

Asset Management System for Improvising the Efficiency of Biomedical Engineering Department in Hospital

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Abstract

Background: *The asset management plans should be such that it provides the management a greater degree of efficiency in the use of medical equipment. The plan should be such that equipment procurement program should be kept as a priority, and should be regularly updated. Also addressing the most serious and urgent needs of hospitals without delay.*

Material and methods: *A survey was conducted in our own teaching hospital (Teerthanker Mahaveer Medical College, Hospital & Research Centre, Moradabad, Uttar Pradesh, India) which is tertiary care Centre with 900 functional beds, in the urban area of the state. The survey was conducted for one complete year.*

Results: *It was interesting to note that the results of health care equipment maintenance resulted in problem to 33 participants out of 45 respondents. Therefore around 74% of the respondents had major to minor issues pertaining to management of health care equipment. About 18 reviewed as equipment maintenance was a major problem; 12 indicated that there was a significant problem and 3 reviewed it as a minor problem. Therefore for rest 12 respondents health care equipment posed no problem what so ever.*

Conclusion: *The study conducted in our teaching hospital for the management of the expensive and sophisticated equipment, for the training medical professionals and clinical engineers has shown that maintenance and repair service had two basic functions in a big hospital like ours.*

Keywords: *Asset Management System, Biomedical Engineering, Efficiency, Medical Equipment.*

Introduction

Planning asset management in a given medical setup provides us with the clear picture of future equipment needs, establishing a framework for prioritizing needs and decisions on spending are planned way ahead of their occurrence. The asset management plans should be such that it provides the management a greater degree of efficiency in the use of medical equipment. The plan should be such that equipment procurement program should be kept as a priority, and should be regularly updated. Also addressing the most serious and urgent needs of hospitals without delay. The health care technology management can be defined as an accountable and a systematic approach to meet the

demands and quality standards by ensuring cost-effectiveness, safety and effectiveness.¹ The importance of asset management is well understood in our country especially in terms of biomedical engineering, making it an integral part of hospital management. To maintain equipment asset management in hospitals is an important duty of a clinical engineering department, which includes involvement in equipment procurement and its life-cycle aspects, to provide efficient equipment information and training, monitoring, maintaining, evaluating the functioning of the equipment, and documenting equipment.^{2,3} The need of asset management systems can be well understood as it provides an adequate analysis of financial and clinical indicators. Also, providing synchrony with the regulatory and accreditation requirements.⁴ From this point of view the concept of technology management is actually the practice of incorporating technology with the health service planning of the hospital keeping it efficient and cost-effective in every possible aspect.⁵ In developed economies, the health care equipment maintenance and management is the responsibility of the medical engineering department itself.⁶ Whereas in developing and emerging economies like ours the health care equipment management still stays a major problem in providing effective health care services.⁷ In the following figure the role and need of the asset management in the improvement of the biomedical equipment is well understood. The present study was conducted to determine the role of asset management system in improvising the biomedical engineering department.

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Figure 1: Asset Management Plans

Materials And Methods

A survey was conducted in our own teaching hospital (Teerthanker Mahaveer Medical College, Hospital & Research Centre, Moradabad, Uttar Pradesh, India) which is tertiary care Centre with 900 functional beds, in the urban area of the state. The survey was conducted for one complete year. The participation was mandatory for each participant. The sole purpose of this survey for equipment maintenance technicians was basically to investigate and evaluate the factors responsible for health care equipment maintenance problems in a public health set like ours. All the replies are first-hand and without any alteration from the clinical engineering technicians. There were 40 clinical technicians, 2 equipment maintenance managers and 3 clinical engineers involved in the study survey so conducted. (Table1)

The response of the participants was as documented both manually and later accessed electronically. Considering responsibility for the physical condition, adequate usage, function ability and budgetary performance of the equipment was designated to the biomedical or engineering departments respectively. The hospitals was not able to provide a regular equipment management reports which included details like cost, age, utilisation levels, physical condition, maintenance backlogs spare part utilisation and replacement requirements. Whatever data so collected was again analysed and documented.

Results

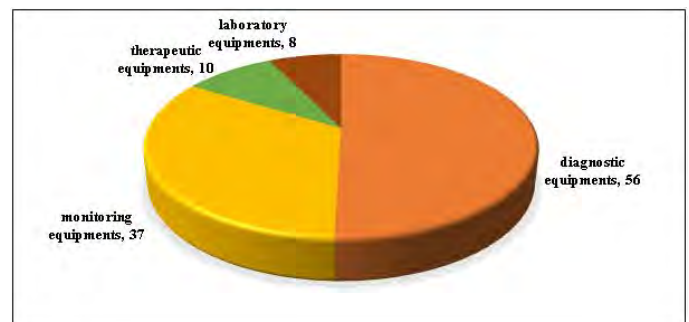
It was interesting to note that the results of health care equipment maintenance resulted in problem to 33 participants out of 45 respondents. Therefore around 74% of the respondents had major to minor issues pertaining to management of health care equipment. About 18 reviewed as equipment maintenance was a major problem; 12 indicated that there was a significant problem and 3 reviewed it as a minor problem. Therefore for rest 12 respondents health care equipment posed no problem what so ever. Equipment maintenance technicians were asked to rate various equipment groups according to their frequency of use and need for maintenance. From the 45 respondents all agreed upon the fact that the diagnostic equipment are most frequently used and need more maintenance than any other equipment. Second were the monitoring equipment, whereas therapeutic equipment and laboratory equipment were ranked third and fourth respectively, with the number of problems faced. The diagnostic instruments included the ECG, EEG, x-ray units etc. (Graph 1)

The monitoring equipment were the patient monitors and cardiac monitors, therapeutic instruments like the defibrillators, dialysis machines and the laboratory equipment like autoclaves and sterilisers. Considering the finances with respect to procurement and maintenance of these equipment interesting facts showed up. Some equipment were procured by direct purchase while some were donated to the hospital. The response from the 45 respondents 38 stated that the donation of simple devices for example stethoscopes, scales, I.V drip stands and basic surgical instruments were of great use. Considering the maintenance which was seen to be in house and out house departments as not all the machines were repaired in the house itself. As some machines were to be moved out of the institute for repair and rest technicians were not familiar with the equipment machinery leading to a major stand still in the departments in case of mechanical failure. From the 45 responses regarding spare parts inventory in the hospital was considered critical, nearly 28 respondents stated that it was critical and rest 17 stated it was manageable. Which clearly states that standardisation of the procedures for maintenance can ease management and maintenance and decrease inventory costs. (Graph 2)

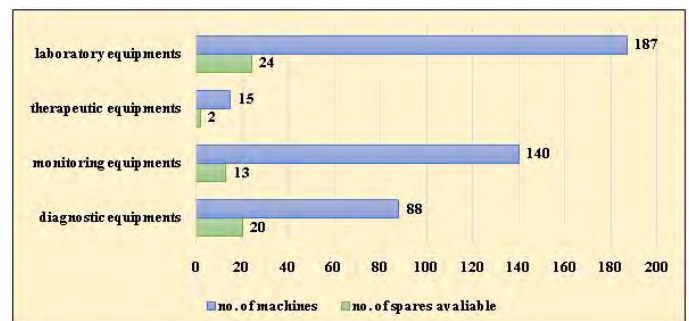
Table 1: Subjects enrolled in the study

Job title	No of people
Clinical Engineering Technicians	40
Clinical engineers	3
Equipment maintainers managers	2
Total	45

Graph 1: Relation between no. of problems to equipment category



Graph 2: Relation between no. of instrument and spares available



Discussion

All the respondents agreed upon the fact that the training of equipment users and operators reduces equipment efficiency in terms of time bound results. The basic problem is the lack of training and specialised personnel to conduct continuous and periodic training programs to help personnel to maintain the equipment. The respondents also noted that primarily nurses were the majority users of health care equipment and majority of them were inadequately trained in equipment operation. In spite of continuous interdepartmental shuffling of nurses there was no adequate regular training program for them in new departments. The survey showed that the involvement of the clinical engineering staff for equipment selection and procurement was limited to the writing of technical specifications only. The maintenance specialists felt the same as, there was a lag in the instrument required for the institution to the procurement of the instrument. Thus, suggesting a need for equipment selection and procurement protocol. Inadequately procured equipment are normally the source of maintenance problems and often rendering the equipment as non-functional and waste of money. However, to maintain services the institute lacks proper technical infrastructure and budget too. Few respondents provided negative response to such donations as they were of an inferior quality.^{8,9} A frequent point mentioned from the participants was that maintenance contracts were negotiated by the administration or financial departments lacking the technical know-how to assess long time results and technical implications in future. The opinion was that the tender boards always focused too much on purchase price. Whereas, the cost of ownership which surpasses all direct and indirect expenses related to the item of health care equipment over its economic life. With the changing trends worldwide and an option was worth considering that the advantages such as low initial capital investment and readily available services. The data so collected from this study based survey clearly suggested that the health care equipment are the necessary component of any quality oriented health care system. On their own the equipment are not functioning in full capacity due to lack of technical knowledge and a comprehensive financial support, which includes the funding to train both maintenance staff and equipment operators and engineers. It becomes hard to imagine that a modern health care system lacking the technical know-how to provide precise diagnosis and treatment for life threatening diseases. Also, there remains a danger of overuse and underuse of such equipment due to lack of technical and management expertise. Also, the economic penalties are soaring high. The need of practical recognition of technological expertise is required for a healthy environmental and social needs. Also, it is observed that inadequate training of nurses, especially working in the intensive care units had the benefit of learning the complex use of machines.¹⁰ For example computing data and providing information to private services providers.¹¹ This fact corresponds to the study conducted by the World Bank.¹²

Conclusion

The study conducted in our teaching hospital for the management of the expensive and sophisticated equipment, for the train-

ing medical professionals and clinical engineers has shown that maintenance and repair service had two basic functions in a big hospital like ours. Primarily it is to retain technical operability and the secondly to give reliable information which is important for management of the equipment which is essential for the selection and procurement of the equipment. Both capacities were found to be in a developing stage in our institute.

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