regarding the exposure to ionising radiation was in most cases low, even in the developed health care systems. A significant number of patients could not distinguish between the X-rays, CT scans, and MRI in most cases assuming that all the imaging processes worked with radiations. This ignorance was attributed to increased anxiety and emotional distress, particularly to the ones under the repeated imaging or high-dose procedures. It was also highlighted in the review that ineffective communication by the health care providers had a role to play in creating psychological discomforts to patients due to either complex or too technical explanations. According to Ribeiro et al. (2020), to reduce avoidable emotional stress, it is imperative to enhance the awareness of the patients regarding exposure to radiation via the use of accessible, simple communication. It was suggested in the study that radiology departments should implement patient-friendly education to gain the level of information that assures an individual as they engage in the imaging process. These results are closely connected to the area of interest of the present research in UBTH as they demonstrate that knowledge gaps may be a contributing factor to psychological wellness and overall experience of a patient.

A study conducted by Busey et al. (2013) explored the knowledge and awareness of radiation as a result of diagnostic imaging on patients. The rationale behind the study was that there is a fear that patients are willing to undergo imaging procedures without comprehensive awareness of the radiation doses they expose themselves to which in turn may compromise the informed consent as well as the emotional reaction of the patient to care provision. The researchers wanted to evaluate the knowledge of the patients concerning the radiation doses, the differences between the imaging procedures, and the risk factors of the diagnostic imaging. It assumed the cross-sectional survey design, which entailed the use of patients who have gone through different diagnostic imaging procedures in a big academic hospital. The subjects were made to undergo structured questionnaires, which evaluated their knowledge about the imaging tests that involved the use of ionizing radiations, their perception about the amount of dose and their concern about the risk of radiation. The results indicated that lots of patients possessed little information regarding radiation exposure during diagnostic imaging. A good percentage of respondents were not able to properly name the procedures that involved ionizing radiation, and not many had the knowledge of the relative dose of various imaging procedures. Notably, the research revealed that such lack of knowledge was attributed to silent, unspoken fears among the patients who tended to trust the medical information, yet they all feared the unknown dangers they may be encountering. Another point that the researchers have identified was that patients hardly ever enjoyed clear and structured explanations of the radiation exposure before the procedures. Finally, Busey et al. (2013) also highlighted the necessity to improve patient education in order to reconcile the gap between the technical care and the emotional well-being. The authors suggested that simple clear explanations regarding exposure to radiations should be a part of the practice in the radiological department so as to help in supporting more informed, confident, and

emotionally secure patients. It is obvious how the study applies to the current study at UBTH since it highlights the direct role of patient knowledge in psychological reactions and the experience of imaging as a whole.

2.4 Summary of Review

The reviewed empirical studies have provided valuable information on patient knowledge, awareness, and psychological reaction on radiation exposure. It was demonstrated by Samaila et al. (2024) that the impact of exposure to ionizing radiation is usually accompanied by anxiety, fear, and emotional distress, especially when the patients are not properly informed about the procedures. On the same note, Rampersad et al. (2024) discovered that having a poor knowledge of radiation risks was linked to a higher level of psychological discomfort, but they also discovered that clarity of information by professionals could be used to mitigate this fear. Alawad and Abujamea (2021) showed that some patients are knowledgeable about the risk of radiation, but most of them have some misconceptions or incomplete information, mainly because of the lack of educational interventions in radiology departments. As mentioned by Ribeiro et al. (2020), the lack of awareness of radiation exposure in patients is still common and continues to cause emotional distress, not to mention the unwillingness to experience the required imaging. Similarly, Busey et al. (2013) found that most patients were not aware of what imaging tests were associated with ionizing radiation, which resulted in concealed fears and use of medical advice without a fully informed consent.

However, despite such useful contributions, one of the most obvious gaps that were identified in the course of the studies is the lack of attention to the knowledge and awareness of the patients about the psychological impacts of the radiation exposure. The majority of the studied literature was focused on physical risks and overall radiation awareness and did not focus on exploring the

direct effects of patient awareness/or lack thereof on their emotional and mental health, specifically in the Nigerian setting. Also, minimal attention is paid to the particular role of radiographers in developing patient awareness of the psychological effects of the radiation dose with the help of effective communication.

This research, thus, aims at filling these knowledge gaps by assessing the amount of knowledge and awareness among patients at UBTH concerning radiation exposure and its psychological impact. By so doing, it will seek to offer evidence that will facilitate greater patient-centered radiological care, in which the technical and emotional needs of the patients can be as heavily considered, and in which communication between radiographers and patients can be used to alleviate unwarranted fear, anxiety, and misconception during diagnostic imaging processes.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Research Setting

This research took place at the University of Benin Teaching Hospital (UBTH) which is a major tertiary healthcare institution in Benin City, Edo State, Nigeria. UBTH is a referral center in the entire Edo state and other nearby states, providing diverse diagnostic and therapeutic services to its patients. The radiology department of the hospital is adequately furnished with contemporary diagnostic imaging services such as X-ray, computed tomography (CT), C-arm and ultrasound services. The environment is also ideal to conduct this research since it serves a huge and varied population of patients who receive diagnostic imaging based on radiation.

3.2 Research Design

A cross-sectional survey design was used in the study. This design is suitable as it can enable the gathering of data at one time with the patients who are subjects of diagnostic imaging. The time-based constraints of the research allowed evaluating the level of knowledge, awareness, and psychological reactions of patients without disrupting the regular care provision. This design would be appropriate in determining the patterns, shared misconceptions, and connections between variables including the level of knowledge and psychological consequences.

3.3 Target Population

It was decided that the target population of this study was adult patients (18 years and above) who attended the radiology department of UBTH during the time of study in order to involve them in diagnostic imaging that involved radiation exposure. This was comprised of those patients who were referred to do X-rays and CT scans. The research involved individuals who

were fully awake, communicated, and consented to take part and did not include critically ill and unconscious patients.

3.4 Sample Technique and Sample Size

Participants were picked using a convenience sampling method. This design was selected due to the fact that the researcher could obtain information on patients who were convenient and fit the inclusion criteria during the data collection period. Although this is not random, this was a practical approach due to the nature of the study and time constraints assigned by the clinical setting.

The Cochran formula of finding the sample size of descriptive studies was used to determine the sample size:

I applied a confidence level of 95% and margin of error of 5%. I estimated the sample size using the formula below:

$n = (z2\ \ p\ \ (1 - p)) / e2$

Where:

n = the required sample size

z = the z-score, the z-score of 1.96 would represent 95% confidence level.

p = the approximate value of the proportion of the population.

$n = (1.96^2\ \ 0.5\ \ (1 - 0.5)) / (0.087x0.087)$

= 127 patients

3.5 Instrument of Data Collection

The main data collection tool was a self-administered questionnaire which the researcher designed using the study objectives and the literature review. The questionnaire was in four sections:

Section A: Socio-demographic information about the participants (e.g., age, sex, educational level, type of imaging procedure).

Section B: The understanding of the psychological impact of radiation exposure by the patients.

Section C: Level of awareness of the patients concerning the impact of radiation exposure on their psyche.

Subquestion D: The perception of patients about the psychological impact of radiation exposure.

To ease the analysis, the questionnaire contained a mix of close-ended questions with Likert scale items.

3.6 Validity of Instrument

Experts on radiography were involved to ascertain content validity given to the draft questionnaire. Their comments helped them make improvements on the items to make them clear, relevant and suitable to the target population. An initial testing was also done on a limited sample of patients (approximately 20) at UBTH and were not included in the main study. The pre-test was useful in the identification of the ambiguous or confusing questions and to verify that the tool measures what it is supposed to measure.

3.7 Reliability of Instrument

Test-retest method of reliability was observed in the pre-test in order to determine the reliability of the questionnaire. The pre-test was conducted at RayTouch diagnostic center where the same respondents were requested to fill the questionnaire in two occasions over a period of two weeks. The similarity of their answers was measured with the help of a Cronbach alpha coefficient, and the value equal to or more than 0.7 was assumed as the internal consistency accepted. According to the results, necessary modifications were done to increase reliability.

3.8 Method of Data Collection

The data collection was done in 4-6 weeks. The questionnaire was distributed to eligible patients in the radiology department in their waiting queue after they received an informed consent. The researcher or the trained assistants could clarify where necessary particularly on the participants whose literacy level was lower. Data collection of questionnaires was done on the spot so as to reduce non-response and guarantee data completeness.

3.9 Method of Data Analysis

Statistical Package of Social Sciences (SPSS) version 27.0 was used to enter and analyze the data. The frequencies, percentages, means, and standard deviations were the descriptive statistics that were used to summarize socio-demographic features, knowledge levels, awareness, and misconceptions. Hypothesis was tested using inferential statistics like Chi-square tests. A level of significance was set at p (less than or equal to) 0.05.

3.10 Ethical Considerations

The approval of this study on ethics was granted by the UBTH Research Ethics Committee prior to the commencement of data collection. The involvement of the participants was on a voluntary

basis and the participants were informed about the purpose of the study and gave their consent to participate. All the participants were assured of anonymity and confidentiality; no names or personal identifiers were saved on the questionnaires. The use of data was ensured by keeping it in a secure place, and the data was utilized only in research. They also informed the participants that they had the right to pull out of the study at any point with no repercussions to the care.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Results

4.1.1 Socio-Demographic Characteristics of Respondents

A total of 127 patients participated in this study. Table 4.1 presents the socio-demographic distribution of the respondents.

Table 4.1: Socio-Demographic Characteristics of Respondents (N = 127)

Variable	Category	Frequency	Percentage (%)
Age	18-25	23	18.1
	26-35	38	29.9
	36-45	32	25.2
	46-55	21	16.5
	Above 55	13	10.2
Sex	Male	54	42.5
	Female	73	57.5
Marital Status	Single	41	32.3
	Married	68	53.5
	Divorced	11	8.7
	Widowed	7	5.5
Educational Level	No formal education	9	7.1
	Primary school	18	14.2
	Secondary school	47	37.0
	Tertiary education	53	41.7
Type of Imaging	X-ray	76	59.8
	CT scan	38	29.9
	Both	13	10.2
Previous Imaging	First time	49	38.6
	Not first time	78	61.4

Table 4.1 shows that the majority of respondents were aged 26-35 years (29.9%), followed by those aged 36-45 years (25.2%). Females constituted 57.5% of the sample, while males were 42.5%. More than half of the respondents (53.5%) were married, and 41.7% had tertiary

education. X-ray examination was the most common imaging procedure (59.8%), and 61.4% of the patients had undergone radiation-based imaging before.

4.1.2 Knowledge of Psychological Effects of Radiation Exposure

Research Question 1: What is the level of patients' knowledge of the psychological effects of radiation exposure?

Table 4.2: Knowledge of Psychological Effects of Radiation Exposure (N = 127)

Item	Response	Frequency	Percentage (%)
Awareness that radiation can affect someone psychologically	Yes	56	44.1
	No	71	55.9
Identification of psychological effects	Anxiety	48	37.8
	Stress	41	32.3
	Depression	19	15.0
	None	32	25.2
	Don't know	43	33.9
Belief that repeated exposure increases distress	Strongly agree	37	29.1
	Agree	51	40.2
	Disagree	28	22.0
	Strongly disagree	11	8.7
Knowledge of difference between imaging modalities	Yes	62	48.8
	No	65	51.2

Table 4.2 reveals that 55.9% of respondents did not know that radiation exposure could affect someone psychologically. Only 37.8% correctly identified anxiety as a psychological effect, and 33.9% admitted they did not know any psychological effects. However, 69.3% (strongly agree + agree) believed that repeated exposure could increase psychological distress. Slightly more than half (51.2%) could not distinguish between imaging procedures that use radiation and those that do not.

Table 4.3: Overall Knowledge Level Classification (N = 127)

Knowledge Level	Frequency	Percentage (%)
Good (70-100% correct)	28	22.0
Fair (50-69% correct)	25	19.7
Poor (Below 50% correct)	74	58.3
Total	**127**	**100.0**

Table 4.3 shows that 58.3% of respondents had poor knowledge, 19.7% had fair knowledge, and only 22.0% demonstrated good knowledge of the psychological effects of radiation exposure.

4.1.3 Awareness of Psychological Effects of Radiation Exposure

Research Question 2: What is the level of patients' awareness of the psychological effects of radiation exposure?

Table 4.4: Awareness of Psychological Effects of Radiation Exposure (N = 127)

Item	Response	Frequency	Percentage (%)
Healthcare provider explained psychological effects	Yes	30	23.6
	No	97	76.4
Information given about anxiety/fear before imaging	Yes	22	17.3
	No	105	82.7
Aware that emotional support reduces anxiety	Yes	67	52.8
	No	60	47.2
Aware of hospital measures for emotional concerns	Yes	18	14.2
	No	109	85.8

Table 4.4 indicates that 76.4% of respondents reported that no healthcare provider had ever explained the psychological effects of radiation exposure to them. Similarly, 82.7% stated they were not given information about how radiation might make them feel anxious or fearful before the procedure. While 52.8% were aware that emotional support could reduce anxiety, 85.8% were unaware of any hospital measures to address emotional concerns about radiation.

Table 4.5: Overall Awareness Level Classification (N = 127)

Awareness Level	Frequency	Percentage (%)
High (70-100% aware)	21	16.5
Moderate (50-69% aware)	27	21.3
Low (Below 50% aware)	79	62.2
Total	**127**	**100.0**

Table 4.5 shows that 62.2% of respondents had low awareness, 21.3% had moderate awareness, and only 16.5% had high awareness of the psychological effects of radiation exposure.

4.1.4 Perception of Psychological Effects of Radiation Exposure

Research Question 3: What elicits patients' perception of the psychological effects of radiation exposure?

Table 4.6: Perception of Psychological Effects of Radiation Exposure (N = 127)

Item	Response	Frequency	Percentage (%)
Emotional response when told about imaging	Calm	36	28.3
	Slightly anxious	54	42.5
	Very anxious	28	22.0
	Afraid	9	7.1
Belief that radiation could harm psychologically	Yes	64	50.4
	No	27	21.3
	Not sure	36	28.3
Overall emotional experience during procedure	No distress	29	22.8
	Mild distress	51	40.2
	Moderate distress	35	27.6
	Severe distress	12	9.4
Worry about long-term mental health effects	Strongly agree	38	29.9
	Agree	49	38.6
	Disagree	31	24.4
	Strongly disagree	9	7.1
Would prefer more information beforehand	Yes	106	83.5
	No	21	16.5

Table 4.6 reveals that 71.6% of respondents experienced some level of anxiety or fear when informed about radiation-based imaging (slightly anxious, very anxious, or afraid). Half of the respondents (50.4%) believed radiation could harm them psychologically, while 28.3% were unsure. Regarding emotional experience, 77.2% reported experiencing some degree of distress during the procedure. A substantial 68.5% (strongly agree + agree) expressed worry about long-term mental health effects, and 83.5% indicated they would have preferred more information about psychological effects before their procedure.

4.1.5 Relationship Between Socio-Demographic Variables and Knowledge Level

Table 4.7: Cross-tabulation of Socio-Demographic Variables and Knowledge Level (N = 127)

	Good	Fair	Poor	χ^2	p
Age Group					
18-25	4 (17.4)	5 (21.7)	14 (60.9)	12.38	0.135
26-35	10 (26.3)	8 (21.1)	20 (52.6)		
36-45	8 (25.0)	7 (21.9)	17 (53.1)		
46-55	4 (19.0)	3 (14.3)	14 (66.7)		
Above 55	2 (15.4)	2 (15.4)	9 (69.2)		
Sex					
Male	14 (25.9)	9 (16.7)	31 (57.4)	2.14	0.343
Female	14 (19.2)	16 (21.9)	43 (58.9)		
Marital Status					
Single	8 (19.5)	9 (22.0)	24 (58.5)	3.72	0.715
Married	16 (23.5)	13 (19.1)	39 (57.4)		
Divorced	3 (27.3)	2 (18.2)	6 (54.5)		
Widowed	1 (14.3)	1 (14.3)	5 (71.4)		
Educational Level					
No formal education	0 (0.0)	1 (11.1)	8 (88.9)	24.67	0.000*
Primary school	1 (5.6)	2 (11.1)	15 (83.3)		
Secondary school	8 (17.0)	9 (19.1)	30 (63.8)		
Tertiary education	19 (35.8)	13 (24.5)	21 (39.6)		
Type of Imaging					
X-ray	15 (19.7)	17 (22.4)	44 (57.9)	5.83	0.212
CT scan	10 (26.3)	6 (15.8)	22 (57.9)		
Both	3 (23.1)	2 (15.4)	8 (61.5)		
Previous Imaging Experience					
First time	6 (12.2)	7 (14.3)	36 (73.5)	11.92	0.003*
Not first time	22 (28.2)	18 (23.1)	38 (48.7)		

Tables 4.7 present comprehensive cross-tabulations showing the distribution of knowledge levels across all socio-demographic characteristics. It shows that knowledge distribution varied across age groups, with the 26-35 age group having the highest proportion of good knowledge (26.3%), though this difference was not statistically significant. It also reveals similar knowledge distribution between males and females (both 25.9% good knowledge), confirming no significant gender difference. Married patients had slightly better knowledge than other marital statuses, but this was not statistically significant. A striking differences by educational level: patients with tertiary education had notably better knowledge distribution (35.8% good, 24.5% fair, 39.6% poor) compared to those with no formal education (0% good, 11.1% fair, 88.9% poor). It shows that CT scan patients had slightly better knowledge (26.3% good) compared to X-ray patients (19.7% good), though not significantly different. It demonstrates that patients with previous imaging experience had substantially better knowledge (28.2% good, 23.1% fair, 48.7% poor) compared to first-timers (12.2% good, 14.3% fair, 73.5% poor). Table 4.7 also shows the chi-square analysis, confirming that only educational level ($\chi^2 = 24.67$, $p = 0.000$) and previous imaging experience ($\chi^2 = 11.92$, $p = 0.003$) had significant relationships with knowledge level at $p < 0.05$. Age, sex, marital status, and type of imaging procedure showed no significant relationships with knowledge level.

4.1.6 Testing of Hypothesis

Hypothesis: There is no significant relationship between patients' knowledge of radiation exposure and their psychological response (such as anxiety or emotional distress) during diagnostic imaging at UBTH.

Table 4.8: Cross-tabulation of Knowledge Level and Psychological Response (N = 127)

Knowledge Level	No Distress	Mild Distress	Moderate Distress	Severe Distress	Total
Good Knowledge	12	11	4	1	28
Fair Knowledge	8	12	4	1	25
Poor Knowledge	9	28	27	10	74
Total	**29**	**51**	**35**	**12**	**127**
Column %	**22.8%**	**40.2%**	**27.6%**	**9.4%**	**100%**

χ^2=18.42; p = 0.001

Table 4.8 presents the cross-tabulation showing the relationship between knowledge level and psychological response (emotional distress). The table reveals clear patterns: among patients with good knowledge, 42.9% experienced no distress or mild distress, while only 3.6% experienced severe distress. Conversely, of patients with poor knowledge only 12.2% had no distress and 13.5% had severe distress. Most patients who had poor knowledge (37.8%), were moderate and even severely distressed as opposed to 17.9% in those who had good knowledge. It also demonstrates the outcome of the chi-square test that would investigate the association between the level of knowledge of the radiation exposure in the patients and their psychological reaction. The computed chi-square test of 18.42 and 6 d.f. resulted in a p -value of 0.001, not less than the 0.05 level of significance. Thus, the null hypothesis is not accepted. It shows that knowledge of radiation exposure among patients and their psychological reaction during diagnostic imaging at UBTH have a strong relationship. Poorly-informed patients had a higher chance of the emergence of the level of anxiety and emotional distress.

4.2 Discussion of Findings

In this study, it was found that most patients at UBTH (58.3) had less knowledge on the psychological impacts of radiation exposure with only 22.0% showing good knowledge. Precisely, 55.9 percent of the surveyed respondents knew nothing about the possibility of radiation exposure having any psychological impact and a good number of them (33.9 percent) confessed to being still unaware of any psychological impact of radiation exposure. These results go hand in hand with those reported by Busey et al. (2013), who established that a significant number of patients who received diagnostic imaging did not have a good knowledge of radiation exposure and its different effects, including psychological effects. The gap in knowledge that is observed in the present study is alarming, as it implies that the patients are agreeing to the procedures without necessarily knowing the emotional and mental impacts they may have.

This gap in knowledge is further emphasized by the fact that only 37.8 percent of the respondents were able to accept the presence of anxiety as a psychological effect of exposure to radiation. It is in line with Rampersad et al. (2024), who discovered that patients in a tertiary care facility had significant misunderstandings about the use of ionizing radiation and its influence, mostly because of the lack of proper patient education. The insufficient level of knowledge, which was measured in the given study, can be explained by the fact that the field of radiology is rather technical, and the discussion is usually dedicated to the effectiveness of the procedures rather than patient education. According to Ribeiro et al. (2020), the lack of awareness of patients about radiation exposure and its impact adds to the increased anxiety and emotional pressure.

Interestingly, the general poor knowledge did not stop 69.3% of the respondents who were of the idea that repeated radiation exposure has the potential of enhancing psychological distress. This

implies that the patients might lack detailed knowledge but they have an intuitive knowledge that repeated exposures have emotional implications. This intuition cannot be relied upon to alleviate anxiety, indeed it might increase worry when not supplemented by clear information that is reassuring. The given discovery reinforces the necessity to not only bridge the gaps in knowledge, but also support patients emotionally and offer proper frameworks to work through their concerns.

It was also discovered in the study that education level was a significant factor in knowledge (= 0.000) and the patients with tertiary education proving to be more knowledgeable regarding the psychological effects than those with a lower level of education. This result is consistent with Alawad and Abujamea (2021) who have found that more educated patients were usually more sensitive about radiation hazards. Nevertheless, the problem of the existing knowledge gaps even in educated patients indicates that formal education is not enough. It is evident that there is a need to develop patient-friendly health education in radiology departments specifically targeting the gaps irrespective of the education levels of patients.

The researchers discovered that, the awareness of the psychological effects of radiation exposure was low among patients as 62.2% were found to be lowly aware and only 16.5% of the patients were highly aware. The most notable perhaps was an observation which revealed that 76.4 percent of the respondents had never been given by healthcare providers any explanation on the psychological effects of radiation exposure. This is a critical communication problem in clinical practice in UBTH. Kolsur and Mamtha (2024) also noted that patients in institutions have a tendency to be unaware of radiation safety and psychological effects since healthcare providers do not provide comprehensive explanations in most cases. This trend will indicate that the

technical competence emphasis in radiology can be grabbing the attention of the crucial patient education and emotional support requirements.

Moreover, 82.7% patients reported not being provided with any information regarding how radiation exposure could make them anxious/fearful prior to their procedure. This is a worrying aspect, given the fact that patients are exposed to sudden emotional distresses during imaging due to this deprivation of pre-procedure counseling. Ribeiro et al. (2020) state that psychological strain is more likely to escalate when patients have inadequate information, which is replaced by assumptions or culturally biased fears. There is also the limitation of the communication that prevents patients to make an informed consent, because they may not comprehend the emotional aspects of the procedure they are giving consent to.

Interestingly, 52.8 percent of the respondents were quite aware of the ability of emotional support in lowering anxiety and 85.8 percent were not aware of any hospital strategy that might consider emotional issues relating to radiation. This is an indication of a lack of connection between the patients in as much as they know the importance of emotional support but are not convinced that it is given the priority or made available in the health care system. This observation is not new as Aldahery (2023) observed that radiographers do not receive proper training or even institutional support to meet the emotional needs of patients during imaging services. It points out a disconnection not only at the level of personal communication, but also at the level of the systemic strategies of patient-centered care.

It was also established in the study that awareness was strongly correlated with prior imaging experience ($p = 0.003$). Patients with prior imaging were a little more aware of the psychological effects, perhaps due to the repetition of effects that provided them with first hand experience of

the impact. Nevertheless, level of awareness was still quite low in such patients, which means that experience alone does not necessarily lead to improvement of understanding and it should be supported by intentional learning and communication by healthcare providers.

The results in terms of perception showed that 71.6 percent of the patients felt a measure of anxiety or fear whenever it was told that they were going to undergo imaging based on radiations. This is in line with the findings of Samaila et al. (2024), who reported that the prevalence of emotional distress is often high among patients, going as far as acute anxiety prior to a procedure up to prolonged emotional distress. This was further indicated by the fact that only 28.3% of the respondents felt calm which means that the imaging experience is emotionally distressing to most of the patients, irrespective of the level of physical risk that it entails.

Also, 50.4 per cent of the respondents had the belief that radiation would affect them psychologically and 28.3 per cent were in doubt. This confusion per se is in distress because patients are placed in a state of emotional uncertainty, with no knowledge as to whether their fears are justified or not. It is possible that Rampersad et al. (2024) have noted that the myths surrounding radiation exposure are among the factors that drive anxiety and fear particularly in patients first arriving at the facility or patients receiving high dose. The fact that almost 80% of patients either thought they were psychologically harmed or they did not know it shows the pressing necessity of clear and helpful communication that can mention these fears.

The research also revealed that 77.2 per cent of patients suffered some level of emotional distress during imaging procedure and 9.4 per cent of them said that they had severe distress. The result is correlated with Ribeiro et al. (2020) stating that a significant part of emotional pressure among patients is connected to their unawareness and the absence of reassurance. Even the fact that

distress is present in even routine procedures points out to the fact that emotional comfort is as significant to radiological care as physical safety. It implies that psychological support may be integrated in the routine imaging procedures to enhance patient experience considerably.

Notably, 68.5 percent of the participants were concerned about the mental health consequences of radiation with time. This is a long-term concern that means that the mental effects of radiation exposure are not terminated when the imaging procedure has been done; they may persist and transcend to anxiety. This observation can be used to argue in favor of Samaila et al. (2024) point that mental health assistance must be part of imaging and treatment guidelines particularly in the case of vulnerable populations or those with a need of recurring imaging.

Lastly, an overwhelming majority of patients (83.5) said that they would have preferred to be informed more about the psychological impact of radiation exposure prior to undergoing the procedure. Such preference to have more information indicates that the patients are not inactive subjects of care, but rather, they desire to be participatory and informed participants in their treatment process. This observation resonates with the suggestions of Busey et al. (2013), who highlighted that need to enhance patient education that would result in more knowledgeable, self-assured, and emotionally stable patients. It also conforms to the postulates of the Health Belief Model that holds that communication and sufficient information (cues to action) could minimize perceived barriers and positively influence emotional reaction of patients to health interventions.

The research determined that the knowledge of radiation exposure and psychological response of patients had a statistically significant relationship ($kh2 = 18.42$, $p = 0.001$). This implies that poorly informed patients had a high probability of developing increased anxiety and emotional discomfort in the course of diagnostic imaging. This result supports the theoretical framework

that will be used to conduct this study especially Health Belief Model, which indicates that people beliefs and knowledge determine how they respond emotionally and behaviorally to health related situations.

This finding is in line with the literature at large. Rampersad et al. (2024) observed that effective explanations by healthcare professionals greatly lowered the anxiety levels in patients who are undertaking imaging. Likewise, Ribeiro et al. (2020) highlighted that enhancing patient awareness by means of the effective and easy to access communication is a key to lessening redundant emotional strain. The meaningful correlation that has been identified in this study contributes to the fact that knowledge is not merely a technical issue; it is a crucial element that defines the emotional health and the general experience of patients in the healthcare facilities.

The clinical implication of the research is obvious: the response to a lack of knowledge by patient education and communication should be at the forefront in the radiology departments. Once the patients know what radiation is, the purpose of its usage, and safety protocols established; they will be in a better position to control their emotions and handle the imaging procedure with confidence, as opposed to fearing it. In its turn, it may also enhance cooperation in the field of imaging, increase the quality of care, and make people more trustful of the healthcare system.

CHAPTER FIVE

CONCLUSION, RECOMMENDATIONS, LIMITATIONS, AND SUGGESTIONS FOR FURTHER STUDIES

5.1 Conclusion

This paper finds that gaps in patient knowledge and awareness of psychological effects of radiation exposure in UBTH are very high. Most of the patients who approach diagnostic imaging procedures lack proper information about the emotional and mental effects of radiation exposure, which causes them to develop anxiety, fear, and emotional distress. Failure to communicate by the healthcare providers especially the radiographers adds significantly to these psychological burdens. The fact that knowledge is correlated with psychological response to a great extent once again proves that enhancing patient knowledge can directly lead to the reduction of emotional distress and overall positive patient experience.

The results indicate the necessity of a paradigm shift in the practice of radiology at UBTH, which would consider patient not only as an object of technical operations, but a person with valid emotional and psychological needs. Patient-centered communication, education, and emotional support are not a luxury that will benefit the needs and requirements of patients; it is a crucial part of holistic, high-quality healthcare. By eliminating the gaps in knowledge and awareness that are revealed in this research paper, radiographers and other healthcare providers will be able to make patients feel confident, trustful, and emotionally secure when facing diagnostic imaging.

5.2 Recommendations

Recommendations are based on this study findings as follows:

1.Integration of Patient Education Programs: UBTH radiology department needs to design and introduce patient education programs that are systematic and easy to understand regarding radiation exposure and their psychological impacts on the patients. Such programs may involve short pre-procedural counseling sessions, informational pamphlets, posters or brief videos that are played in the waiting rooms.

2.Radiographer Patient-Centered Communication Training: Radiographers are to be given official training of patient-centered communication and understanding counseling. This training must extend beyond technical expertise to encompass the ability to identify and respond to the emotive worries of patients, provide responses in simple language and be reassuring.

3.Establishing Emotional Support Services: UBTH should also think of having emotional support services in the radiology department which can be access to support services like counselors or patient advocates to offer psychological support to patients who feel extremely anxious or distressed.

4.Simple, Patient-Friendly Language: It is vital to promote the use of non technical jargon between the healthcare providers and the patients. The level of patient understanding should be used to tailor the information and especially the low health literate patients should be considered.

1. 5.Cooperation with Medical and Nursing Personnel: Radiographers are to cooperate with the referring physicians and nurses to ensure that patients obtain the same information and support on the emotional level during the process of receiving medical care. This multidisciplinary strategy can facilitate the strengthening of the important messages and decrease anxiety in patients.

5.3 Limitations of the Study

Although the given study presents useful information, it must be admitted that it has its constraints:

1. Sample Size and Sampling Technique: The study sampled 127 patients in one institution which is relatively small as the study employed a convenience sampling method. This hinders the generality of the results to other hospitals or regions in Nigeria. The potential way forward involves the use of random sampling and larger and more diverse populations in future research.

2. Self-Reported Data: The study used self-reported data and the patients therefore this could be subject to recall bias, social desirability bias or poor interpretation of question. It is also possible that some of the respondents gave answers that they thought were to be given and not based on real knowledge or emotions.

3. Cross-Sectional Design: The study is cross sectional in nature which implies that the data were taken at one point in time. This design is not able to measure the impact of knowledge, awareness, or psychological change with time or following interventions.

5.4 Suggestions for Further Studies

According to the results and shortcomings of the current study the following recommendations can be given regarding further research:

1. Multi-Center Studies: Future studies need to be held in more than one healthcare institution in Nigeria to enhance the generalizability and give a wider picture of the patients knowledge and awareness regarding radiation exposure and its psychological impact.

2. Longitudinal Studies: Longitudinal studies that observe patients and their changes throughout time may offer much information about the influence of knowledge, awareness, and psychological reactions on education interventions or recurring imaging experiences.

3. Intervention Studies: Experimental or quasi-experimental studies are needed to determine the effectiveness of particular patient education programs or communication interventions in decreasing the anxiety levels of patients receiving radiation-based imaging and enhancing their knowledge.

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APPENDIX

QUESTIONNAIRE
Evaluation of the Knowledge and Awareness of Psychological Effects of Radiation Exposure among patients in UBTH

Dear Participant, my names is Eboigbe Precious Omoye, a 500 level final year student of the Department of Radiography, University of Benin. You are kindly invited to participate in a research study titled "Evaluation of the Knowledge and Awareness of Psychological Effects of Radiation Exposure among patients in University of Benin Teaching Hospital " This study is being conducted as part of a research project at the University of Benin, Department of Radiography. The purpose of this questionnaire is to gather your valuable perceptions and awareness psychological effects of radiation exposure. Your participation Is completely voluntary.

INSTRUCTIONS TO RESPONDENTS
Please answer the following questions honestly. Your responses will be treated with strict confidentiality and used only for research purposes. There are no right or wrong answers. Kindly tick (✓) the most appropriate option or fill in the blank spaces where necessary.

SECTION A: SOCIO-DEMOGRAPHIC DATA

1. Age:
☐ 18–25
☐ 26–35
☐ 36–45
☐ 46–55
☐ Above 55

2. Sex:
☐ Male
☐ Female

3. Marital Status:
☐ Single
☐ Married
☐ Divorced
☐ Widowed

4. Educational Level:
☐ No formal education
☐ Primary school
☐ Secondary school
☐ Tertiary education

5. Occupation: _____

6. Type of Imaging Procedure Today:
☐ X-ray
☐ CT scan
☐ Both

7. Is this your first time undergoing diagnostic imaging involving radiation?
☐ Yes
☐ No

SECTION B: KNOWLEDGE OF PSYCHOLOGICAL EFFECTS OF RADIATION EXPOSURE

8. Do you know that radiation exposure during medical imaging can affect a person psychologically (e.g. cause anxiety, fear)?
☐ Yes
☐ No

9. Which of the following do you think could be a psychological effect of radiation exposure? (You may tick more than one)
☐ Anxiety
☐ Stress
☐ Depression
☐ None
☐ I don't know

10. Repeated radiation exposure during imaging can increase psychological distress (e.g. worry, fear).
☐ Strongly agree
☐ Agree
☐ Disagree
☐ Strongly disagree

11. Do you know the difference between imaging procedures that use radiation (e.g. X-ray, CT) and those that do not (e.g. ultrasound)?
☐ Yes
☐ No

SECTION C: AWARENESS OF PSYCHOLOGICAL EFFECTS OF RADIATION EXPOSURE

12. Has any healthcare provider ever explained to you the possible psychological effects of radiation exposure?
☐ Yes
☐ No

13. Before undergoing imaging, were you given any information about how radiation exposure might make some people feel anxious or fearful?
☐ Yes
☐ No

14. Are you aware that emotional support can reduce anxiety related to radiation exposure?
☐ Yes
☐ No

15. Are you aware of any measures (e.g. counseling, education) provided by the hospital to address patients' emotional concerns about radiation?
☐ Yes
☐ No

SECTION D: PERCEPTION OF PSYCHOLOGICAL EFFECTS OF RADIATION EXPOSURE

16. How did you feel when you were told you would undergo an imaging test involving radiation?
☐ Calm
☐ Slightly anxious
☐ Very anxious
☐ I was afraid

17. Do you believe that radiation exposure during imaging could harm you psychologically?
☐ Yes
☐ No
☐ I'm not sure

18. Rate your overall emotional experience today regarding your imaging procedure:
☐ I felt no distress
☐ I felt mild distress
☐ I felt moderate distress
☐ I felt severe distress

19. I am worried about the possible long-term effects of radiation on my mental health.
☐ Strongly agree
☐ Agree
☐ Disagree
☐ Strongly disagree

20. Would you have preferred to receive more information about the psychological effects of radiation exposure before your procedure?
☐ Yes
☐ No

THANK YOU FOR YOUR TIME AND HONEST RESPONSES.

HEALTH RESEARCH ETHICS COMMITTEE (HREC)

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Registration Number:
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PROTOCOL NUMBER: ADM/E 22/A/VOL.VII/2025/246

PROPOSAL TITLE: "EVALUATION OF THE KNOWLEDGE AND AWARENESS OF PSYCHOLOGICAL EFFECTS OF RADIATION EXPOSURE AMONG PATIENTS IN UNIVERSITY OF BENIN TEACHING HOSPITAL"

PRINCIPAL INVESTIGATOR(S): EBOIGBE PRECIOUS OMOYE

DEPARTMENT/INSTITUTION: DEPARTMENT OF RADIOGRAPHY, SCHOOL OF BASIC MEDICAL SCIENCES UNIVERSITY OF BENIN, BENIN CITY, EDO STATE.

DATE CONSIDERED: SEPTEMBER 30TH, 2025

DECISION OF THE COMMITTEE: APPROVED

THIS APPROVAL DATES 30/9/2025 TO 29/9/2026. IF THERE IS DELAY IN STARTING THE RESEARCH, PLEASE INFORM THE HREC SO THAT THE DATES OF APPROVAL CAN BE ADJUSTED ACCORDINGLY

REMARK:

CHAIRMAN: PROF. (MRS) A.N. OFILI **SIGNATURE & DATE:** 30/9/2025

UNIVERSITY OF BENIN TEACHING HOSPITAL ETHICS & RESEARCH COMMITTEE Sign..... Date..... BENIN CITY P.M.B. 1111

SUPERVISOR (S): DR. G.E. OKUNGBOWA

DECLARATION BY INVESTIGATOR(S):
PROTOCOL NUMBER (please quote in all enquiries)
Note that no participant accrual or activity related to this research may be conducted outside of these dates. All informed consent forms used in this study must carry the HREC assigned number and duration of HREC approval of the study. In multiyear research, endeavor to submit your annual re-port to the HREC early in order to obtain renewal of your approval and avoid disruption of your research. No changes are permitted in the research without prior approval by the HREC except in circumstances outlined in the Code. The HREC reserves the right to conduct compliance visit your research site without previous notification

Signature & Date.....

APPENDIX III

INTELLECTUAL PROPERTY & TECHNOLOGY TRANSFER OFFICE (IPTTO)

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CLEARANCE FORM

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NAME: EBOIGBE PRECIOUS OMOYE

MATRIC NO: BMS2005183

DEPARTMENT: RADIOGRAPHY

FACULTY: BASIC MEDICAL SCIENCES

SESSION OF GRADUATION: 2024/2025

DIRECTOR
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IPTTO (VCO)
UNIVERSITY OF BENIN

Head Of Unit (IPTTO)