AVAILABILITY AND ADEQUACY OF POSITIONING AIDS AND IMMOBILIZATION DEVICES IN RADIODIAGNOSTIC CENTRES IN MAIDUGURI METROPOLIS NORTH-EASTERN NIGERIA

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Abstract

Background: Positioning aids and immobilization devices are vital radiographic accessories that help to keep patients in standard and non-standard imaging positions and also minimize patient movement during radiographic procedures.

Aim: To assess the availability and adequacy of positioning aids and immobilisation devices in major radiology departments within Maiduguri.

Materials and Method: A descriptive research design was adopted for the study. A self-designed checklist; pattern adopted from International Atomic Energy Agency Human Health series No. 4 and structured oral interview with the most senior radiographer or technician in the various radiodiagnostic centres were used to assess the availability and adequacy of positioning aids and immobilisation devices in seven radiodiagnostic centres tagged X1 to X7 for purpose of anonymity. The radiodiagnostic centres were purposively selected. Only positioning aids and immobilisation devices used in Diagnostic radiology were assessed in this study.

Results: There were a total of 66 (100 %) positioning aids and 33 (100 %) immobilization devices with each centre having at least, a positioning aid. Some of the centres studied X3, X5 and X6 does not have any immobilization device. Centre X1 has the highest number of positioning aids 48 (72.7 %) while; Centre X3 had the least.

Conclusion; the availability and adequacy of positioning aids and immobilisation devices within Maiduguri metropolis have been assessed and found to be grossly inadequate in most of the centres compared to the perceived number of patients presenting to those centres for imaging procedures.

Key words; Positioning aids, immobilization devices, patient restraint, radiography, availability

Introduction

Positioning aids are ancillary devices which maintain the patient in a non standard treatment position. These devices have various application both in radiotherapy and diagnostic radiography[1–3]. Positioning aids and immobilization devices in the context of diagnostic radiography practice, are useful technical tools in radiographic procedures which help to facilitate radiographic investigation especially among the two extreme group of patients; paediatrics and geriatrics [4–6]. Immobilization is a process of securing a patient in a comfortable position to avoid body movement during radiographic procedures. The need for positioning aids is to set up the patient in a special position designed to improve radiographic procedures and patient's comfort[1,7]. Positioning aids have been found to increase patient comfort and minimize the risk of pressure ulcer, especially in geriatric patients [8]. Proper immobilization techniques improve image

quality, decrease the length of the examination and decrease the need for repeat exposures in children and other patients with disabilities [9]. Positioning aids help in patient positioning, while immobilization devices help in patient restraint, which maintains patient in a rigid or fixed position in order to avoid movement during examination[3–5]. An ideal immobilization device secures patient and constraints motion in a "comfortable position," does not interfere with positioning and image quality, easy to use and inexpensive [1,5] These accessories just like other radiographic accessories such as lead aprons should be available and adequate in every radiology department with regular quality control and audit conducted on them [4,10,11]. This is to ensure that their integrity is not compromised.

The use of patient positioning aids and immobilization devices to acquire quality diagnostic images with minimal repeats and discomfort to the patient cuts across different imaging modalities used in radiology and is well documented in literature [12–15] This is of particular importance in restive patients such as pediatric and some geriatric patients, patients with disabilities and those with traumatic injuries and amputations who cannot afford to maintain a standard position[8,16]. While most of the studies on positioning aids and immobilization devices in diagnostic radiography focuses on paediatric patients [3,9,16,17] studies focusing on the use of these devices on adult patients especially, those with trauma and physical disabilities is sparse. Positioning technique faults have been advanced as reasons for sub-optimal image quality in a recent study[4]. Inadequate positioning aids and immobilization devices could be possible culprits of poor positioning however; this has not been previously proven by research. This study intends to ascertain the availability and adequacy of basic and essential ancillary x-ray equipment such as positioning aids and immobilization devices used in radiodiagnostic centres within Maiduguri metropolis.

Materials and Method

A descriptive research design was adopted for this study. Ethical clearance was sought from the ethical committees of the various radiodiagnostic centers where the study was conducted. Seven major radiodiagnostic centres were purposively selected and tagged X1 to X7 for purposes of anonymity. The study was conducted for a period of four months from March 2015 to June 2015.

A Census of all positioning aids and immobilization devices in all the radiodiagnostic centres within Maiduguri Metropolis which agreed to participate in the study were assessed**.** A self-designed checklist; pattern adopted from International Atomic Energy Agency (IAEA) Human Health series No. 4 [11] and structured interview with the most senior radiographer or technician in the various radiodiagnostic centres were used for this study. Data collected were categorised based on the objectives of the study and analysed using simple descriptive statistical tools such as frequencies and proportions with the aid of a Statistical software SPSS version 16 for windows.

Results

A general overview of the positioning aids and immobilization devices within Maiduguri metropolis is presented in table 1

Table 1: General overview of positioning aids and immobilization devices

Description of centres	Available no. of positioning aids	Available no. of immobilization devices	Total
X1	26 (39.4%)	22 (66.7%)	48 (48.5%)
X2	11 (16.7%)	8 (24.2%)	19(19.2%)
X3	1 (1.5%)	NA	1(1.01%)
X4	12 (18.2%)	2 (6.1%)	14 (14.1%)
X5	4(6.1%)	NA	4 (4.04%)
X6	7(11.0%)	NA	7 (7.1%)
X7	5 (7.6%)	1 (3.03%)	6 (6.1%)
TOTAL	**66 (100%)**	**33 (100%)**	**99 (100%)**

NA= Not available

As presented on table 1, there are a total of 66 (100 %) positioning aids and 33 (100 %) immobilization devices in all the radiology centres studied within Maiduguri metropolis. Centre X1 has the highest number of positioning aids and immobilization devices, totalling, 48 (48.5%), while, Centre X3 accounted for the least number of positioning aids with no immobilization devices 1(1.01%). Also as can be seen from table 1.0 Centres X3, X5 and X6 did not have any immobilisation device.

Table 2: Types of positioning aids and immobilization devices

S/N	Type of Positioning Aid/ Immobilization device in use	Number of centres N=7
1.	Cassette holder	4 (57.1%)
2.	Foam wedge	6 (85.7%)
3.	Sand bag	7 (100%)
4.	Infant body immobilizer	1 (14.3%
5.	Paediatric chest immobilizer	Nil
6.	Decubitus sponge block	5 (71.4%)
7.	Heel support	2 (28.5%)
8.	Head holder	1(14.3%)

As presented on tables 2, of the seven (7) radiodiagnostic centres studied, sandbag was available in all the centres 7(100 %) while only one each of infant body immobilizer and head holders were available in two different centres with each having 1 (14 %) respectively. As can be seen from the table, availability of the positioning aids and immobilization devices were not uniformly distributed across the centres. Findings on Adequacy of positioning aids and immobilisation devices in these centres based on structured interview with the most senior radiographers and technicians show that they were inadequate.

Discussion

Proper patient positioning during radiographic examinations is dependent upon the radiographer's knowledge and skills of radiographic technique. This cannot be completely achieved without the use of positioning aids and immobilization devices. Increased film rejects and repeat rates may not be unconnected to poor positioning and immobilization of patients during radiographic procedures. Also, technical faults represent one of the potent limiting factors in optimizing radiographic procedures [4]. Based on existing local literature search at the time of this study, no study has ever assessed the availability and adequacy of positioning aids and immobilization devices in radiodiagnostic centres within Maiduguri and by extension the entire northern Nigeria. It is obvious from the present study that most of the centres lack the adequate number of positioning aids and immobilization devices. The apparent dearth of previous research on the subject and the findings from this study further highlight the value researchers, radiographers as well as hospital management place on this important but often neglected aspect of radiography practice.

It is also clear from the present study that centre X1 has the highest number of positioning aids and immobilization devices 48 (48.5%) of all the centres studied. This score is below average considering the importance of these devices in radiographic positioning of different body parts. Apart from sandbag which was available in all the centres studied, the spread of positioning aids and immobilization devices were not uniform across all the centres studied. While, 85% of the radiodiagnostic centres had form wedge used for positioning, infant body immobilizer and head holders were only available in 14.3% of the centres. It is recommended that these x-ray accessories are supplied alongside major x-ray equipment during procurement and installation [11,14]. However, one wonders why the apparent lack and inadequacies in most of the centres studied. A possible reason that could be advanced for this could be due to poor quality control practice and care of these accessories, as have been reported by previous research in the study area [10].

Another finding from this study worthy of note is that, most of the modern facilities for patient positioning and immobilization especially as it relate to paediatric patients are not common in this environment as only one of the centres had an infant body immobilizer. None of the centres had paediatric chest x-ray immobilization device based on the reported findings. This is consistent with findings from a previous research [4], in which the researchers opined that most radiodiagnostic centres in south-south Nigeria lack most of these devices. In the present study, sand bag was the most common in all the centres studied.

Beyond just having the required positioning aids and immobilization devices in place, radiographers need adequate training on how to use and care for these devices as suggested by a previous study [3]. This training is even more important now than ever because some of the traditional or conventional immobilization devices may not be compatible with evolving modern imaging equipment and digital systems. For example the widely used sand bags which was the commonest in this study could present as artifacts on digital radiography systems[13]. Most radiographers who make use these accessories are not aware of this modern concept. Use of positioning aids and immobilization devices, especially that of restraints in paediatrics and toddlers have been recommended by the European Guidelines on Quality Criteria for Diagnostic Radiographic Images in Paediatrics [6]. This

is because it is the responsibility of the radiographer to produce an image of diagnostic quality whether the patient cooperates or not. The recommendation on use of positioning aids and immobilization devices has not been fully implemented in these centres because; the present research shows that devices available are inadequate and not evenly distributed across the centres based on imaging modalities available and patient through put.

The present study has given us a fair idea about the availability and adequacy of positioning aids and immobilization devices in Maiduguri. Based on the findings from this study, we could infer that the lack of positioning aids and immobilization devices with their corresponding inadequacy in some cases as depicted by this study could be responsible for the increase in positioning errors and repeat/reject rates. Findings from this study has far reaching consequences for all the radiodiagnostic centres within Maiduguri considering the fact that the city has been surrounded by armed conflict (the Boko Haram crisi) that has ravaged the area for over nine years now [17]. The numbers of patients that visit various radiodiagnostic centres following traumatic emergencies resulting from suicide bomb blast injuries or insurgency attacks on civilians have increased over the years. These activities have over stretched the limited health care facilities within the metroplolis.

A maximum proportion of 48% positioning aids and immobilization devices available in centre X1 is quite small and unimpressive considering the volume of radiodiagnostic investigations undertaken daily, especially trauma emergencies. The centre with the highest proportion of positioning aids and immobilization devices is the largest of the radiodiagnostic centres studied with; three conventional x-ray rooms, fluoroscopy, mammography, angiography, ultrasound CT and MRI. Considering the fact that the use of positioning aids and immobilization devices cut across all these imaging modalities, there is need to ensure that these ancillary devices are not just available but adequate and consistent with the size of the department and patient through put to the facility. Even though, size and patient through put was not the main focus in this study. The fact that of all the radiodiagnostic centres studied within the metropolis no individual centre had up to 50% of positioning aids and immobilization devices is a poor and unimpressive finding. Hence, this needs to be improved upon as a matter of urgency. This is a wakeup call to radiographers and hospital management alike. Apart from the positioning aids and immobilization devices listed in these studies, the researchers acknowledge the fact that there are still a host of others which were beyond the scope of this study. Urgent interventions are needed by way of provision of these accessories and also personnel training on how to use and care for these accessories to ensure quality diagnostic images and patient protection.

Conclusion

This study has for the first time established the total number of positioning aids and immobilization devices within Maiduguri metropolis with centre X1 having the highest proportion of positioning aids and immobilization devices. This is grossly inadequate considering the fact that these accessories are used across all the imaging modalities for different patient categories. The authors acknowledge the fact that the present study did not take into full consideration the actual patient throughput and number of diagnostic rooms in the centres studied in ascertaining adequacy of the positioning aids and immobilisation devices. This does not however, negate the findings of this study. A follow-up study is recommended in future, after an intervention by way of providing basic positioning aids

and immobilization devices and staff training to see if there will be changes and improvements in practice.

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Conflict of Interest: Nil

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