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Research Article

To Study the Equipment Management at District Hospital Leh:A Descriptive Study

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Introduction:

The era of high technology and competitive world along with increasing expectation of patient and customer satisfaction demand many changes in the type of equipment for providing quality care in hospitals. Equipment maintenance is one of the essential component of any health care facility. All health care organization need to implement a maintenance programme for equipment since lots of budget is spent on equipment procurement and poor maintenance could lead to more breakdown and may affect the work output of a health facility. Besides, it is a very costly investment if proper maintenance especially of highly sophisticated equipment like CT Scan, MRI, Ultrasonography, X Ray etc is not done. Medical devices or equipments are being used to support patient care in every health set up. The devices in use should be safe , reliable and operational to provide the optimum level of service. According to WHO , the life of equipment can be extended by 10 years by proper equipment maintenance.**[1]** As per a report, 30% to 63% of Rs 10,000/ crore worth of existing medical equipment in public health facilities across all states in India is dysfunctional.**[2]**

Medical equipment range from simple to sophisticated equipment. With today's technological improvement and increasing demand and expectation of patients towards health care, it is to ensure that the devices are safe and reliable to use. Any health care organization must have a well planned and managed maintenance programme so that they are readily available for use when needed. Besides , studies have shown that it not only prolongs the life of equipment but reduces the cost.

Medical equipment maintenance can be divided into two major categories: Inspection and preventive maintenance (IPM) and corrective maintenance (CM) . IPM includes all scheduled activities that ensure equipment functionality and prevent breakdowns or failures. Preventive maintenance (PM) refers to scheduled activities performed to extend the life of a device and prevent failure (i.e. by calibration, part replacement, lubrication, cleaning, etc) [1].The main purpose of equipment maintenance is to ensure the safety of clients during use by making sure that all the equipment is fit for use and kept in efficient working order.

The present study was conducted to assess the equipment maintenance at district hospital Leh. Sonam Norboo Memorial Hospital (SNM) is the only district level hospital of the region and caters the major population of ladakh. It is 150 bedded hospital and provides 24x7 speciality services.Speciality of all streams is available at the hospital.For providing quality care, the hospital is equipped with all sophistiated and life saving equipment. Since this hospital is the main lifeline of the area for patients from nearby as well as far flung areas,continuum of care is essential which is not possible without proper equipment management. Till date, no such study has been done in the area and keeping in view the importance of equipment maintenance in provision of health care, the present topic have been chosen. The study would help in identifying the present scenario of equipment maintenance and scope for improvement of service delivery if any.

Objective :

To study the equipment management system at District Hospital, Leh

Methodology :

Study Location: District Hospital Leh Ladakh, Jammu and Kashmir.

Type of Study : Descriptive study.

Study Design : It was a cross sectional observational and retrospective record based study.

Study period: The present study was conducted for a period of two months from March to April 2017.

Inclusion Criteria: All the equipments procured and installed after 2010.Due to the flash flood in August 2010,whole of the district hospital was submerged for two days. Only patients were shifted through rescue operation to the nearest army hospital. So many equipments were damaged due to the mishap and not due to maintenance mis-management.

Data collection: Primary data was collected through

interview of respondents who were the In -charge staff dealing with equipment in their routine activity. Secondary data was obtained from the retrospective available records.

Study tool: Pretested Semi –structured close ended questionnaire was used in the study.

Pretesting : Pilot study was done in one or two department to test the feasibility of the study and for any modification in questionnaire.

Sampling Technique: Purposive sampling of equipment from various department depending upon the feasibility, co operation of the staff and priority of usage in day to day patient care like Radiology, Neonatal Intensive Care Unit (NICU),Labour Room, Blood bank, Sanitation Immunization section, Dental section, Physiotherapy ,Geriatric ward and Laboratory section were included in the study.

The purpose of study was explained to the respondent through informed consent and prior permission was taken from Medical superintendent. A set of three semi- structured questionnaire were used. Equipment In- charge of all the sections were interviewed and records were collected from available registers and invoice and contract papers.

First part of schedule included demographic characteristices like age, sex, level of education and work experience of the staff . Second set included questions pertaining to the total number of all new,old and obsolete equipments, existence and type of any maintenance programme, training regarding equipment maintenance ,type of contract, if any,availability and inventory of spare parts, record keeping, type of checks, manual availability, replacement of parts, lubrication, cleaning and decontamination, designated /outsourced personnel for maintenance, tags, labels display and strategy for prioritization of medical equipment. Further, one functional and one non functional / obsolete equipment were selected randomly from each section which form the third portion of the questionnaire.

Results and Discussion:

The present study was done to access the equipment management system at District Hospital, Leh.

Mean age of the respondent was 43.2 years .Majority of them were females and most of them have studied upto matriculation. Work experience in various departments ranges from 4-25 years.

In all,298 equipments from various sections were included to find out the number of equipments and their status. The number of staff handling the equipments and their training status were enquired. It was 19 for Radiology, 62 for Laboratory, 7 for Immunization, 2 for Waste management, 9 for Dental, 12 for Sanitization, 4 for Geriatric, 8 for Physiotherapy, 78 for NICU, 83 for Labour Room and 14 for Blood bank. Number of equipments was 108 and 149 for old and new equipments respectively. It was 37 for Critical and 226 for Non-Critical equipments. About 182 equipments were functional and 67 were non-functional at the time of study. 37 were awaiting repair. For 41 equipment ,failure were reported during the past one year. In all, 70 staff were handling the equipments in various sections on day to day basis. Only 34 got training for equipment maintenance at the time of induction. Only 33 percent of the senior staff was aware about equipment maintenance strategy. **Bird CT** noted that personnel handling equipment were inadequately trained to handle the maintenance of new equipment and to provide repair by hit and trial.[7]

Table 1:Frequency distribution of maintenance of Equipment for all sections

Particulars	Yes	
	no	**%**
Existence of equipment breakdown maintenace programme	1	8.3
If yes ,Adherence to preventive maintenance	1	8.3
Awareness of staff about the different types of equipment maintenance strategy	4	33.3
Record of maintenance for each equipment/log book	10	83.3
Availability of spare parts.	1*	8.3
Inventory of spare parts	0	0
Forms used for record keeping	4	33.3
Availability of mannuals	8	66.6
Operational mannual	8	66.6
Service mannual	0	0
Checks of equipment	8	66.6
Replace worn out/ damage parts	4	33.3
Replace parts before expiry date	0	0
Lubrication	9	75
cleaning	12	100
Decontamination	9	75
Availability of cleaning agents	12	100

Particulars	Yes	
	no	**%**
Updating of service schedule in equipment register	5	41.6
List of moving and handling equipment	3	25
Certificate of fitness(safe working load	1	

shown with expiry date)		8.3
Unique no for each equipment(tags and labels)	3	25
Labels: showing date of work done/coloured inspection stickers to show due date for inspection.	0	0
Risk based prioritization of medical equipment	0	0
Mission based prioritization of medical equipment	0	0
Maintenance based prioritization of medical equipment	1	8.3
Resource based prioritization of medical equipment	0	0
Disposing of equipment as per the recommendation of manufacturer	3	25

Table Contd....

Particulars	Yes (n)	%
Acceptance testing after installation	7	58.3
Provision of operational mannual and service mannual after installation.	4	33.3
Safe working load shown on the equipment	5	41.6
Fitness certificate with expiry date	0	0
Installation and storage as per guidelines	12	100
Service contract at the time of installation.	5	41.6
warranty period/ maintenance contract	5	41.6
service contractor by manufacturer/ external service provider (outsourcing)	5	41.6
Frequent Check for wear and tear defects .	10	83.3
	2	16.6
Whether getting training for updation on equipment handling at regular interval (on the job training/ CME etc)	3	25
Audit / physical verification	12	100
Power back up	12	100
Availability of spare parts	0	0

*Non functional

Table 2 shows the frequency distribution of maintenance of equipment of all the sections. Except the Radiology section, none of the departments studied had equipment breakdown maintenance programme. Logbook maintenance accounted for 83 percent which was satisfactory.In contradiction **Praschant J Patil** study found that none of the equipment had log book maintained.[3] None of the section had inventory for spare parts and in only 8 percent equipments minor spare parts were available in the present study.**Shakir B M** emphasize in his study the need for better standard of keeping equipment inventories and records.out of all the equipments only operational manual was available for 66 percent items. Equipment check at times was done in 8 out of 12 sections. Lubrication, Cleaning, Decontamination and availability of cleaning agents were satisfactory in most of the sections and ranged from 75 to 100 percent.. None of the sections have strategy for prioritization of equipments, display of tags, labels and colour inspection stickers as per the WHO guidelines. Disposal and condemnation of equipments as per the guidelines was practised in 3 out of 12 sections. Updating of service schedule in equipment register was done in 41 percent. Only 25 percent maintained the list of moving and handling of objects.[8]

Purchase and installation of equipment was done as per norms for all the equipments. Study by Amrollahi **M H** revealed that procurement, distribution and control of medical equipment was satisfactory except for the maintenance part.[9]

Time of installation and model number was known for 86% and 43% of the equipment respectively. Acceptance testing after installation and equipments check were done in 58.3 percent cases. 33.3 percent were provided manual after installation. In 41.6 percent, safe working load on equipment was shown. Some of the section hired external service provider for minor repair. This finding is in contrast to the results by **Prashchant J Patil** wherein minor corrections were done by the untrained technicians. Check for minor wear and tear was satisfactory in most of the sections. Only one – fourth of the staff got 'On the Job Training' or CME at regular interval. Availability of power for running the equipment was round the clock and physical verification was done every year.[3]

In addition, Items like Laser, ECG, CBC Analyzer, Weighing machine, Continuous Passive Movement machine (CPM), Baby Warmer, Mucus sucker machine, Ultrasonography (USG), Iced Line Refrigerator (ILR), Floor Cleaning machine, Deep Freezer and bacteriological Incubator were selected randomly from various sections to see status and reasons for non-functionality.The reason for non-functionality was not able to detect faults, damage due to mishandling, non-availability of funds and spare parts and no response from vendors for maintenance. In some cases, it was cheaper to buy new equipment than to repair the non-functional equipment. Few of the equipments were obsolete. Other reasons like cheaper cost of new equipment, lifetime of equipment accounted for non-functional status or obsolete condition of equipment.

Conclusion and recommendation:

The study revealed lack of medical equipment committee and lack of equipment management strategy. There is a need to streamline the maintenance of equipment. keeping in view geographical background of remote and isolated area and the importance of the hospital being the main hospital of the area, provision of continuum of care for supporting patient care with state of the art technology and their maintenance as per the guidelines is emphasized.

Need of Biomedical engineer is the need of the hour as

outsourcing of personnel from outside the district everytime for maintenance is very costly and time consuming especially during winters when air connectivity is the only linkage with the outside world.Staff handling equipment should be trained regarding equipment maintenanace from time to time.Spare parts should be available and staff trained for minor faults.supervision from in charge of every section routinely or periodically to keep the equipmet in working order is must. Besides strict monitoring from administrative section is needed. mannuals should be made available and maintenance contract should be decided beforehand. Record keeping should be computerised.

Limitation and research scope : The study gives an overview about equipment management. It doesn't take into consideration other parameters like downtime of the equipment, mean time between failure and other aspects of equipment management like planning, procurement, distribution, location and storage, cost, testing and commissioning etc. Further study focussing on all these aspects with a mix of qualitative and quantitative study with involvement of other stakeholder like Medical Superintendent, Nursing Administrator would give a better insight about the subject.

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