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An Assessment of Equipment procurement and management policies in Radiology Centres in Nigeria

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Abstract

Background: A well organised equipment procurement and maintenance policy in **radiology departments is critical for prompt and efficient health care delivery.**

Objective: To assess the equipment procurement and management policies in radiology departments in Nigeria with a view to finding the possible causes of frequent breakdown.

Materials and methods: A survey was carried out in radiology departments of 13 Government Tertiary health care institutions. Ten Teaching and three Specialist Hospitals in South East, South West and North East of Nigeria were chosen for the study. One hundred and four (104) questionnaires of semi-structured type were distributed to the key players such as radiographers, who are the end users, hospital administrators, and hospital equipment engineers. The questionnaires sought to find out the procedure for equipment acquisition, the presence or absence of pre and post equipment certification, quality assurance program and planned preventive maintenance.

Results: In most of the hospitals (11 of 13 hospitals) the radiographers were not involved in the course of planning, acquisition and delivery of the radiology equipments. It was also found out that only two of the hospitals had Quality Assurance program and none had Planned Preventive Maintenance programing place.

Conclusion: There was absence of organized policy to involve the end users in the process of equipment procurement in most of the hospitals studied. Little presence of quality assurance program and complete absence of planned preventive maintenance were observed in all the hospitals. This may have accounted for the frequent breakdown, large numbers of unserviceable equipment and long down time when faults developed.

INTRODUCTION

Equipment is the major tool of any radiology department. The quest for improved health care services led to an increasing need for production of radiology equipment that strikes a balance between production of high quality diagnostic images and reduced radiation dose to patients. Accurate diagnostic imaging using the current generation of radiological equipment requires that they always function optimally. Advances in technology and increased demand for quick and efficient delivery of radiology services led to heavy reliance on computer based technology. The increased sophistication of modern radiology equipment come with greater potential for breakdown which was absent in older and simpler equipment[1]. Although the complexity has greatly reduced equipment size in many cases, improved diagnostic imaging efficiencyand speed, it however necessitates higher maintenance and quality control requirements than was required for the older models.

A well equipped radiology department with adequate staff mix ensures prompt and accurate diagnosis, discourages referrals and provides opportunities for medical and radiology students to learn and carry out research[2]. These goals are often encumbered by increased downtime of the equipment. Colligan[3] described three factors that cause equipment downtime as Planned Preventive Maintenance Checks (PPM), Quality Control (QC) checks, and equipment breakdown. Although the first two are desirable to forestall the third factor occurring, it should be such that the total time taken does not affect the equipment's availability below a clinically and economically unacceptable value.

It is a common sight in many radiology departments in Nigerianto find unserviceable and unused radiology equipment. A major factor implicated is the non-involvementof the end user in the acquisition of the equipment. This has usually lead to procurement of equipment that are either obsolete or do not fit the needs of the department. Either of these factors precipitatethe abandonment of sometimes newly acquired equipment. The objectives of this study were to: assess the equipment acquisition policies in Nigerian tertiary health institutions,identifying the possible lapses in the process of acquisition of the equipment, and assess the maintenance program in place in the hospitals.

MATERIALS AND METHODS

A survey of 13 Government owned Tertiary health care institutions was conducted. Ten Teaching and three Specialist Hospitals selected from the South East, South West and North East of Nigeria weresurveyed in the study. One hundred and four (104) questionnaires ofsemi-structured type were distributed to thekey players in acquisition, installation, and use of radiology equipment. They included radiographers, who are the end users, hospital administrators, and hospital equipment engineers. The questionnaire was divided into five parts. The first part

gathered demographic information about the respondents, the hospitals studied, and the radiology equipment types in the hospital. The second part evaluated the method of equipment procurement and the input of the end users during procurement. The third part dealt with conduction of pre and post installation tests for equipment certification, suitability for the end users and the desired functions. The fourth part explored the presence of quality assurance and planned preventive measures, while the last part of the questionnaire studied the possible causes of abandoned equipment, process of equipment repair and possible causes of downtime of broken-down equipment. Respondents were also asked to suggest the best protocol for acquisition of radiological equipment.

A total of 88 out of the 104 questionnaires were returned, showing a return rate of 84.6%. Data collected were analysed in line with the objective of the study.

RESULTS

Of the 13 hospitals studied, only 2 Teaching Hospitals hadthe full complement of radiology equipment required for effective delivery of diagnostic/ therapeutic services (Table 1).

On the assessment of the number of equipment available and in good condition, 64.4% (n=67) were functional whereas 35.6% (n=37) were broken down and 3.7% (n=4) of the equipment were yet to be installed (Table 2). In 11 of the 13 hospitals, the end users were not consulted before the decision to purchase equipment was made by the hospital management (Table 3). The end users were however consulted in 12 of the hospitalson the specification of the equipment buttheir input was not always adopted.

Post installation and Quality Control tests were carried out in nine of the hospitals, but were not a constant practice (Table 3).Eleven of the hospitals did not have Quality Assurance programmes in place and none operated any form of Planned Preventive Maintenance on their equipment (Table 4).

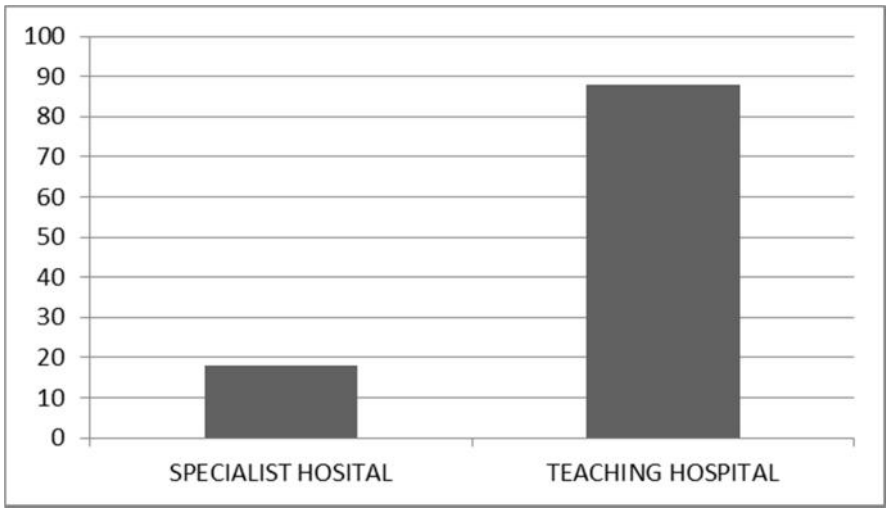

Fig1: Distribution of Equipment among Specialist and Teaching Hospitals

Table 1: Radiology Equipment Types in the Surveyed Hospitals

Hospital	Static X-ray Unit	Mobile X-ray Unit	Fluoroscopy Unit	CT	MRI	Ultrasound	Mammography	Radiotherapy	Total
FMC Abakaliki	1	1	-	1	-	4	1	-	8
NOHE, Enugu	2	2	-	-	-	1	-	-	5
FMC Umuahia	1	2	-	-	-	1	-	-	4
FMC Owerri	1	2	-	-	-	2	1	-	6
EBSUTH Abakaliki	2	1	-	-	-	5	-	-	8
UNTH Enugu	1	1	1	1	-	4	1	1	10
ABSUTH Aba	1	-	-	-	-	-	-	-	1
IMSUTH Orlu	2	5	-	1	1	2	1	-	12
NAUTH Nnewi	1	1	1	-	-	2	1	-	5
LUTH	3	2	-	1	1	2	1	1	11
UCH Ibadan	5	4	1	2	1	5	1	1	20
ESUTH, Enugu	1	1	-	-	-	1	-	-	3
UMTH Maiduguri	3	2	1	1	1	3	1	-	12
Total	24	24	4	7	4	32	8	3	106

Table 2: Radiology equipment types and functionality in the two categories of Hospitals

	Teaching Hospital			Specialist Hospital		
Equipment	Available	Not in use	Functional	Available	Not in use	Functional
Static X-ray Unit	19	4	15	5	1	4
Mobile X-ray Unit	17	6	11	7	3	4
Fluoroscopy	3	2	1	0	0	0
CT	6	3	3	1	1	0
MRI	4	1	3	0	0	0
Ultrasound	23	11	12	8	3	5
Mammography	6	1	5	2	0	2
Radiotherapy	3	1	2	0	0	0
Total	81	29	52	23	8	15

Table 3: Methods of equipment acquisition, and installation

	Teaching Hospitals			Specialist Hospitals		
	Always	Sometimes	Not at all	Always	Sometimes	Not at all
Management decides when to buy equipment and informs end user	8	3	-	3	1	-
End user determine equipment type	-	1	-	-	1	-
End user input sought on specification	9	-	-	3	1	-
End user specification followed on procurement	-	5	4	-	3	1
Post-installation test conducted	6	2	1	3	-	1

Table 4: QA, PPM and Equipment Downtime

	QA		PPM		Equipment Downtime	
	Yes	No	Yes	No	Minor faults (Weeks)	Major Faults (Months)
Teaching Hospitals	2	7	-	9	2 – 4	2 – 6
Specialist Hospitals	-	4	-	9	2 – 8	2 – 12

DISCUSSION

From the result, teaching hospitals had more equipment (n=67) than the Specialist hospitals (n=37) even though both are categorized as tertiary hospitals in Nigeria and allowed to train professionals in respective specialities. The consequence of this has been frequent routine referral of patientsto other centres for diagnostic examinations. It may alsosuggest that the emerging specialists from the training centres may have been poorly exposed to modern radiology equipment.

Radiographers in 69% of the hospitals responded that their non-involvement in the decision to acquire equipment, choice and suitability of equipment were responsible for the purchase of defective, obsolete and sub-standard equipment.Without doubt, it is critical to involve the end usersin the acquisition of radiology equipment.

Other factors that were suggestedwere the inclusion of the right type of equipment with appropriatespecification to achieve the immediate and future goals of the hospital; availability of space and power supply, man power development to facilitateregular and constant maintenance checks, and availability of spare parts for serviceable equipment. The capacity for fund generation to cover purchased equipment maintenance should be borne in mind during the planning stage.

Radiographers reported occasional quality control tests in 69% of the hospitals, but with no planned preventive maintenance in any.The acquisition of radiological equipment must always include an agreement with the manufacturers or their representatives for a pre-installation and post installation servicing programme. This should be backed up with regular quality control tests by the hospital management and the radiographers.

Failure on any or some of these points could imply purchase of defective or unserviceable equipment, unacceptable equipment downtimes and the inability of patients to have access to quality healthcare services.

Several of these factors were outlined by Pardeshi[2] as the causes of ineffective financial expenditure and deprivation of

the public of appropriate medical services.The equipment downtime was assessed and it was observed that minor faults took an average of 3 to 5 weeks to be repaired while major equipment faults lasted between two months and one year. This finding is similar to the work of Agwuet al[4] in which they also reported long downtime for minor faults.

Following from the above, we recommend that the acquisition plan should be structured in line with the hospital needs and streamlined with international best practices for optimum service delivery. Every radiology department should constitute quality assurance committee entrusted with the provision of documented equipment appraisal and replacement policy guidelines to advice hospital administrators on the financial planning, equipment specification and replacement of ageing equipment. This will surely guarantee in hospital personnel and patients the confidence that the services they render and receive would meet their expectations[5]. Hospital administrators should rely more on the expert advice of the Quality Assurance Committee of radiology department to ensure that the right type of equipment needed in the hospital, the specification and model is among the best in its category[6].

CONCLUSION

Evidence from this study show that there are no policies designed to ensure procurement and maintenance of radiological equipment in the studied hospitals. Recommendations have been made to redress this situation in other to facilitate improved Radiology service delivery in the country.

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