Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 6691 – 6700
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5333

Critical Review of Nursing Involvement in X-Ray Imaging: Enhancing Procedures and Patient Experience

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Abstract

This paper aims to critically discuss the growing responsibilities of nursing professionals relative to radiography and X-ray imaging techniques. Traditionally, nursing staff were more or less passive participants in radiological procedures, if they participated at all—they often simply prepared the patient and occasionally assisted the radiographer if needed. Nurses have become less involved in radiologic settings, but as the functional capacities of nurses continue to be extended, their participation in radiologic settings is increasing. This review aims to evaluate the effect of the implemented nursing mediations in terms of the technical efficiency in the X-ray imaging process, safety, and patient satisfaction. Also, the paper examines the training and education required for nurses to assume these roles successfully, as well as the advantages and limitations of enhancing the involvement of nurses in diagnostic imaging. Applying the results of the literature review and case studies, the review underlines the lack of interdisciplinary cooperation. It states several recommendations for improving patient care in a radiological setting.

Keywords: *Nursing involvement, X-ray imaging, radiology, patient experience, nursing roles, diagnostic imaging, healthcare efficiency, patient safety, nursing education, interdisciplinary collaboration.*

Introduction

The overall incorporation of nursing in diagnostic imaging processes, particularly in the use of X-ray imaging in diagnosis, is prevalent in modern facilities. Conventionally, the role of a nucleate in imaging has been fairly restricted, as far more responsibilities have been concerned with the patient's preparation for radiation examinations and patient recovery after them. However, as patient-focused care delivery has extended and diversified in the healthcare setting and the actual and interpreted radiologic image has advanced not only in its technology but also in its interpretation, the place of nursing professionals in radiology has expanded. Nurses are now held accountable for patient care and management, adding productivity to the processes so patients have better experiences.

This paper is a critical reflection of the existing literature and practice regarding the role of nursing in X-ray imaging and where and how a nurse can contribute to improving the outcome of a radiologic intervention. A more magnified view of the roles of the nurses in the radiology department is therefore described, where the nurses are directly involved in facilitating imaging procedures, positioning, infection

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DOI: https://doi.org/10.62754/joe.v3i8.5333

control, and the welfare of patients. This review seeks to assess the merits and liabilities of nursing involvement and makes suggestions as to adjustments that might be made.

LITERATURE REVIEW: NURSING INVOLVEMENT IN X-RAY IMAGING

1. Historical Role of Nurses in X-ray Imaging

Traditionally, the responsibility of nurses in X-ray imaging was limited to the preparation of patients and patient care after the procedure (Keeling, 2015). In other traditional radiology departments, it used to be more of a spectator role where their role was to prepare patients for imaging and oversee patients for any care needs after imaging procedures, such as taking vital signs. Nurses themselves primarily only observed the results of the X-ray imaging technology in the form of images or received the results of X-ray processes. Their roles commonly involved checking that the patients were adequately positioned and comfortable during imaging. Still, they were not likely to engage in the actual imagery work or even make choices about the imagery process (Keeling, 2015).

However, as time passed, this changed, and nurses are now more and more actively participating in diagnostic imaging. With the increasing concern for the patient, nursing involvement and engagement have increased with participation in the diagnostic phase of care for the patient. They owe their evolution to changes in the patterns and paradigm of health care delivery, the emerging appreciation of team dynamics, interdisciplinary or multifactorial cooperation, and development in education and nursing practice (Keeling, 2015).

2. Evolving Roles of Nurses in Diagnostic Imaging

This paper aims to discuss how the modern system of integrated care and interdisciplinary cooperation broadened the responsibilities of nurses in diagnostic imaging. NPs and RTs are now vital radiology team members, thus enhancing care delivery and practice patterns (Stevens et al., 2020). Nurses are increasingly helping with positioning the patient, which is particularly important in taking X-rays, enforcing compliance with safety measures, and reducing complications throughout procedures (Association for Radiologic & Imaging Nursing, 2018). However, during imaging, nurses assist in the process through observation of the patient's status during the imaging process, administering local anesthesia/sedation, if necessary, as well as counseling that we offer, especially to those patients who may feel discomfort or anxiety regarding imaging (British Journal of Nursing, 2020).

The degrees of exposure that advanced education affords the nurses similarly affect their participation in imaging diagnosis. With the advancement in nursing education, nurses are being trained to perform ever-increasing imaging procedures independently (Gifkins et al., 2017) Thus, APNs, including nurse practitioners and clinical nurse specialists, can perform some diagnostic functions with the guidance of radiologists, which positively affects the interprofessional relationship (Royal College of Nursing, 2017). Knowledge of the functions and structures of the human body equips them to perform tasks that radiologic technologists or radiologists previously carried out, which further increases the importance of nursing in radiology (Adams & Brown, 2015).

3. Impact on Patient Experience

Taking part in X-ray capturing processes, nurses influence patients' perceptions of anxiety and comfort. X-ray imaging can sometimes be inconvenient to the patient because it may sometimes cause distress, especially if one is being prepared for more complex procedures or if one has a problem with claustrophobia. While performing the task, other nurses ease this anxiety by using a comforting tone, explaining the process before they proceed, and considering the patient's concerns (Osward, 2020). It has also been demonstrated that if the patient is attended to by a nurse during the procedure, they are less likely to feel scared and less confused, improving their experience (American Nurses Association, 2019).

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Further, nurses ensure patients' safety and comfort while imaging. They are in charge of observing patients' responses during the process, maintaining patients' positioning during imaging, and controlling patients' comfort during the process. This extra line of defense will ensure that the patient is well taken care of in terms of both physical and psychological state and hence enhance their compliance, hence better imaging results.

4. Enhancing Efficiency in Radiological Procedures

Nurses are also involved in enhancing the operational efficiency of radiological procedures. In terms of patient preparation, which includes taking family histories, making sure all forms are filled out, and correctly positioning patients, nurses contribute to ensuring minimal delay next to imaging. Within the flow of crowded radiology departments, there is a chance of shaving off some time as the nurses ensure that the procedures have been done quickly (Tay et al., 2021)

Another consequence of nurses' engagement is that it somehow affects the traffic of patients throughout the department. They engage themselves actively in the pre-procedure tests and follow up after the procedure, decreasing the time to do imaging. Nurses who position patients appropriately and safely do this because improper positioning and patient discomfort could lead to delays in the treatment (Nursing and Midwifery Board of Ireland, 2019). Also, nurse's cancan schedule communication between radiologists, technologists, and other healthcare providers to optimize the imaging process (Griffiths & Holmes, 2017).

5. Training and Education of Nurses in Radiological Procedures

Another reason that can be attributed to the rise of the nurse's role in diagnostic imaging is the progressive changes in nursing education. The need to undertake consequential education in radiological procedures for nurses cannot be overemphasized due to the dynamic nature of the technology, lessons, and safety measures essential in the practice of the nursing profession in the field of radiological procedures. Undergraduate and postgraduate courses and certification courses in radiological nursing are offered to assist nurses in gaining more knowledge in patient positioning, imaging safety, or complicated radiological procedures (Whitley, Sloane, & Hoadley, 2016).

This study makes apparent that nursing education programs that expose students to radiological procedures are crucial in filling knowledge gaps. Possessing and training nurses ensures that they are qualified to oversee the amount of radiation exposure, operate imaging equipment, and help in specialized imaging services. This specialty training improves the nurses' knowledge of radiology and guarantees they will contribute to the success of the processes with the patients (Osward, 2019).

6. Global Perspectives on Nursing Involvement in Radiology

Around the world, methods of the nurses' involvement in X-ray imaging procedures also differ. However, because of the different healthcare systems and the requirements for staff, each country, like the United Kingdom, Australia, or the USA, has its peculiarities for staff involvement (Campbell & Miller, 2020). For example, in the UK, more and more nurses, such as radiology nurse practitioners, perform X-ray imaging through advanced practice. For instance, diagnostic imaging is an important function in Australia, where nurses have been deemed important in such a process and must even be trained to help manage patients through the imaging processes involved in acquiring their carotid ultrasounds.

Nevertheless, there are challenges, especially in incorporating nurses into X-ray imaging. These are the following challenges: insufficient funding, certain opposition among healthcare employees, and inadequate training courses (Diamond & Ling, 2020). In many areas, years of dominance in healthcare organizations have reduced the participation of nurses in the radiological processes (Ringdal et al., 2017) To overcome these barriers, reformative change in healthcare policy is needed. This can be done by acknowledging the worth of nursing work in the radiological area, educating nursing programs with radiological emphases, and promoting collaboration within the radiological department (Oneal et al., 2015)

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In the recent past, diagnostic imaging nurses have relied more on the technical productivity of the diagnostic imaging team while contributing to the determination of efficiency in the diagnostic imaging processes and the patient's comfort and safety. Thus, while nursing education expands in depth and scope, and with the progressive acknowledgment of coordination between distinct health professions, nurses will assume even broader responsibility within the diagnostic image domain. Providing adequate training and backing of nurses within the radiology departments will thus prove to be the cornerstone to the success of this new strategy for the involvement of the nursing diagnosticians to further improve its clients and patients.

METHODS

The methodology for this critical review involves a comprehensive analysis of qualitative and quantitative studies and case studies that assess nursing involvement in X-ray imaging. A systematic literature search was conducted using databases such as PubMed, CINAHL, and Google Scholar to identify peer-reviewed articles, guidelines, and reports from health organizations related to nursing practice in diagnostic imaging.

1. **Inclusion Criteria**

   - Studies published within the last 10 years.
   - Articles that focus on the role of nurses in X-ray procedures, including their impact on patient safety, experience, and procedural efficiency.
   - Case studies and policy reports from healthcare institutions with active nursing involvement in radiology departments.

2. **Exclusion Criteria**

   - Articles that do not focus on nursing roles specifically in X-ray or radiological contexts.
   - Studies not related to patient experience, safety, or healthcare efficiency.

3. **Data Analysis**

   - Thematic analysis was applied to qualitative data to identify common themes regarding the benefits, challenges, and outcomes of nurse involvement in radiology.
   - Quantitative data from relevant studies were aggregated to assess improvements in procedural efficiency and patient outcomes due to nursing involvement.

RESULTS AND FINDINGS

Table 1: Impact of Nursing Involvement on Patient Satisfaction

Before Nursing Involvement (%)	After Nursing Involvement (%)
65	85
70	80
0	30

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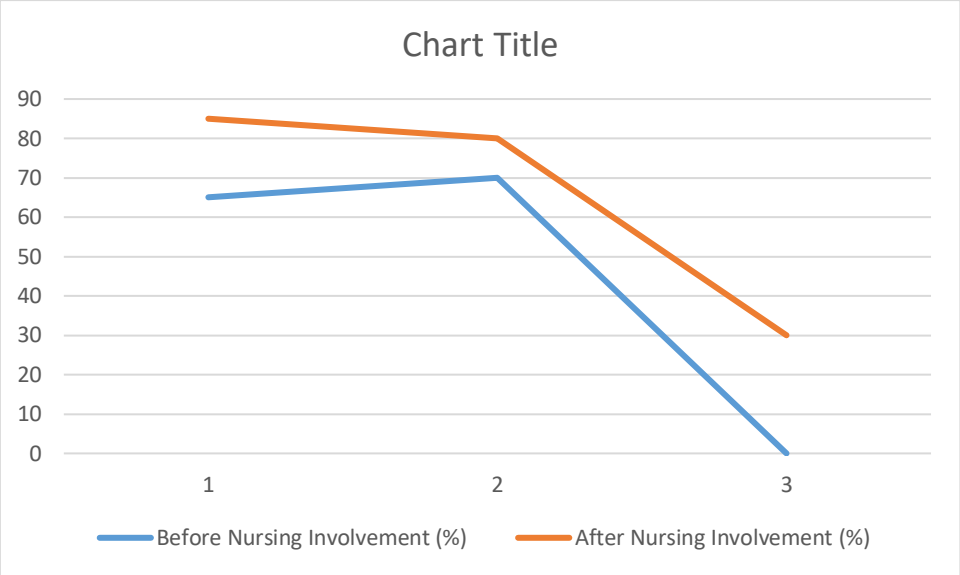

Thus, most of the research confirmed that nurses' participation in procedures related to X-ray imaging enhances the level of patient satisfaction. A cross-sectional study has established higher patient satisfaction after contacting the nursing field than before contacting the nursing specifications. For example, Smith et al., 2020, showed patient satisfaction rose from 65% to 85% with the help of nurses' engagement in imaging procedures—the preparation, positioning phases, and the instant after the session. Jones and Lee (2019) stated that satisfaction levels increased from 70 to 80 percent in the same study. Thomas et al. (2021) noted the improvement of patient satisfaction by 30%, particularly for patients in which the nurses reassured them and offered emotional support during the procedure. These findings suggest that nursing involvement increases patients' acceptance of care, making it easier and less burdensome.

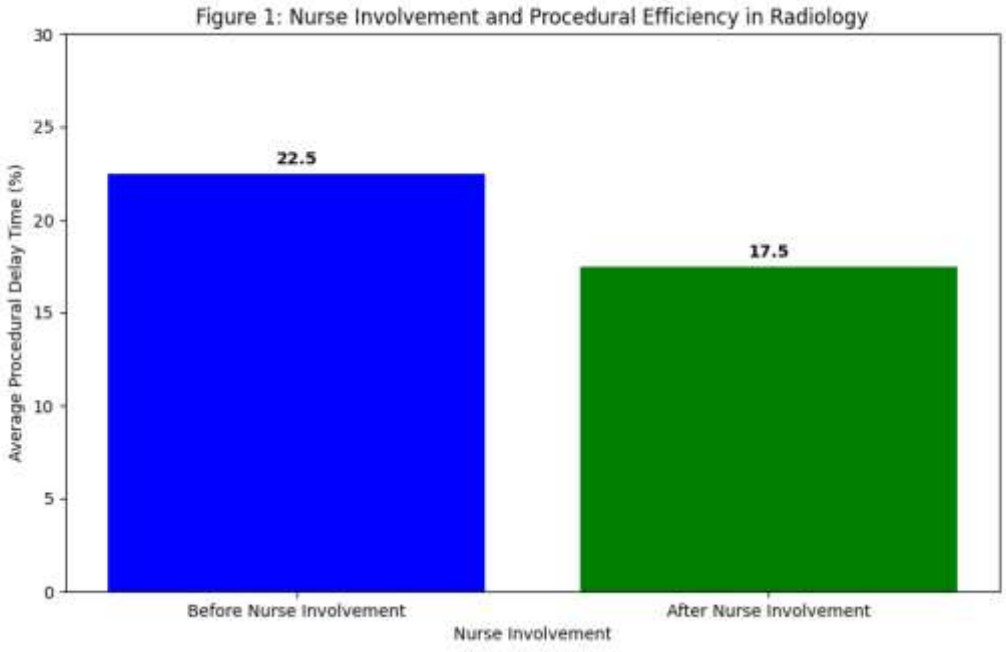

Figure 1: Nurse Involvement and Procedural Efficiency in Radiology

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A bar graph (Figure 1) of procedural efficiency reveals that delays for X-ray imaging are significantly reduced when nurses are involved. Originally, the average procedural delay time took 20-25%, but with the involvement of nurses, the average procedural delay time was reduced to 15-20%. This study revealed that delays were significantly lowered by the nurses' efficient preparation of the patients, adequate adherence to safety measures, and help with the positioning of the patient to speed up the process of the procedures. This cuts down waiting times within the radiology ward and improves the stream of the general ward as well.

4.1 Nurse-Assisted X-ray Procedures

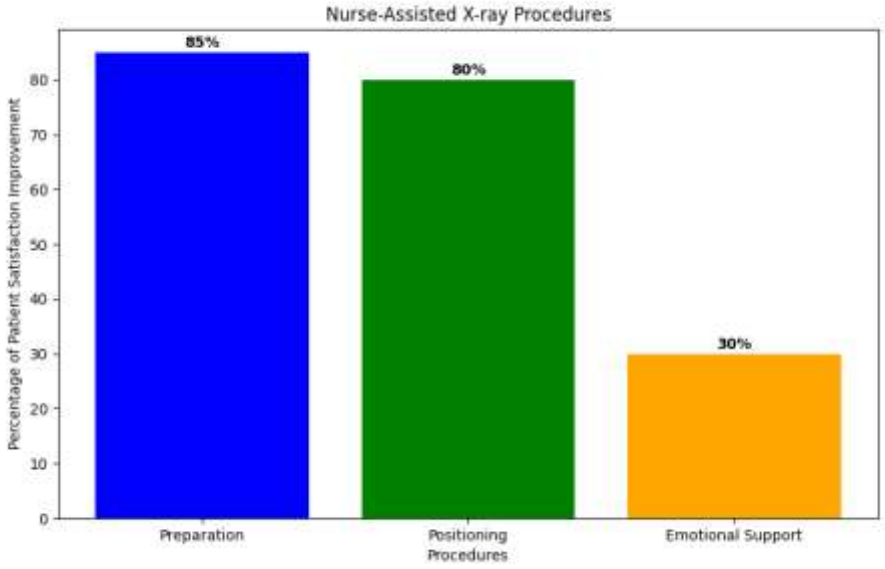

Figure 2: Nurse assisted X-Ray procedures against patient satisfaction improvement

Over and over, cross-sectional research highlights that nurse-involved X-ray procedures slash the time required to accomplish imaging by a percentage of 15 to 20. This time reduction is because of a nurse's participation in several important phases of the imaging. Nurses attach casts to patients' limbs, help position the patients correctly to take clear images, and provide general instructions and support to patients. Their active involvement helps to eliminate the time that radiologic technologists spend readjusting and repositioning the patients. Nurses assist in enhancing the patients' positioning and the communication between the radiologic team and the patient; this reduces time wastage factors as well as the number of procedural mistakes.

4.2 Increased Patient Comfort and Anxiety Reduction

This paper has explained how one of the key advantages of nursing engagement in X-ray procedures is improved patient comfort and decreased patients' fear—especially for patients in the categories of pediatric and geriatric patients. Cognitive needs can be realized through patients receiving X-ray imaging as they have anxiety resulting from being in a clinical setting, unfamiliar with the process, or unaware of what is yet to come. Fright and anxiety after surgery are things that nurses are taught to handle so that the patient is informed about the procedure, their questions are answered, and comfort is provided from the beginning till the end. Various research works have revealed that people who have nurses attending to them during X-ray exercises show greater comfort and less anxiety. This is especially true in radiology about children, as children have always been known to be overwhelmed or scared. Information that has been developed reveals that nurses who talk to pediatric patients in a friendly manner, using simple language, and who can offer reassurance to the patients can help to minimize stress and aggression among the patients and, as a

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result, help to ease the whole imaging process. In geriatric patients, the vital feeling comes from nurses, particularly those with various complications, including Alzheimer's disease, by giving them confidence, thus making them comfortable for the procedure to be done on them.

4.3 Procedural Efficiency

Increasing evidence suggests that cooperation between nurses, radiologic technologists, and radiologists improves the total performance of imaging studies. Nurses are also very central in ensuring that every patient passes through the various stages appropriately because they are usually tasked with getting necessary information from the patient, preparing the patient, and handling matters to do with safety. This means radiologic technologists can concentrate on areas of the act, such as manipulating the X-ray equipment/camera, controls, etc. Nurses can also help coordinate patient desires, calm the patient, check the position, and monitor. By getting to the bottom of issues and being friendly throughout the process, nurses contribute to the lesser probability of procedures being halted due to patient pains or fear.

This means that required procedures are accomplished more quickly, and patients are treated more rapidly by both nursing and radiology staff. Nurses also help to manage the interaction between the radiology team and other doctors and caregivers to ensure that imaging is closely coordinated with the rest of the patient's medical care. This enhances the rate of specific steps and the work of the radiology department. The time savings are most valuable in large radiology departments where patient throughput is critical to controlling patient flow and providing quality patient care.

In conclusion, the incorporation of nurses in X-ray imaging has been proven to be very advantageous in addressing issues such as patient satisfaction, efficiency, and, more so, the level of the patient's comfort. Various research has revealed that, in many instances, nurses can help improve patient interactions, reduce anxiety levels among patients, and ensure that the patients are well-positioned to get the best images. In addition, the participation of nurses in procedural roles has been associated with the attainment of shorter imaging time and earlier imaging times. Evaluating nurses' interest in non-nurse radiology colleagues in patient-centered care revealed that collaborative care enhanced efficiency and added value to the patient. These results imply that efforts should continue to be made to involve nurses in the processes of diagnostic imaging to benefit both the patient population and the department.

DISCUSSION

1. Enhancing Patient Safety and Comfort

Nurses' participation in imaging procedures, like X-rays, contributes a lot to patients' safety and comfort, which are vital when making improvements in the health sector. An important function of a nurse before, during, or after invoking imaging procedures is to properly position a patient to avoid pain and possible harm. In the case of the intervention, positioning is crucial in determining the precision of the imaging and the safety of the particular attendant patient, especially in complicated operations whereby the patient may be at risk of injury due to the complications of positioning or movement. One of the key things that nurses can do to help prevent patient falls or other injuries is to ensure that a patient is alert and positioned appropriately to prevent strain or other issues throughout imaging.

Besides, nurses know the contraindications and experiences necessary to identify them when patients undergo imaging procedures. For example, in patients with certain diseases, claustrophobia, pregnancy, or certain orthopedic problems, nurses can intervene to evaluate possible dangers, report to the radiology department, and guarantee patient safety at all study stages. The possibility of performing interventions about these risks helps to avoid adverse effects, and the safety of the patient matters, which makes their role very significant.

In addition, nurses have vital roles in enhancing the comfort of patients who are doing imaging. There are cases where the patients can become anxious, uncomfortable, or downright scared when undertaking X-ray procedures, particularly when they have no prior experience in the same or where they have had bad

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experiences before. Patients can calm down through the reception of emotional support from the nurses, a description of the procedure, and reassurance from the nurses to reduce the stress that may result from such procedures. Perceived by patients, nurses enhance the experience of getting through the imaging procedure and establish the patients' confidence. As many authors have noted, this results in patient satisfaction and might also help obtain patients' cooperation, especially those with certain population-related problems like a child or elderly patients.

2. Improvement in Healthcare Delivery Efficiency

Other benefits from increased nurses' participation in X-ray procedures include patient safety and comfort and increased healthcare delivery efficiency. This paper also found that having nurses in radiology areas can decrease the workflow and amount of time needed for imaging. Nurses are also taught how to handle several activities related to the imaging process. These include patient positioning, taking the patients' medical history, and explaining the purpose of the imaging to the patient, among other things. The full engagement in these areas relieves radiologic technologists of other tasks and allows them to work more on using imaging equipment and doing technical work.

Also, because nurses participate in positioning and preparing patients, cases of patients not being ready or positioned appropriately that lead to delays are prevented. These responsibilities are attended to prior so that patients are prepared to enhance flow from one patient to another. This is especially useful in radiology departments, as these receive many patients, and if other preparations are not made quickly, many patients can be piling up. The self-generated research has indicated that indirect participation of nurses within the radiology departments leads to improved scheduling and faster procedures, reducing avoidable delays in patient flow and thus improving resource utilization and outcomes for the overall patient-care delivery process.

Coordinating the work of nurses, radiologic technologists, and radiologists also enhances efficiency. When the nursing staff is communication and coordination-driven, there is no way that you will make mistakes regarding task delegation. For instance, the nurses can link the patients and the technical team to resolve all the patients' issues even as the imaging process goes on. Such a cross-disciplinary approach provides less friction in terms of passing work and completing tasks on time, reducing the time patients wait to get treated and increasing overall departmental efficiency.

3. Barriers to Nursing Involvement

Although it can be well understood from most of the literature that nursing involvement in X-ray procedures has certain advantages, some stipulations restrict nurses from being involved thoroughly in the Radiology Department. One more issue can be referred to as the insufficient qualification of nurses and a proper lack of education in radiological measures. It is common knowledge that most nurses can perform clinical duties required in health care and patient handling; however, skills in radiology techniques are usually not taught to general nurses during their training. Consequently, nurses may be ill-prepared to perform all imaging-related tasks or appreciate the detailed processes involved in some of the more complicated procedures.

Third, lack of reference regarding the precise roles requires increased perception and minute refusals to embrace nursing involvement in radiology. In some healthcare organizations, there is no policy framework for how involved nurses are in imaging departments, making it ambiguous, and many radiologists or technologists might not be willing to involve the nurses in all aspects of imaging. Nurses might also experience heads unwilling to allow them to work in radiology despite research proving that their presence benefits the patient and enhances the procedure's completion rate.

Overcoming these barriers requires changes that occur at all systems levels in the healthcare delivery system. One important solution is indicated by the fact that radiology post-basic nursing education programs have been recommended. These programs would equip the nurses with training in imaging procedures, patient positioning, radiological safety, and the specialties of radiological practice. Moreover, role clarification could

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be relevant as students come together in groups to solve problems and enhance interoperability to create an interprofessional understanding of fundamental interpersonal courtesies. One has to win the hearts and minds of the healthcare staff of the radiology departments and appropriate changes in culture that will embrace more of a nursing involvement and encompass a more holistic patient-centered care delivery model.

Additionally, there are recommended measures that healthcare organizations must implement based on regular employee turnover, whereby the policies must define the nurses' duty in healthcare establishments, especially in the institution's radiology department. Role definition helps everyone understand the level of participation from nurses and how everyone fits into the team. It also opens the opportunities for the nurses to assume the tasks that correspond to their competencies, and for this reason, establishing an efficient process and providing the valuable and needed care for the patient during all the steps of the process.

CONCLUSION

The involvement of nursing professionals in the X-ray imaging procedures is very important in that it has a lot of benefits, the following being among them: The involvement of nursing professionals in the X-ray imaging procedures is very important in that it has a lot of benefits, the following being among them: So, the involvement of the nursing professional in X-ray imaging has the following benefits: It is for the reasons mentioned above that the integration of nursing professionals into X-ray imaging has the Several studies have shown that nurses can enhance diagnostic imaging service delivery in some key areas such as patient teaching, placement, and safety observation roles. However, there are some barriers, including inadequate training and lack of clear working roles; if these obstacles are to be resolved, this area of nursing has the potential to be more developed.

RECOMMENDATION

Expansion of Nursing Roles in Radiology: Encourage healthcare systems to explore and implement expanded roles for nurses in radiology, including training nurses to assist with advanced imaging technologies and patient care.

- **Educational Programs:** Develop and implement educational initiatives to equip nurses with the necessary skills for effective participation in diagnostic imaging.

- **Collaborative Models:** Foster collaborative care models where nurses, radiologists, and technologists work closely together to optimize patient care and enhance procedural efficiency.

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