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Easing the Stress and Challenges in Conventional Pediatric Plain X-ray Imaging in Ghana

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Abstract

Background: Pediatric imaging in Ghana remains one of the biggest challenges for radiographers. The stress and challenges involved in the imaging of pediatric patients make it one of the unattractive areas for radiographers in the profession. Sedation has been one of the most resorted ways to minimize the anxiety and fear of pediatric patients usually undergoing CT and MRI. The challenge remains in the field of plain X-ray imaging. This literature review addresses the various challenges radiographers encounter in imaging pediatrics and some ways to minimize the stress and challenges encountered to improve quality diagnostic healthcare delivery, patient and parent satisfaction, and safe radiation-based examination practices. **Objectives:** To identify common sources of stress in pediatric patients, some common challenges radiographers face in imaging pediatric patients, and ways to ease the stress and challenges involved in the imaging of pediatric patients. **Methods:** Literature searches were done using Google Scholar, PubMed, and Science Direct to search for relevant articles concerning the topic. Articles that addressed at least 1 of the following; stress in pediatric radiology, managing pediatric radiology stress, challenges in pediatric imaging, minimizing anxiety, and stress levels in pediatric radiology were included. **Conclusion:** The quality of pediatric plain X-ray imaging can be improved when the various ways and strategies to minimize the stress and challenges involved are implemented in our various radiology departments in the hospitals in the country.

Subject Areas

Radiology & Medical Imaging

Keywords

Pediatric Radiology, Anxiety, Stress, Radiation, Challenges

1. Introduction

Pediatric radiography is one of the major disciplines of the radiography profession. Just like an adult would require ionizing radiations to visualize the internal organs for diagnosis, it is the same with pediatrics. Due to their high susceptibility to the effects of ionization radiations, the ALARA (As Low As Reasonably Achievable) principle is employed to make sure they are receiving less radiation with high-quality diagnostic images being produced to help with diagnosis. [1]

Generally, children display high levels of distress and anxiety when they find themselves in a foreign environment usually in the healthcare setting [2]. Radiology departments are no exception and this is one of the biggest challenges radiographers face in the radiology department. Pediatric patients scheduled for radiological examinations exhibit high levels of stress, fear, anxiety, and distress when they are met with a sterile-looking environment and large radiological machines that intimidate them [3]. The parents of these patients are most of the time equally anxious and disturbed as their wards are. They tend to ask whether the radiation exposure is safe for their kids and the potential effects of the radiation dose on their kids. These anxieties from the parents can escalate the fear and anxiety of their children [4].

Stress, an internal physiological or psychological disturbance and tension which is usually due to the imbalance between the environmental demands and a person's ability and capacity to cope or respond appropriately leads to a set of behavioral responses exhibited by these pediatric patients [3]. Pediatric patients under distress may exhibit stress behaviors such as crying, moving, resisting the examination, running away from the examination room, and flailing which result in delay and sometimes cancellation of the procedure [5].

The stressful nature of invasive medical procedures pediatric patients suffer sometimes causes long-term effects such as post-traumatic stress disorder symptoms [4]. Trypanophobia, which is an extreme fear of needles is one common stress almost every healthcare professional deals with when they encounter pediatric patients. In our line of work, we have had to explain to our pediatric patients severally that we are not going to inject them before we try to proceed with our examination.

Recently, we have observed that medical requests for pediatric radiology services come often as adult imaging services are required. The goal of every radiation-based examination is therefore to produce high-quality diagnostic images to help with the diagnosis, treatment, and management of patients with minimal ionizing radiation dose exposure to patients. The nature of our pediatric patients sometimes makes it difficult to achieve this goal as they are under stress resulting in multiple radiation exposures. However, it is well established that exposure to ionizing radiation dose during childhood bears a higher risk of long-term effects such as cancer than in adults. Our pediatric patients are more susceptible to radiation-induced tissue effects than adults because their systems are still in the development stages [6].

To achieve this goal of high-quality diagnostic images with minimal radiation dose to pediatric patients, medically-intervened sedation is mostly resorted to in cases like CT examinations and MRI examinations which do not use ionizing radiations to help alleviate anxiety, ensure smooth and successful scanning process, and reduce the delay both in the scanning and attending to other patients in the waiting area [3].

The major challenge now is the conventional plain X-ray imaging of pediatric patients. This literature review seeks to examine some of the challenges and the ways to ease and minimize the stress involved in conventional pediatric plain X-ray imaging in the Ghanaian setting.

2. Common Sources of Stress for Pediatrics in a Radiology Department

In a study to examine the challenges faced in pediatric radiography and the possible solutions, these were outlined as the common sources of stress for pediatric patients [7].

2.1. The Environment

Naturally, children react and become hostile to a new environment, especially in the hospital setting. Radiology rooms with huge X-ray machines and generators automatically frighten most patients. This increases the fear and anxiety levels in our patients.

2.2. The Radiologic Technologist

Most children react when they see healthcare professionals. The fear of needles is very common in our patients. They have a preconceived thought that they are going to be pricked with a needle or going to receive an injection. Aside from that, we are strangers in the sight of these patients and they would not want to leave their parents' presence to be with you. Our inability to familiarize ourselves with our patients increases their anxiety levels.

3. Challenges in Conventional Pediatric Plain X-ray Imaging in Ghana

At the time of this review work, there were no published articles addressing this issue in the Ghanaian setting. Therefore, these challenges are observational challenges we have faced over our three years of practicing radiography in Ghana. These challenges include.

3.1. Imaging Room Set-Up

Over the years of practice both during our student clinical years, post-clinical internship, and finally mainstream employment as full-time radiographers, careful observation shows that most of our imaging rooms are adult-friendly and not pediatric patients-friendly. Most imaging rooms are filled with bright plain

lights, no colorful lights noted, bright wall color painting with no designs, and sometimes have huge X-ray generators in there. Pediatric patients are intimated just by the appearance of the room and the huge imaging machines. This raises their anxiety levels since most of these patients have a preconceived thought and mind that they are going to be injected once they see a healthcare professional.

3.2. Lack of Immobilization Devices

Plain X-ray, just like taking a picture with your phone with little movement causes motion and blurry images, requires that our patients are still and no trace of movement is made during the radiation exposure. The fear, panic, and anxiety our pediatric patients come to the imaging room with make it difficult for them to stand still. This is sometimes frustrating as their parents are employed momentarily to act as immobilization agents. The persistent crying, flailing, and movement while they are restrained by their parents sometimes increases the anxiety levels of the parents as they feel and go through the pains their children are going through. This method is not always effective as some of the parents out of compassion and love for their children are not able to properly immobilize them resulting in distorted images that require a repeat thereby increasing the radiation dose.

3.3. Lack of Distractive Devices

Distraction involves shifting one's attention away from distress or a painful stimulus to more pleasurable and enjoyable stimuli [8]. Children generally are easily distracted. Within a split second, they have stopped crying and gravitating towards a sound that is been produced within their reach. Most imaging rooms have no distractive devices to help manage the anxiety levels of our pediatric patients. A personal strategy we have developed over the years is to inflate gloves into balloons, make smiley emoji sketches on them, and hand them over to our pediatric patients just to distract them. Well, this strategy works for about 6/10 pediatric patients we encounter. Others out of frustration tend to reject these improvised balloons.

3.4. Communication and Scheduled Procedures to Undertake Barrier

Communication is always key in ensuring a successful and smooth radiological examination. Our pediatric patients sometimes come just right out of the laboratory unit where they have already undergone a needle prick for blood sample tests. The anger and frustration from that minimally invasive procedure at the laboratory unit makes it difficult for the radiographer to communicate and familiarize with this angry little boy or girl. This makes it quite challenging for the scheduled X-ray examination to be done. We believe that when our pediatric patients undertake all the non-invasive procedures first before attending to the invasive procedures last, it will somehow ease the stress healthcare professionals not radiographers only go through while giving care to their pediatric patients.

3.5. Waiting Area Set-Up

The nature of our radiological waiting area also serves as a factor in the challenge radiographers encounter when imaging our pediatric patients. A typical Ghanaian waiting area in the radiology department has long chairs arranged just outside the X-ray room sometimes with no relaxation agents such as a television to calm the patients down. At the same time, they wait to be attended to. Children are easily drawn to visual content and therefore a television set in the waiting area helps calm these anxious patients and their parents down even before they are attended to. In a study to explore the experiences of parents of autistic patients scheduled for X-ray examinations, the survey showed that the waiting area did not reduce the anxiety levels of the kids because it was not comfortable enough for them [9]. This is demonstrated in Figure 1.

3.6. Workload

A normal day in the life of a Ghanaian radiographer working in a teaching or regional hospital involves attending to about 20 - 25 adult patients a day in the OPD unit and about 25 - 30 patients when working at the Accident and Emergency Unit. These patients usually present with requests for multiple body parts. In the Accident and Emergency Unit, you are likely to encounter about 10 polytrauma cases. The stressful and tiring nature of attending to these patients and the skills employed to produce high-quality diagnostic images for these trauma patients with modalities that are not built to support the nature of work in the Accident and Emergency Unit makes it difficult to attend and give care to pediatric patients who are already under stress. A personal observation made over the years shows that some of these pediatric cases are pushed back to be attended to last due to the aforementioned challenges.

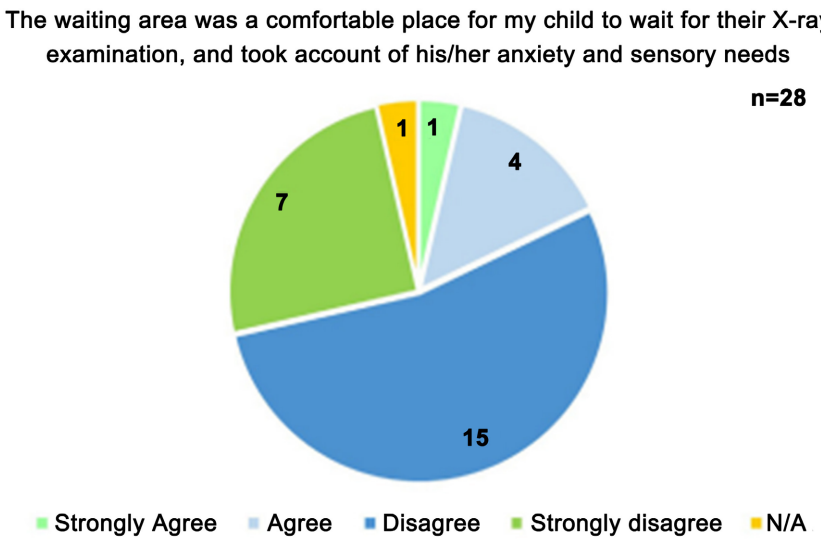

Figure 1. Shows a pie chart representation of the survey conducted to evaluate how the waiting area was effective in easing the anxiety and stress of autistic patients scheduled for X-ray examinations.

4. Strategies to Minimize Stress and Challenges in Pediatric Plain X-ray Imaging

Providing quality diagnostic care and satisfying the parents of our pediatric patients is the goal of every radiographer. Anxiety influences both the pediatric patients and their parents' subjective perceptions about the radiological examination and in turn, affects quality healthcare delivery [10]. With the advancement of medicine, pediatric patients are subjected to more possible stressors in the medical setting especially those who have to undergo frightening diagnostic tests and treatments [11].

These interventions will help ease and minimize the stress and pain experienced by the pediatric patient, the parent, and the radiographer during imaging.

4.1. Improving the Quality of the Imaging Room Set-Up

The quality of our imaging rooms must be improved. Changing the institutional and inhumane traditional imaging rooms will help alleviate the anxiety of our pediatric patients and their parents [12]. Making the imaging room pediatric-friendlier goes a long way to affect the quality of healthcare delivery, improves patient and relative satisfaction, affects reputation, patient loyalty, patient retention, and attractiveness, and eventually revenue generation [13]. Installing ambient lightening systems that can be programmed to change colors during imaging procedures and colorful wall designs and paintings will ease the stress and anxiety of our pediatric patients, parents, and the radiographer thereby ensuring smooth and high-quality diagnostic imaging procedures.

4.2. Parental Involvement

Separation from parents accounts for about 80% of the anxiety and stress pediatric patients go through in the healthcare setting [2]. The involvement of parents can be a valuable resource for minimizing the anxiety and stress pediatric patients experience. However, the anxiety of parents can affect and raise the anxiety of their children during the examination. Parents' stress behavioral activities such as criticisms, apologizing, and excessive reassurance such as "Don't worry, we will be done soon, everything is okay stop crying, it is not painful" amongst others can elevate the anxiety levels of the patients [4]. Radiographers are therefore to educate the parents and explain in clear terms what the procedure is about and how their active participation can help with the examination. This education will first alleviate the stress and anxiety of the parent and eventually relieve the pediatric patient of the stress and fear.

4.3. Preprocedural Preparation, Communication, and Familiarization with Equipment

Preprocedural preparation for pediatric patients before radiological examinations is key to minimizing stress and anxiety. The details of the examination should be communicated to the child in clear terms considering the child's age

and his or her current state and mood. This can happen in the waiting areas before the patients are attended to. Preprocedural preparation items like coloring books, animated videos explaining how X-rays are taken, and animated pictures of little boys and girls taking X-rays help minimize the anxiety of our patients [4]. In the examination room, familiarizing yourself with the patients such as carrying them around the room, letting them touch the X-ray tube, showing them the collimator light, and letting them have a feel of the X-ray equipment takes away the pain, fear, panic, and stress thereby resulting in a smooth and quality diagnostic imaging procedure [12].

4.4. Use of Immobilization and Distractive Devices

A distorted image is regarded as a non-diagnostic image. This means that the examination has to be repeated until a diagnostic image is obtained. Thus, one with no motions or artifacts. This therefore requires that our pediatric patients stay calm and still during the process of image capture using ionizing radiations. In our Ghanaian setting, immobilization devices are hard to come by in our radiology departments and imaging rooms. According to a study, about 93.5% of radiologic technologists admitted they use immobilization devices when imaging pediatrics however only 19.2% admitted that they had received formal training and safety guidelines in the use of these restraining devices. 72.7% admitted that they did not know its use with 52.8% admitting their facilities had no restraining devices [14]. In Ghana, the majority of our imaging departments have no restraining devices to use in conventional plain X-ray imaging. Most of these radiologic technologists resorted to the traditional use of guardians or staff as immobilization agents to hold the children during the examination. Though sometimes not effective, they eventually help with the imaging of the patients. A careful observation made in our years of practice shows that most pediatric patients tend to resist the restrain put on them thereby increasing the stress, pain, anxiety, and the time of imaging because the radiographer has to carefully time these patients in distress for the shortest possible moment they are calm to expose for a high-quality diagnostic image devoid of motion artifacts. Using the distractive devices approach has proven to be effective over the years of practice. Distraction has been termed one of the best non-pharmacological approaches and methods for easing, alleviating, and minimizing anxiety and pain in pediatric patients [15]. Our personal experiences of playing animated rhymes with our patients, letting the parents sing lullabies for our patients, inflating gloves into balloons, and making smiley emoji sketches have been helpful throughout the years of practice. In the age of modernization, virtual reality (VR) systems and music therapy where pediatric patients have the opportunity to select their favorite music to play in their headphones help minimize and ease the anxiety of pediatric patients [16].

4.5. Use of a Child Life Specialist

Child life specialists are certified skilled professionals with training in child de-

velopment. They help children to adapt and cope with a variety of clinical procedures [17]. In a low-income country like Ghana, getting child life specialists to assist in pediatric clinical procedures will be a challenge. However, our nurses and even radiographers in the radiology units can be allowed to take short online courses to be trained based on child development to fill in the shoes of child life specialists in our imaging rooms. This will go a long way to affect not only conventional plain X-ray imaging but CT, MRI, and other fluoroscopic examinations.

4.6. Positive Reinforcement

Positive reinforcement is one of the effective ways to minimize pediatric patient stress. It involves the encouragement and reward of pediatric patients before, during, and after the radiologic examination [4]. Showering verbal praises, applauding the patient, and giving certificates in the form of congratulatory stickers to pediatric patients will ease the stress, anxiety, and fear of pediatric patients, parents, and the radiographer as well.

5. Conclusion

This literature review examined and analyzed the issues concerning the radiologic imaging of pediatric patients. Some of the challenges encountered in the everyday life of a Ghanaian radiographer in the imaging of pediatric patients were laid out with some ways to ease and minimize the stress involved in imaging our patients. Implementing these strategies in our various radiology departments in the country will help improve the quality of diagnostic imaging healthcare to our patients with high-quality diagnostic images being produced to help diagnose, manage, and treat our patients with minimal exposure to ionizing radiation doses. One major challenge likely to hinder the implementation of these outlined strategies is financial constraints, especially regarding changing the imaging room set-up to make it more pediatric-friendly and the purchase of these immobilization devices such as the pigg-o-stat. However, we are of the positive view that when the other strategies are well employed in our practice, there is going to be a significant improvement in the radiography practice, especially concerning pediatric radiography.

In the future, we look forward to carrying out another research on the effectiveness of these strategies as they are employed in our radiology departments and any significant improvements and developments made in the imaging of our pediatric patients.

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Conflicts of Interest

The authors declare no conflicts of interest.

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