Performance Of Health Care Equipment In Public Sector Hospitals

(With reference to Select Hospitals in Hyderabad)

Dr. Ch. Seetha Ram

Assistant Professor, GITAM Institute of Management,

GITAM University, Visakhapatnam

drcsr@yahoo.com

Abstract: *The main objective of this research paper is to ascertain the problems and causes related to the failure of health care equipment and devices in Hyderabad public sector hospitals and to recommend policies and strategies to develop a procedure or mechanism for better management of health care equipment to improve health care delivery and to minimize wastage of scarce public resources. A structured questionnaire survey was used to collect data from a sample of twelve public sector hospitals situated in different regions of Hyderabad. This study also includes may discussions with medical professionals, health care administrators and paramedical staff etc. This paper concludes that non –existence of national healthcare technology management policy on selection, assessment, acquisition, usage, maintenance, disposal and replacement of medical equipment and devices in Hyderabad is the main factor responsible for poor management of healthcare equipment and device, Formulation and implementation of coherent health care equipment and devices*

management policy at national and regional level would improve health care delivery and resolve many of the problems related to the management of health care equipment and devices in public sector hospitals in Hyderabad.

Introduction

Much of the health care equipment in Visakhapatnam public sector hospitals are non functional, non usable or badly maintain. Therefore, most of the time that countries scarce resources are wasted ad peoples health care is undermine. The main reasons for this pathetic situation: purchase of sophisticated equipment which is underutilized which reduce life of equipment, over purchase of accessories and extra spare parts and modifications to facilities initially unforeseen duet to lack of expertise in choosing appropriate equipment, lack of standardization resulting in increased cost of spare parts or additional purchases and extra workload on limited competent staff, excessive down time of equipment due to lack of preventive maintenance, inexperience in repaired and lack of spare parts and unfavorable purchasing contracts. These high percentage failures of equipment lead to resource wastage and poor quality of health care delivery in Hyderabad public sector hospitals.

Objectives of the Study

1. To ascertain the present operational status of the health are equipment in Hyderabad public sector hospitals
2. To identify the problems and causes related to the lower level performance of the health care equipment in the public sector hospitals
3. To recommend policies and strategies and to develop comprehensive technology management policy for better management of healthcare equipment and devices in the public sector hospitals

Hypotheses of the Study

1. More than 50% of medical equipment in public sector hospitals in Hyderabad unusable at any given time for some reason or other. In some cases this may vary much higher than this.
2. Health care equipment obsolescence and lack of standardization would be negatively related to operational performance of stock of equipment.
3. Poor maintenance, inadequate finances for maintenance and timely non replacement of obsolete equipment, Lack of trained manpower for equipments maintenance and poor equipment procurement procedures adopted y the Ministry of Health car associated with poor equipment performance in the Hyderabad public sector health service.

Methodology of the Study

The questionnaire was prepared and data were collected from a sample of twelve public sector hospitals situated in different areas of the Hyderabad. This questionnaire survey also included many discussions with medical professionals, health administrators, paramedical staff etc. The survey carried out for this study included following hospitals located in different areas of the Hyderabad and also collected data on a random sample of 660 hospital stays and summarized.

The main reason for failure of health care equipment:

There are many reasons behind the failure of health care equipment in public sector hospitals in Hyderabad But according to he literature survey and interviews with various stakeholders in the health sector the following main reasons have been identified: poor maintenance, inadequate finances for maintenance and timely replacement of obsolete equipment, lack of trained manpower for equipment maintenance and poor procurement procedures and adopted by health authorities. Theo following section will ascertain each and every factor for the performance of health care equipment in Hyderabad

Operational performance of health care equipment:

Hypotheses No.1 states that more than 50% of medical equipment in public sector hospitals in the state unusable at any given time for some reason or other, in some cases this may be varied between 30%-70%. From the data collected the Equipment operational performance indicator is calculated by using following formula. Operational performance- (number of functional devices*100) / Total number of devices, the Table-1 and Table-2 illustrates the details of equipment performance in each hospitals and dept-wise.

Table – 1

Operational performance of the health care equipment

Hospital Name	Equipment Sample Size (n)	Functional Devices (OK)	Performance % (OK/n)	Failure %
Nizam Institute of Medical Sciences Hospital	563	367	65	35
Andhra Mahila Sabha Hospital	438	262	60	40
Neloufer Hospital	274	187	68	32
ESI Hospital	315	176	56	44
Gandhi Hospital	402	233	58	42
Govt. Chest Hospital	253	162	64	36
L V Prasad Eye Institute Hospital	290	154	53	47
Mahaveer Hospital	172	88	51	49
New Citi Hospital	265	130	49	51
Cancer Hospital	119	35	29	71
Vijay Marie Hospital	120	58	48	52
Medinova Hospital	247	155	63	37
Average	-----	----	58	42

Source: Field Study through structured questionnaire

Table – 2

Equipment Performance in Hospital by Department-wise (%)

Departments	NIMS	AMS	Neloufer	ESI	Gandhi	Chest	LVPrasad	Mahaveer	New Citi	Cancer	Vijaya Marie	Medinova
Operating Theaters	71	52	53	58	61	70	50	30	43	0	81	59
Intensive Care Units	46	28	64	38	80	81	47	69	33	NA	0	70
X Rays	62	67	77	90	45	83	67	66	62	0	0	60
Other Units	72	70	79	60	53	55	60	51	53	32	52	54
Operational Performance	65	60	68	56	58	64	53	51	49	29	48	63
Sample Size (Total No.)	563	438	274	315	402	253	290	172	265	119	120	246

Source: Field study through structured questionnaire

These tables show that out of 563 items of equipment surveyed at Nizam Institute of Medical Sciences only 367 were functional yielding a performance figure of 65%. In other worked only 65% of the total stock of equipment was functional and 35% is non functional. The highest number of equipment failure reported at this hospital in intensive care units and lowest number reported in operation theaters. At Andhra Mahala Sabha Hospital only 60% of the total stock of equipment was functional and 40% is non functional. The highest number of equipment failure reported at this hospital in intensive care units and lowest number reported in wards, clinics, physiotherapy, ECG, and laboratories etc. At Neloufer Hospital only 68% of the total stock of equipment was functional and 32% is non functional. The highest number of equipment failure reported at this hospital in wards, clinics, physiotherapy, ECG, and laboratories etc. and lowest number reported in operating theaters. At ESI Hospital only 56% of the total stock of equipment was functional and 44% in non functional. The highest number of equipment failure reported in intensive care units and lowest number reported in X-rays section. At Gandhi only 58% of the total stock of equipment was functional and 42% is non functional. According to table-2 highest number of equipment failure reported

in X-ray section and lowest number reported in intensive care units. At Govt. Chest Hospital only 64% of the total stock of equipment was functional and 36% is non functional. The highest number of equipment failure reported in wards, clinics physiotherapy, ECG and Laboratories etc. and lowest number reported in X-rays section. At LVPrasad Hospital only 53% of the total stock of equipment was functional and 47% is non functional. The highest number of equipment failure reported in intensive care units and lowest number reported in X-ray and scanning section. At Mahaveer Hospital only 51% of the total stock of equipment was functional and 49% is non functional. The highest umber of equipment failure reported in operating theaters and lowest umber reported in intensive care units, At New Citi Hospital only 49% of the totals stock of equipment was functional and 51% is non functional. The highest number of equipment failure reported in intensive care units and lowest number reported in X-ray and scanning section. A t Cancer Hospital only 29% of the total stock of equipment was functional and 71% is non functional. In this hospital none of the equipment were functional in operating theaters and X-ray sections and only 32% of equipment functional in ward, clinics, physiotherapy, ECG and Laboratories. At Vijaya Marie Hospital only 48% of the total stock of equipment was functional and 52% is non functional. In this hospital none of the equipment were functional in intensive care units and X ray sections and 81% of equipment functions is operating theaters, At Medinova 63% of the total stock of equipment was functional and 375 in non functional,. The highest number of equipment failure reported in wards, clinics, physiotherapy, ECG, and Laboratories etc. and lowest number reported in intensive care units.

In summary an overall average equipment performance for all the hospitals in this sample is found to be 58%, which means that 42% of the stock of equipment in public sector hospitals is unusable for some reasons or other.

The relationship between lack of standardization of health care equipment and operational performance:

Hypothesis no.2 states that health care equipment obsolescence and lack of standardization would be negatively related to operational performance of a stock of equipment. First, I analyze the relationship between lack of standardization of health care equipment and operational performance. In general a very homogenous set of medical devices would record a higher equipment performance figure than a very heterogeneous set. To analyze this relationship can select a very common device called syringe pump used in Intensive care units in Hospitals. This device used to infuse drugs patients automatically using syringes, since several drugs are delivered at the same time at least three syringe pumps are used per patient. Generally six bed ICU may have eighteen syringe pumps,. To calculate the degree of standardization and equipment performance the following information used. The total quantity of syringe pumps available, number of different models in the set, number of different manufacturers and the total number of functional syringe pumps, Based on these information the following two formulae have been used to compute the indicators.

Degree of Standardization: STD = 1-(MOD -1)+ (MAM - 1) / 2 (QTY - 1)
Where QTY= Number of syringe pumps in each hospital
MOD = Number of different models available in the set
MAM = Number of different manufactures in the same set
Equipment performance = (Number of syringe pumps functional in the set* 100) / Total number of syringe pumps in the same set.

The overall results show that somewhat weaker relationship between the degree of standardization and equipment performance. When inquired of nurses working in ICUs in several hospitals they said that lack of standardization of equipment is not much problematic as they gradually become familiar with the various brands and models of equipment over time. However, the engineers and officials in the Bio-Medical Engineering

Division responsible for maintenance in al the above hospitals mentioned that a high degree of standardization of medical equipment in general is desirable because of the possible spare parts and consumable management problems a highly heterogeneous set of medical equipment usually brings in.

The other main reason for poor performance of health care equipment

The hypothesis no.3 states that poor maintenance, inadequate finances for maintenance and timely non replacement of obsolete equipment, lack of trained manpower for equipment maintenance and poor equipment procurement procedures adopted by the authorities are associated with poor equipment performance in the Visakhapatnam public sector health service, Evidences show that the availability of trained manpower and effective equipment maintenance system has a positive relationship wit operational performance of healthcare equipment. The other reason is failure to allocate sufficient finance for equipment maintenance and replacement of obsolete equipment has contributed to low levels of operational performance of medical equipment in public sector. Therefore, it is evident that there are deficiencies at various stages in the procurement process of medical equipment to the public sector hospitals leading to equipment ineffectiveness, operational and inefficiency problems.

Recommendations

- The government should set up a Hospital Engineering Training Institute to train local staff on medical equipment and devices maintenance and management. This institute should plan to conduct education and training programmes for medical, nursing and other paramedical staff on principles of operation and care of equipment on regular basis, They should also be educated on the economic consequences of not looking after the equipment carefully. This proposed institute should be open to private sector engineering

personnel of companies engaged in the supply and maintenance of medical equipment of g0vernment and private hospitals on a feel levying basis, WHO assistance could be sought to set up this Institute and to get the trainers and teaching staff trained abroad initially.

- The Health Ministry should ensure that candidates selected for overseas training have sufficient qualifications and experience to follow the course, Thy should, on their return, be assigned with work related to the training received and encouraged to acquire adaptive capabilities gradually. The present scheme to designation of technical staff and scheme of recruitment should be revised. New technical and engineering staff should be recruited to strengthen the technical service a priority and have them trained abroad for the time being in Bio medical / Telemedicine and clinical engineering until a training institute is set up locally. Attractive salaries, incentives and good infrastructure facilities should be offered to retain the staff.
- A computerized maintenance management system should be introduced to improve the maintenance service. A central data base on all medical equipment and technical systems installed in hospitals should be established. At least 5% to 10% of the replacement value of the current stock of equipment should be set apart for maintenance annually.
- The Health Ministry should prepare policy guidelines on the acceptance of foreign donated equipment, Factors such as recipient requirement, compatibility of the equipment to local electrical and environmental conditions, age of the equipment, availability of spare parts and needed supplies, operational cost, availability of technical documentation, availability of service support should be evaluated before acceptance. This would prevent dumping of inappropriate and unwanted technology into the system, All the medical equipment for all government hospitals, except emergency purchases, should be centrally purchased,

Conclusion

This research study confirms that around 42% of healthcare equipment in public sector hospitals in Hyderabad are not functional and therefore unusable. In some cases it goes up to 70% in some public sector hospitals, which located in rural areas manage by the provincial bodies. This situation has far reaching implications for the health care delivery service and leads to deplorable wastage of scarce resources in Visakhapatnam. It is very common to see unattended equipment lying in state of despair, sometimes if want of minor repairs and simple accessories, for weeks and months in hospital corners. Underutilization, Incorrect handling, lack of right equipment, lack of funds for maintenance and routine operation, poor equipment acquisition strategies, manpower shortage, etc. can be cited as main contributory factors to the present pathetic situations of the healthcare sector in the country. Chronic lack of qualified and competent staff with technical and managerial expertise in the field of Biomedical and clinical engineering is the most pressing problem the state health sector faces today. There are no academic or professional institutes locally that conduct courses and training programmes on this specialty. Poor salaries and lack of career prospects discourage good engineers and technicians from joining this service. The dearth of human resources has compelled the Ministry to employ private companies to maintain even low to medium tech equipment at exorbitant rates,. Even this solution has not brought about the desired results very often because the Ministry lacks resources for contract management and event the private services providers cannot find enough competent manpower in the country. There is lack of awareness among the health authorities on the high cost of ownership of medical equipment. The cost includes the purchasing price as well as recurrent expenses involved in running the equipment, Purchasing price is only the tip of the iceberg. Annual running cost, inclusive of maintenance cost, cab be substantial and in some cases may exceed the purchasing price of the equipment, The Ministry is

hell-bent on investing more money in purchasing new equipment but little thought is given to sustainability of equipment. This has led to insufficient budgetary allocation for maintenance and routine operation resulting in reduction of useful lifetime of equipment. The biomedical engineering department of the ministry of health has remained a highly centralized service since its inception about 50 years ago, Technical problems in medical equipments require speedy responses, Delays in restoring the defective equipment cause severe disruption of the patient care service and have resulted in fatal consequence in certain instances, A centralized healthcare technical service such as that operated by the Ministry of health has been totally unsuccessful in meeting the competing demands of a widespread healthcare system that is highly technology intensive. The Ministry does not have a central database with detailed inventory information on the installed base of medical devices and technical systems. This information is essential for procurement and budgetary planning to prevent unnecessary procurement and mal-distribution of equipment, There is no national healthcare technology management policy governing selection, assessment, acquisition, usage, maintenance, disposal and replacement of medical equipment. Implementation of such coherent technology management policy at national and regional level would resolve many of the technology issues identified in course of this study. The state health sector should plan to achieve at least 80% to 90% equipment performance up from the current 58% to contribute to the provision of a better health care service to the general public.

Scope for further research

This research study focused on state sector hospitals, A similar study could be conducted on the technology issues in the private sector hospitals and examine whether there are any variations in performance among the private hospitals as well as between the private and public sector hospitals and if so the causative factors.

Reference

1. Attanayaka. N (2001) An assessment of the effectiveness of decentralization of health services, The South Asian Predicament, New Delhi, Sage Publications

2. Khalil. T.M. (200), Management of Technology, The key to competitiveness and wealth creation, McGrawa Hill, USA

3. Mackie J (1986) National Policy on Maintenances and Repair of Healthcare Equipment, International conference report, WHO.

4. WHO (2006) The World Health Report, Working Together for Health, Geneva.

5. Department of Census and Statistics (2007) Statistical Abstract 2007: wwww.statistics.gov.in

* * * * *