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Public Financial Management Strengthening Project (PFMSP)

Report on Third-Party Verification of Medical Equipment and Inventory Management of Bharatpur Hospital of the Ministry of Health and Population (MOHP)

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PFMSP Year 5 Workplan Activity B.2.1.4 Conduct third party verification or appraisal of equipment, inventory at MOHP and selected hospitals and academies to establish a base-line database of medical equipment

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TABLE OF CONTENTS

Acknowledgements

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Our sincere thanks go to PFMSP for providing expert opinions and guidance. We hope this verification of Medical Equipment would pave the way for future planning and programming.

Acronyms and Abbreviations

Acronym	Definitions
AMC	Annual Maintenance Contract
CMC	Comprehensive Maintenance Contract
HCTP	Health Care Technology Policy
HEAL	Health, Education, Agriculture and Logistics
HOD	Head of Departments
HR	Human Resource
MEM	Medical Equipment Management
MoHP	Ministry of Health and Population
NHP	National Health Policy
NHSP	Nepal Health Sector Strategy
PFMSP	Public Financial Management Strengthening Project
PHSA	Public Health Service Act
QSRD	Quality Standard and Regulatory Division
SOP	Standard Operating Procedure
USAID	United States Agency for International Development

1. EXECUTIVE SUMMARY

Nepal has made significant progress in health outcomes relative to its income level. Yet, inability to ensure consistent access to quality health services by the people, accountable human resources to public health and services, disproportionate return from investment in the health services and unavailability and optimum use of necessary modern equipment as well as specialized doctors in public health institutions are the main challenges in promoting and availing quality health services in Nepal.

Medical Equipment Management (MEM) takes place within the context of human, material, structural, organizational, and financial resources. It is a process which helps hospitals to develop, monitor, and manage their equipment to promote the safe, effective, and economical use and maintenance of equipment. The healthcare system has become dependent on new technologies developed to facilitate patient care. A good management practice includes planning, acquisition, incoming inspection, inventory, installation, commissioning and acceptance, training of users and operators, monitoring of use and performance, maintenance, and replacement or disposal of equipment.

Since long, hospital equipment management issues are in the limelight. Time and again the issues are highlighted by the media. MoHP has identified the weaknesses in its inventory management system, including non-compliance among federal level hospitals and health academies that have not regularly updated lists of existing medical equipment. Given these prevailing issues, MoHP, therefore, initiated to conduct a third-party verification of existing equipment at hospitals and academies under MoHP purview and to recommend setting up of a comprehensive inventory management system to address these problems.

The urgency to rectify the weakness has also been heightened due to the ongoing COVID-19 pandemic in Nepal. Concerns regarding limited equipment, instruments for diagnosis and treatment in recent COVID -19 pandemic crisis further substantiated the need of verification of medical equipment in hospitals as well as its proper use.

MoHP took the leadership in collaboration/ support of USAID Public Financial Strengthening Project (PFMSP) for the verification of the medical equipment and inventory management of selected hospitals that would help ensure the proper utilization of medical equipment with effective inventory management. The objectives of the third-party verification of medical equipment in academics and hospitals for MoHP are to:

- Conduct verification of all existing medical equipment as well as the review the inventory management and the system.
- Identify the number of required and available equipment's needed to provide health services as per the nature of health services to be provided.
- Suggest the strategies to be taken forward to utilize medical equipment properly, also keeping in mind the effective inventory management.

MOHP and PFMSP assigned the HEAL Group to carry out this task. The Standard Tool checklist developed by MoHP with the support from PFMSP was used to collect data on medical equipment at both the sampled hospitals in Bharatpur and Bir Hospital.

After the orientation program with the MOHP and the concerned officials from the hospitals, the HEAL Data Collection Team began collecting data and other relevant information from June 8, 2021, in Bharatpur Hospital and June 27, 2021,at Bir hospital which continued for a month. Retrospective review of inventory records, physical verification of hospital equipment and interviews/ and interaction with Department Heads and Store Managers were undertaken by the HEAL Team.

1.1 Based on the review carried out presented below are some of the key observations:

- Out of 1,006 equipment verified at Bharatpur Hospital, more than half (53.5%) were procured by the hospital showing enhanced capability in procurement.
- Most importantly nearly one-fifth (17.2%) of equipment's source of receipt was unavailable. This necessitates significant improvement in proper recording for inventory management of equipment. Out of the total equipment, interestingly 15% (10% unbundled and 5%) were not in use during time of verification. About one-tenth (9%) of equipment are out of order. The reasons identified are technical error, equipment being under maintenance and accessories and associated parts were unavailable. If the equipment were out of order due to unavailability of accessories and or associated parts, and if with valid warranty period, Hospital Management should follow up with the supplier for accessories. Equipment that are completely damaged or irreparable need to be decommissioned as per prevailing government rules to free the unnecessarily occupied space. Decommissioning also generates revenue to the government.
- Out of the 101 unbundled equipment, almost half (47.5%) of equipment were received as donation. The underlying reasons are either they are stored (in stock), unavailability of working station, and installation not completed.
- It was found that maintenance of 375 equipments were done at least once during their life cycle. The average number of maintenances of all equipments are 7.4 from the time of commissioning up until the date of verification.
- All equipment received in donation (N=96) do not have information on maintenance cost. Out of the total, 91 were "out of order" equipment from all sources, equipment received as donation comprises of 4.4%. So, it is eminent that Hospital Management, while accepting donated equipment, should also make sure with the providers/donors to include budget for repair and maintenance.
- About one-third of hospital purchased equipment (170/538) have information on maintenance cost. The total maintenance cost across all services/department is Rs. 4 million and average maintenance cost of Rs.23,553.20. General Medicine department has the highest cumulative costs with approximately Rs. 1.3 million. Radiology Department has information of cumulative maintenance cost information for only a third of equipment (N=18) and has the highest average maintenance cost of Rs. 80,816.17 amongst all departments verified.

  Out of the total of 1,006 equipment in all departments 44.7% of all equipment across all services (departments) are less than 5 years old. Similarly, 19.6 percent of equipment are aged between 5 to ten years. However less than 1 % (N=7) of all equipment are more than ten years old. At the time of verification 35% (N=352) of all medical equipment's purchase date were not available. One-third of total equipment has cost information available, enhancement of inventory management including recording is required for planning.

- Two-third (65.9 %) of equipment across all departments have both purchased/received and installation/commissioned date. The average difference in dates of received and installation is 27.5. Only 19.4 % (N=195) equipment across all departments have availability of document on warranty period, while 43.5% of all equipment has information on availability of installation report and service agreement.
- About half of all equipment (49.9%) were maintained at least once. Similarly, the other half of equipment (50.1%) have no records available of maintenance. 1.4% of equipment across all departments have annual maintenance contracts, 0.3% have comprehensive maintenance contracts and 54.9% have maintenance schedule.

- Almost all (99.2%) of equipment verified (N=1,006) have infrastructure to keep the equipment functioning, 59.9% of equipment have user catalog available; logbook is maintained for 93.6% of equipment. About 14.2 services per day are provided by all equipment across all departments. About 95% of equipment have human resource available for the operation as well as 95.3 of HR operating those equipment have received user training. This indicates medical equipment in Bharatpur Hospital are operated by well-trained HR with user training to operate those equipment.

1.2. Recommendations

- 17.2% of equipment's source of receipt is unavailable. It is important to note that records of purchase/receipt, warranty period, AMC/CMC, availability of catalog and user manual were not available at the verification. Hospital Management should work on improving inventory records of medical equipment.
- Information flow between store and departments, hospital management and donor as well as hospital and government for better supply chain management of equipment.
- Keeping in lieu of 15% (10% unbundled and 5% are not in use) of all medical equipment not in use either they are in stock for future use or unavailability of working station, or installation are not completed. If the equipment are out of order due to unavailability of accessories and or associated parts, and if with valid warranty period, Hospital Management should follow up with the supplier for accessories. Equipment that are completely damaged or irreparable, Hospital Management should proceed with decommissioning as per government rules. This not only frees spaces but also generate revenue to the government.
- Unavailability of HR to operate ECG Machine and Lithotripter in Anesthesia OT Department resulting unused. If those equipment are needed there, then appropriate human resource should be deployed to use the equipment. If they are not needed there, hospital management should transfer those equipment to the departments where they are needed for more patient care services.
- As half of the equipment received as donation are unbundled, they are either in stock or working station is unavailable specifically for washing machine, dryer, and ironing equipment under other services. Hospital Management, before accepting such equipment should make sure whether they have physical infrastructure to keep and make such equipment operational. Keeping unbundled equipment for longer period of time gradually decreases life span of such equipment. It is suggested that Hospital Management mange resources to make such equipment operational.
- Only about 20% of all equipment have information on maintenance cost. Effective maintenance management of medical equipment is one of the major issues for quality of care, for providing cost-effective health services and for saving scarce resources. Hospital management is thus suggested in the decision-making in support of selection, purchase, repair, and maintenance of medical equipment, especially for capital equipment.
- While purchasing equipment, especially for capital equipment, to include AMC/CMC in the bidding document.
- Medical equipment received as donation comprises 4.4% of total medical equipment. However, no information on cost of maintenance was found. So, it is eminent that Hospital Management, while accepting donated equipment, should also make sure with providers for repair and maintenance provision as well.
- Equipment that requires maintenance frequently, and maintenance cost is ~~id~~ high, Hospital Management should weigh on pros and cons of keeping such equipment or seek for new procurement.

- The healthcare system has become dependent on new technologies developed to facilitate patient care. Old and obsolete equipment are needed to be decommissioned and start for planning new acquisitions. In case of acquisition of new equipment with advanced technology, it is essential to assess the availability of physical infrastructure to house such equipment and train personnel responsible to operate such equipment

2. INTRODUCTION

2.1 Background

Medical Equipment Management (MEM) takes place within the context of human, material, structural, organizational, and financial resources. It is a process which helps hospitals to develop, monitor, and manage their equipment to promote the safe, effective, and economical use and maintenance of equipment[1]. The hospital equipment management is a management cycle that starts from planning, procurement, acquisition, installation, commission, decommissioning and finally disposal of hospital equipment[2]. In developing countries absence of maintenance and repairs of hospital equipment, improper procurement plan, improper calibration, and poor validation of the equipment are the major challenges in hospital equipment management[3].

Hospital equipment inventory is an essential part of an effective health-care technology management[4]. The (mis-) management of physical assets impact the quality, efficiency, and sustainability of health services at all levels. It could be some issue with sophisticated life-support equipment in a tertiary hospital setting, or with simple equipment required at the primary healthcare level for effective diagnosis and safe treatment of patients. What is vital at all levels and at all times is a critical mass of affordable, appropriate, and properly functioning equipment used and applied correctly by competent personnel, with minimal risk to their patients and to themselves.

Nepal has made significant progress in health outcomes relative to its income level. Yet, inability to ensure consistent access to quality health services by the people, accountable human resources to public health and services, disproportionate return from investment in the health services and unavailability and optimum use of necessary modern equipment as well as specialized doctors in public health institutions are the main problems in promoting and availing quality health services in Nepal [5].

2.2 Rationale

Public hospitals hold a vast array of medical equipment ranging from small inexpensive items to expensive complex. This verification examines the efficiency and effectiveness of the use, management, and maintenance of major medical equipment in hospitals and academics under Ministry of Health and Population (MoHP). The assignment included an assessment of the current status, life expectancy of medical equipment and the asset management practices in hospitals.

Since long, hospital equipment management issues have come into the limelight. Time and again the issues are highlighted by the media as well. MoHP has identified weaknesses in its inventory management system, including non-compliance among federal level hospitals and health academies that have not regularly updated lists of existing medical equipment. MoHP, therefore, initiated to conduct a third-party verification of existing equipment at hospitals and academies under MoHP purview and recommend set up of a comprehensive inventory management system.

1https://www.asianhhm.com/technology-equipment/medical-equipment-management
2 Rajeev B, Ashish D (2007) Healthcare Knowledge Management: Issues, Advances, and Successes, Library of Congress Control Number: 2006923639: 10:0-387-335404.
3 Mercy Adusei Boatemaa, Hospital Equipment and its Management System: A Mini Review, 2017, https://juniperpublishers.com/ctbeb/pdf/CTBEB.MS.ID.555684.pdf
4 http://apps.who.int/iris/bitstream/handle/10665/44561/9789241501392_eng.pdf;jsessionid=719B092427000867CEF76A22AEBA4E71?sequence=1
5 https://un.org.np/sites/default/files/doc_publication/2018-08/who_nepal_ccs_2018-2022.pdf

The urgency to rectify the weakness has also been heightened due to the ongoing COVID-19 pandemic in Nepal. Concerns regarding limited equipment, instruments for diagnosis and treatment in recent COVID -19 pandemic crisis further substantiated the need of verification of medical equipment in hospitals.

The Office of Auditor General in its Annual Report has highlighted mandatory requirement for public entities in maintaining up-to-date record of every non-expendable item, conserve, timely repair & and maintenance, and decommissioning of un-repairable as per Financial Procedure Regulations (2064) and Fiscal Accountability Act (2076) [6].

MoHP decided to conduct a third-party verification of medical equipment and inventory management of selected hospitals/academics with support from USAID/PFMSP. Health, Education, Agriculture and Logistic (HEAL) Group was assigned on behalf of PFMSP and MoHP to carry out the third-party verification of medical equipment in academics/hospitals with no conflict of interest.

2.3 Objectives

With support from the MoHP, the verification of the medical equipment and inventory management of selected hospitals would help ensure the proper utilization of medical equipment with effective inventory management. The specific objectives of the third-party verification of medical equipment in academics and hospitals for MoHP are:

- Conduct medical equipment verification as well as inventory management.
- Identify the number of required and available equipment's needed to provide health services as per the nature of work.
- Suggest the strategies to be taken forward to utilize medical equipment properly, also keeping in mind the effective inventory management

2.4 Hospital Equipment Management in Nepal

A systematic way to manage medical equipment is to study and optimize all phases in the useful life of that equipment. Medical equipment plays an important role in the healthcare delivery. MEM takes place within the context of human, material, structural, organizational, and financial resources. It is a process which helps hospitals to develop, monitor, and manage their equipment to promote the safe, effective, and economical use and maintenance of equipment through a life cycle approach is prescribed. It typically consists of nine stages; Planning, Procurement, Delivery and incoming inspection, Inventory and documentation, Installation and commissioning, User training, Monitoring of performance, Maintenance and Replacement or disposal. [7]

Nepal Health Infrastructure Development Standards integrates planning for important building blocks of the health system - health infrastructure, human resources, and equipment. An efficient and effective system is crucial to improve and ensure quality health services at the point of service delivery. Human resources, Infrastructure, Procurement and Supply chain are highlighted as essential, interconnected components that need to function in tandem for smooth service delivery. These systems are altogether geared towards ensuring optimal deployment and quality of health personnel, setting up minimum infrastructure and the timely procurement, uninterrupted supply of drugs and equipment and logistics. [8]

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[6] Office of Auditor General, Annual Report, 2020/21

[7] https://www.asianhhm.com/technology-equipment/medical-equipment-management

[8] https://www.nhssp.org.np/Resources/HI/HI_Dev_Standards_2074BS_Unofficial_Translation_Volume4.pdf

In Nepal, system and procedures are in place for the management of medical equipment from need identification, preparation of annual procurement plan, procurement, receipt, recording, quality assurance, commissioning, repair/maintenance, and decommissioning. All public sector institutions get supplies basically from three sources; government, own procurement, and donations. For the procurement, all public sector institutions are required to abide the Public Procurement Act 2063, Public Procurement Regulations 2064. All institutions are required to prepare annual procurement plan basing on need identification. Depending upon the price, volume procurement is done either direct, through quotation or competitive bidding. Public Procurement Monitoring Office (PPMO) has developed standard bidding document and all procurements are to be made accordingly. Annual Maintenance Contract (AMC) and Comprehensive Maintenance Contract (CMC) can be inbuilt in the bidding document. The provision of pre and post shipment inspection is in place for quality assurance. After quality inspection, the received equipment are entered in the main stock register. After entering the inventory in store records, the equipment are installed and commissioned as per the contract and the suppliers are required to perform periodic maintenances as per AMC and CMC for specified period of time. The suppliers are required to provide training to users on the operation of the equipment. When the equipment become un-repairable, then every institution should proceed decommissioning of such equipment as per Government's Financial Procedure Rules. For decommissioning of un-repairable medical equipment, MoHP has also published a guideline which was endorsed by PPMO, and Auditor General's Office as well[9].

High-quality health services involve the right care, at the right time, responding to the service users' needs and preferences, while minimizing harm and resource waste[10]. The condition of medical equipment used has an impact, no matter how small, on the patient mortality rate. Globally, it is considered that almost 10% of the world population's mortality rate is due to medical equipment failure.

Despite of system being in place hospital equipment management is still of less priority in many hospitals. The data from one of the previous projects of MoHP showed that on an average 30-33% of the equipment are out-of-order. Almost 4% of the equipment were not commissioned in the facility. Moreover, 2 to3% of the equipment were not verified in the health facility. The underlying reasons for the above data were found to be due to lack of human resource to operate that equipment, lack of proper training for users as well as the technicians and lack of a proper inventory management.[10]

2.5 Regulatory and Guiding Policies

The quality equipment management includes production, procurement, transportation, use, and even maintenance of the equipment. There are many relevant guidelines in this regard like Public Procurement Act/Regulation, Equipment Handling Standard Operating Procedure (SOP)s, User Manual, Maintenance Guidelines, and Equipment Auction Guidelines.

The Health Care Technology Policy (HCTP)[11], 2006 was the guiding document for utilization and operation of medical equipment. An appropriate equipment and facility management system is essential for increasing returns from such investments. HCTP aims to improve life cycles of medical equipment from planning, procurement, and implementation.

The National Health Policy (NHP), 2019[12] outlines the policy of medical and managerial audit of health institutions, which is carried out to strengthen the quality of services and institutional capacity.

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[9]http://dohslmd.gov.np/web/en/postdetail/final-auctioning-and-writeoff-guideline-2067
[10]https://www.who.int/healthinfo/global_burden_disease/GlobalHealthRisks_report_full.pdf
[11] http://mohp.gov.np/downloads/Health-Care-Technology-Policy.pdf
[10] Report on "Nationwide Maintenance Outsourcing Program", MD, DoHS
[12]National Health Policy, 2019

NHP has well spelled out about the equipment and inventory management to deliver quality health services. The strategy 6.10 mentions ensuring establishing mechanism to determine price and quality of drugs, equipment, and technological health materials and to regulate them. It also addresses the need to develop the guidelines and standards to receive and utilize medicines, equipment, medical supplies as per the need from international, national, and local government, non-government, and private entities. It also ensures making procurement, transportation, storage, and distribution system more effective and systematic by preparing specifications of drugs and medical supplies.

The Fifteenth Plan (2019/20 – 2023/24) reiterates ensuring quality health service by using medicine and treatment methods, physicians, and the latest technology in service delivery, and enhancing the availability and skills of human resources. For this reforming the quality of health services will be provided by health institutions at all levels by effectively implementing Nepal Health Infrastructure Development Standards and Minimum Service Standards (MSS).

Nepal Health Sector Strategy (NHSP), 2015-20[13] has incorporated to rebuild and strengthen the health systems: HRH, Infrastructure, Procurement and Supply chain management as its output. It calls for necessary institutional arrangements, including building capacities at different levels, to leverage technologies adequately, better manage (asset management) existing technologies and improve repair and maintenance functions[14].

The Public Health Service Act (PHSA), 2018[15] spells that each health institution shall provide services subject to the Minimum Standards as determined by the Ministry. Key thrust of PHSA is the responsibility of the health institution to maintain the quality of healthcare services. The quality health service is not possible without quality equipment management.

13 Fifteenth Plan, 2019/20 – 2023/24, National Planning Commission, March 2020
14 Nepal Health Sector Strategy, 2015-2020, Government of Nepal, ministry of Health and Population, 2015
15 The Public Health Service Act, 2075 (2018)

3. METHODOLOGY

3.1 Sampling

For the purpose of verification of medical equipment, Quality Standard and Regulation Division (QSRD) of MoHP selected two major hospitals based on the geographical setup and flow of patient. While Bharatpur Hospital is based outside Kathmandu valley, Bir Hospital is one of the leading hospital of the capital. Both of these hospitals have commendable patient flow with numerous medical equipment used for quality healthcare services delivery. Furthermore, the Physical Assets Management Sub-division of the Management Division (MoHP) had earlier carried out a study per the equipment management perspective at Bharatpur Hospital.

3.2 Tool Used

The Standard tool developed by Ministry of Health and Population (MoHP) was used to collect data on medical equipment at both the sampled hospitals: Bharatpur Hospital and Bir Hospital (Annex 1). A separate questionnaire was also developed for the Head of Departments (HODs) of the respective hospitals to gain a broader perspective and information regarding the program.

3.3 Orientation

3.3.1 Orientation to Head of Departments

With the initiation of MoHP, Quality Standard & Regulation Division (QSRD) and HEAL Group coordinated with the Bharatpur Hospital's administration for necessary arrangements to carry out the orientation program at the respective hospitals. A team comprising of representatives from MoHP, Lumbini Province Health Secretary, and HEAL Group conducted the orientation program in Bharatpur hospital. Despite the nationwide lockdown due to COVID – 19 pandemics, the team successfully conducted orientation program at Bharatpur Hospital on June 7, 2021, followed by the orientation program at Bir Hospital on June 25, 2021.

The orientation program witnessed the presence of various dignitaries from QSRD, MoHP, The Hospital Chief from both the hospitals at their respective facility, Head of Departments (HODs) as well as other guests. Chief QSRD/MoHP, Under Secretary/MoHP, Chief Medical Superintendent of each hospital facilitated the orientation program.

During the orientation, all dignitaries highlighted on affordable, appropriate, and properly functioning equipment applied correctly by competent personnel is crucial for delivering quality health services. Health Secretary of Lumbini Province explained the objectives of the hospital equipment verification. He shared that MoHP have had in mind of carrying out a verification of medical equipment in larger hospitals. This would be of great help for planning, programming, procurement, and deployment of appropriate human resources. Verification of medical equipment in Bharatpur Hospital is the beginning of this far-sighted program. He added that the outcome of the project would be most beneficial to the facility itself followed by the policy making procedure in the future.

It was also highlighted that hospital equipment management issues have been in the limelight since a long time. Time and again the issues are highlighted by the newspaper as well. They emphasized and instructed the third-party verification team to bring the actual scenario as it is. The need to do a lot in equipment management in all public hospital was also realized during the discussion. It was further stated that the hospital management side everything might be well set regarding the equipment management, but third-party independent audit could bring the real picture. Furthermore, the COVID-19 pandemic made the management realize the need of medical equipment in case of emergency as there were discrepancies in stock register and actual availability. The Technical Lead from HEAL Group also facilitated the orientation program.

The meeting also concluded that this verification will not only help in identifying the issues of availability of equipment as well as human resource required to operate those equipment, but also on the procurement management, and current status of use. The independent report will certainly highlight these issues that would be helpful in future planning and programming. In the Plenary Session participants raised few queries. Summary of which are as following:

a. The measures for User Trainings to be undertaken, to address the lack of knowledge to operate certain equipment.
b. The absence of human resources for the maintenance of the concerned medical equipment which results in a greater number of non-functioning equipment and in some cases the unbundled supplies too.
c. The lack of overall management knowledge of medical equipment.
d. Provision of service contract while contracting for the medical equipment

3.3.2 Orientation to the Data Collection Team

An orientation and proper explanation on the use of the data collection tools is an important part of this assessment. Hence, the detailed information and importance of those tools were explained to the data collectors. The session was facilitated by the Chief QSRD/MoHP, Health Secretary, Lumbini Province, Under Secretary/MoHP, third-party audit/verification Part-Time Technical Lead and Bio-Medical Engineer thoroughly facilitated the orientation program.

A separate orientation only for the data collectors was conducted to familiarize them to the main motive of the program including how to proceed and prepare for data collection. This session provided them with the pointers on what was expected from them during the process until the completion of data collection. The checklist developed by MoHP was introduced to the Data collectors with a detail explanation of each variable included that further enhanced their understanding of how to use the Data collection tool. The Biomedical Engineer then described each variable in detail. She also pressed on the data collectors not to leave any room blank. The process of data collection was also explained to the participants, and they seemed to not have any problem with the discussed information. The participants were reiterated not to leave any field blank and not to fill the sheets with cooked up information.

Lumbini Province Health Secretary ran a practical session requesting the participants to fill up some dummy data on the data collection tool as an exercise to ensure the understanding of the data collectors regarding the tool. All the participants practiced and filled up the forms with some hypothetical data. The session was fruitful to observe any errors or confusions on the use of the tool. Necessary feedbacks and suggestions were provided right away to clear out any confusion as well as to correct the errors from the data collector’s point of view.

3.4 Data Collection

Data Verification Team Members were hired prior to orientation program for Bharatpur Hospital. As far as possible, Data Verification Team Members were selected on the basis of how well accustomed the data collectors would be with the hospital environment, their knowledge of the medical equipment as well as their ability to efficiently collect the data. After the orientation program, the data collection team began collecting data and other relevant information from June 8, 2021, in Bharatpur Hospital. which continued for a month. The data collection team applied the following methodologies for the verification:

3.4.1 Retrospective Review of Inventory Records for Medical Equipment

The main Financial Administration Rules and Regulations of the Government of Nepal requires every government institution to enter every item received in the main stock register. Main stock register also provides information on where the items are sent. Likewise, at the end of any fiscal year, all government institutions are mandatorily required to prepare annual physical inventory of goods with quantity, conditions of non- expendable goods whether usable, unusable, or repairable. The

information collected served as the main entry point for the verification. The data collection at Bharatpur hospital started with the verification team sitting with the Store Manager and reviewing the noted inventory. However, for Bir hospital, the scenario was a little different. As a proper inventory was not managed at the departments of Bir hospital, the data collection began with the physical verification of the medical equipment from each existing department.

3.4.2 Physical Verification of Hospital Equipment

With the standard checklist developed and endorsed by the MoHP, the team at Bharatpur hospital then visited every department of the hospital for the physical verification of the medical equipment. Using the checklist, the verification team at both the health facilities collected the data of medical equipment and inventory management for:

- Number of required and available equipment
- Source and date of equipment commissioning
- Cost and status of equipment
- Installation reports, agreement document and/or warranty period of the equipment
- Relation of use and maintenance of equipment
- Relation of use and average services provided per day
- Availability of catalogue/user manual, logbooks, etc.
- Environment, Human Resource (HR) availability, user trainings for optimal use of equipment

The physical verification of hospital equipment also demanded the data collecting team to search for the equipment that were stored away either for non-repairable of auctioning processes or for disposal process.

3.4.3 Interviews and Interaction with Department Heads and Store Managers

Often time, most of the government hospitals lack the provision of a qualified HR to oversee and ensure the optimum functioning of the equipment as well as to conduct preventive and corrective maintenance according to the need. Up to date record keeping of the available medical equipment including maintenance of records would foster their future procurement plan of the hospital.

The verification team carried out interaction and interview with Department Heads and Store Managers. A Structured questionnaire was designed and used to capture the perspective of Head of Departments and Store Managers on availability of human resources to operate the medical equipment, repair & maintenance, and effective utilization of limited space. The interview tried to capture the availability of following information:

a. Installation agreement document with date of installation
b. Warranty agreement
c. Annual Maintenance Contract (AMC)/Comprehensive Maintenance Contract (CMC) documents
d. Record of number of services provided through the equipment
e. Facilitation for the maintenance cost for the medical equipment
f. Requirement of any new equipment to be included in its services
g. Benefit of adding the equipment to the patients and the department
h. Availability of enough space to setup the new equipment or service
i. Required Human Resource to effectively operate the existing or the demanded
j. User training of the existing staffs meet up the HR requirement
k. User training for better efficiency of the existing equipment

3.5 Verification Process

3.5.1 Coordination

A fair number of preparatory activities were carried out ahead of an verification. HEAL Group coordinated with MoHP/Quality Standards and Regulations Division (QSRD) for the necessary

approval. Following the approval, MoHP facilitated with Bharatpur Hospital for the orientation program of the Department Heads, Administrative Staff, Financial Staff, Procurement Staff and Store Manager.

This was the first step to ascertain formal association of third party with hospitals and build conducive environment during the whole process. This was crucial to align the objectives of verification with hospital administration and departments have time to prepare. Department Heads of both Hospitals then facilitated with other staffs for third party verification.

3.5.2 Audit/Verification Execution

The verification process consisted of various activities including interviews with concerned personnel, on-site medical equipment verification, assessing process and system controls, and regular communication with other relevant parties within the hospital. All the above-mentioned methodologies were practiced in order to obtain the qualitative data as demanded by the tool and the aim of the program. This phase of an verification ended with an exit meeting with HODs.

3.5.3 Reporting

The report outlines the results of the third party's independent verification of medical equipment in Bharatpur Hospital, providing accurate status of medical equipment along with recommendations on any corrective actions that need to be taken. This enables the hospital management to effectively track quality and performance over time and identify areas for improvement.

3.6 Quality Assurance

A practical session for the data collectors during the beginning of the data collection process of filling up some dummy data on the data collection tool as an exercise helped to ensure the proper and complete understanding of the tool used by the data collectors. As mentioned earlier, those dummy data were cross checked, and the necessary feedbacks and corrections were made on the same sitting.

After the session, the data verification team members performed a field test in Bharatpur Hospital. After the field test, the issues that came up were addressed and rectified. The Data Verification Team Members were urged to fetch the information regarding the need of hospital equipment from all the existing departments and especially from newly created department.

For data quality assurance, the Bio-Medical Engineer and Coordinator checked completed checklist from each department questionnaires. The raw data collected were further reviewed by the senior personnel for inconsistencies and blank spaces. Necessary administrative data were accumulated in coordination to the respective office departments. The data then was entered in Microsoft Excel and checked once again for recording errors.

3.7 Monitoring

Bio-Medical Engineer (BME) from HEAL Group stayed for a week to monitor the data collection process in Bharatpur Hospital. She provided necessary guidance to the team and reviewed collected data every day. This helped Data Verification Team Members to enhance their capacity in data collection and focus on what to be collected as per the checklist.

The BME routinely monitored data collection process in Bir Hospital. HEAL Group Team frequently visited the sites during data collection process for quality and completeness.

The coordinators in both hospitals routinely monitored the data collection throughout verification process. Time and again, MoHP also made follow up visits and interactions to facilitate the addressing of issues, problems that came across.

3.8 Data Review

The central team thoroughly reviewed the collected data. Various inconsistencies were found during the review process. The inconsistencies were directed to the Data Verification Team Members for rectification. Accordingly, the Data Verification Team Members revisited the collected data and reverted back with the necessary and complete information.

3.9 Data Management and Analysis

The verification team collected the data on printed datasheets, which were later electronically transcribed as well as directly entered on the Excel Sheets provided to them. To resolve inconsistencies in the data, the team first reviewed the data. During review process, cleaned the data and entered for analysis. Data is analyzed by using SPSS,

3.10 Limitations of Audit/Verification

- The verification of medical equipment included purposively selected hospitals. The sampled hospitals may not represent the situation of all hospitals in the country overall.
- The various documents that were required during the verification process were not filed properly and unavailable. (e.g. Installation report; Annual Maintenance Contract/Comprehensive Maintenance Contract; Warranty agreement, etc.) (Findings)
- It was observed that the unavailability of HR at the health facility to efficiently operate certain equipment and the unforeseen transfer of the available HR directly affects the services provided by the facility to the patients.

4. OBSERVATIONS AND DISCUSSION

4.1 Total Number of Equipment with Source of Receipt

Table below shows the total number of equipment with source of receipt, i.e., equipment purchased by hospital, received as donation, and supplied by the government.

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Department	Number of Equipment Available	Sources			Source Not Available (%)
		Purchased by the Facility (%)	Donation (%)	Government (Center) Supply (%)	
Anesthesia	94	55.3	3.2	31.9	9.6
Dental	19	31.6	0	31.6	36.8
ENT	11	90.9	0	9.1	0
General medicine	321	62.6	11.2	15.9	10.3
Laboratory	60	45.0	6.7	18.3	30.0
Gynae/Obs	88	50.0	0	31.8	18.2
Orthopedics	7	71.4	14.3	0	14.3
Other Services	134	14.2	32.8	5.2	47.8
Pediatric	111	29.7	5.4	49.5	15.3
Physiotherapy	17	100.0	0	0	0
Psychiatry	1	100.0	0	0	0
Radiology	22	81.8	0	18.2	0
Dermatology	2	100.0	0		0
Supporting services	78	92.3	2.6	0	5.1
Surgery	41	75.6	0	14.6	9.8
Total	**1,006**	**53.5**	**9.5**	**19.8**	**17.2**
	N	**538**	**96**	**199**	**173**

Observations:

- More than half (53.5%) of the equipment were procured by the hospital.
- Around one-tenth (9.5%) of the total equipment have been received through donation.
- One-fifth (19.8%) of equipment were received from government sources.
- Most importantly nearly one-fifth (17.2%) of equipment's source of supply is not known. This necessitates significant improvement in proper recording of equipment received.

4.2 Current status of all equipment by Services (Department)

Table below provides the information on current status of equipment by services (department). Under this criterion five categories were assessed-**Functioning, Out of Order, Not in Use, Unbundled** and **For Auction** for all departments.

Department	Number of Equipment Available	Function'l (%)	Out of Order (%)	Not in Use (%)	Unbundled (%)	For Auction (%)	NA (%)
Anesthesia	94	75.5	19.1	4.3	1.1	0.0	0.0
Dental	19	94.7	5.3	0.0	0.0	0.0	0.0
ENT	11	100.0	0.0	0.0	0.0	0.0	0.0
General medicine	321	84.4	10.0	0.9	3.7	0.0	0.9
Laboratory	60	66.7	23.3	5.0	0.0	1.7	3.3
Gynae/Obs	88	87.5	6.8	1.1	4.5	0.0	0.0
Orthopedics	7	71.4	14.3	0.0	14.3	0.0	0.0
Other Services	134	9.7	7.5	28.4	54.5	0.0	0.0
Pediatric	111	91.9	4.5	0.9	2.7	0.0	0.0
Physiotherapy	17	88.2	5.9	5.9	0.0	0.0	0.0

Psychiatry	1	100.0	0.0	0.0	0.0	0.0	0.0
Radiology	22	77.3	9.1	13.6	0.0	0.0	0.0
Dermatology	2	100.0	0.0	0.0	0.0	0.0	0.0
Supporting services	78	91.0	1.3	0.0	6.4	0.0	1.3
Surgery	41	95.1	0.0	0.0	4.9	0.0	0.0
Total	**1,006**	**74.9 (N-753)**	**9.0 (N=91)**	**5.4 (N=54)**	**10.0 (N=101)**	**0.1 (N=1)**	**0.6 (N=6)**

Observations:

- Three-fourths (74.9%) of the equipment are functioning and are used in patient care services.
- Out of the total equipment, 15% (10% unbundled and 5%) were not in use at the time of data collection.
- About one-tenth (9%) of the equipment are out of order.
- Equipment that are completely damaged or irreparable need to be decommissioned as per prevailing government rules to free the unnecessarily occupied space. Decommissioning also generates revenue to the government.

4.3 Source of Equipment by Functioning Status

Table below provides the Source of Equipment by its' Functioning Status. Three sources of receipt (Institution Purchase, Received as Donation and Government (Center) Supply) were verified with the Current Status of Equipment (Functioning, Out of Order, Not in Use, Unbundled and for Auction).

Types	Number of Equipment Available	Function'g (%)	Out of Order (%)	Not in Use (%)	Unbundled (%)	For Auction (%)
Hospital Purchase	538	86.8	8.0	1.3	3.9	0.0
Received as Donation	96	43.8	4.2	2.1	50.0	0.0
Government Supply	199	75.9	15.6	4.0	4.0	0.4

Observations:

- Out of the 538-equipment purchased by the hospital 87% are functional.
- Out of the 199-equipment supplied by the Government 76% are functional.
- Higher percentage (16%) of government supplied equipment's are out of order compared to Hospital purchase (8%).
- Out of the equipment received through donation (N=96), 44% are functional and 52% are not in use (2% are not in use and 50% are unbundled).The underlying reasons are either they are stored (in stock), unavailability of working station, and installations have not been completed.

4.4 Hospital Purchase- Current Status of all Equipment by Services (Department)

Table below provides the current status of all equipment purchased by Hospital in all services (departments). Total equipment purchased by the hospital in all services (department) were verified for functioning, out of order, not in use, and unbundled.

Service (Department)	Functioning	Out of Order	Not in Use	Unbundled	Total
Anesthesia	86.5	11.5	1.9	0	52
Dental	100.0	0	0	0	6
ENT	100.0	0	0	0	10
General Medicine	87.1	10.0	0	3.0	201
Laboratory	70.4	25.9	3.7	0	27
Gynae/Obs	93.2	4.5	2.3	0	44
Orthopedics	80.0	20.0	0	0	5
Other Service	15.8	5.3	5.3	73.7	19

Pediatric	90.9	9.1	0	0	33
Physiotherapy	88.2	5.9	5.9	0	17
Psychiatry	100.0	0	0	0	1
Radiology	83.3	5.6	11.1	0	18
Dermatology	100.0	0	0	0	2
Supporting services	97.2	1.4	0	1.4	72
Surgery	100.0	0	0	0	31
Total	**86.8**	**8.0**	**1.3**	**3.9**	**538**

Observations:

- Eighty-seven (86.8%) of the medical equipment purchased by the hospital (N=538) in all departments are functioning.
- Unbundled equipment purchased by the hospital is 3.9% of which three-quarters (73.7%) are associated with other services.
- The reasons behind the out of order equipment identified are either due to technical error, or under maintenance, or parts not available or are damaged.
- By department, “Other Service”, only 16% of equipment are functional. 73.7 % of equipment are unbundled and 5.3% of equipment are not in use.

4.5 Donation- Current status of all Equipment by Services (Departments)

Services (Department)	Functioning	Out of Order	Not in Use	Unbundled	Total
Anesthesia	100.0	0	0	0	3
General medicine	75.0	8.3	5.6	11.1	36
Laboratory	75.0	25.0	0	0	4
Orthopedics		0	0	100.0	1
Other Services	6.8	0	0	93.2	44
Pediatric	100.0	0	0	0	6
Supporting services		0	0	100.0	2
Total	**43.8**	**4.2**	**2.1**	**50.0**	**96**

Observations:

- 43.8% (N=96) equipment received as donation are functioning while 50% of equipment donated are unbundled. 4.2% of such equipment are out of order.
- Likewise 2.1% of equipment received as donation are not in use. The reason for not in use is mostly cited as under maintenance.
- It was observed that half of the equipment received as donation are unbundled. They are either in stock or working station is unavailable specifically for washing machine, dryer, and ironing equipment under other services.

4.6 Government (Center) Supply - Current Status of all Equipment by Services

Table below gives the current status of equipment received from Government (Center) supply against current status (functioning, out of order, not in use, unbundled or for auction).

Services (Department)	Functioning	Out of Order	Not in Use	Unbundled	For Auction	Total
Anesthesia	53.3	36.7	10.0	0	0	30
Dental	83.3	16.7	0	0	0	6
ENT	100.0	0	0	0	0	1
General	80.4	15.7	0	3.9	0	51
Laboratory	54.5	36.4	0	0	9.1	11
Gynae/Obs	78.6	7.1	0	14.3	0	28
Other Services	14.3	28.6	42.9	14.3	0	7
Pediatric	94.5	3.6	1.8	0	0	55

Radiology	50.0	25.0	25.0	0	0	4
Surgery	83.3	0	0	16.7	0	6
Total	**75.9**	**15.6**	**4.0**	**4.0**	**.5**	**199**

Observations:

- Three-fourths (75.9%) of Government supplied equipment in all services (department) are functioning and are in use for patient care.
- Four (4) % each of government supplied equipment are not in use and unbundled. They are either in stock or working station is unavailable. Or not as per the need of hospital.
- 'Out of order equipment need to be decommissioned as per prevailing rules of the government

4.7 Source of Equipment by Times of Maintenance

Below Table compares the source of equipment (purchase, received as donation and government supply) with maintenance (total number of maintenance and average number of maintenance).

Source	Number of Equipment Available	No of Equipment with at least One maintenance(>0)	# Total Number of Maintenance of all the equipment(>0)	Average Number of Maintenance
Hospital Purchase	538	375 (70%)	2790	7.4
Donation	96	26 (27%)	41	1.6
Government Supply	199	56 (28%)	333	5.9
Source Not Available	173	45 (26%)	255	5.7
Total	**1,006**	**502 (50%)**	**3,419**	**6.8**

Observations:

- Of the total 1,006 equipment verified, maintenance of only about half (N=502) of the equipment from all sources were done. Average number of maintenances of hospital purchased equipment is 7.4.
- The average number of maintenances of all equipment from all sources is 6.8.
- Out of the equipment received as donation (N=96), only 26 of such have had at least one maintenance.
- The average number of maintenances of equipment received as donation is 1.6; lowest among all sources of receipt.

4.8 Hospital Purchased Equipment Times of Maintenance Status by Services (Department)

Services/Department	Number of Equipment Available	No of Equipment with at least One maintenance (>0)	# Total Number of Maintenance of all the equipment(>0)	Average Number of Maintenance
Anesthesia	52	39	264	6.8
Dental	6	6	40	6.7
ENT	10	3	13	4.3
General	201	147	1,066	7.3
Laboratory	27	12	105	8.8
Gynae/Obs	44	36	172	4.8
Orthopedics	5	5	20	4.0
Other Services	19	5	36	7.2
Pediatric	33	21	173	8.2

Physiotherapy	17	11	68	6.2
Psychiatry	1	1	13	13.0
Radiology	18	7	40	5.7
Dermatology	2	0	0	0.0
Supporting Services	72	67	682	10.2
Surgery	31	15	98	6.5
Total	**538**	**375**	**2,790**	**7.4**

Observations:

- A total of 538 hospital purchased equipment across all services (departments) were verified.
- Cumulative maintenance number of all equipment across all services/department is 2,790.
- It was found that maintenance of 375 (70%) was carried out at least once.
- The average number of maintenances of the equipment that are maintained at least once is 7.4.

4.9. Donated Equipment Times of Maintenance Status by Services (Department)

Table below gives the donated equipment maintenance status by services/departments. It captures information on the number of equipment with at least one maintenance, cumulative number of maintenances of all equipment with at least one maintenance and average number of maintenances across all service/departments.

Services/Department	Number of Equipment Available	No of Equipment with at least One Maintenance(>0)	# Total Number of Maintenance of all Equipment(>0)	Average Number of Maintenance
Anesthesia	3	1	1	1.0
General medicine	36	23	34	1.5
Laboratory	4	0	0	0.0
Orthopedics	1	0	0	0.0
Other Service	44	1	2	2.0
Pediatric	6	1	4	4.0
Supporting services	2	0	0	0.0
Total	**96**	**26**	**41**	**1.6**

Observations:

- Out of the 96 donated equipment verified, 26 were repaired/maintained at least one time.
- The cumulative number of maintenances of all equipment across all services/departments is 41 with the average number of maintenances of 1.6 per service/department.
- In average per equipment of pediatric department received 4maintenance

4.10 Government Supplied Equipment Times of Maintenance Status by Services (Department)

Table below gives the Government (center) supplied maintenance status by services/departments. It captures information on the number of equipment with at least one maintenance, cumulative number of maintenances of all equipment with at least one maintenance and average number of maintenances across all service/departments.

Services/Department	Number of Equipment Available	No of Equipment with at least One maintenance(>0)	# Total Number of Maintenance of all Equipment(>0)	Average Number of Maintenance
Anesthesia	30	6	60	10.0
Dental	6	2	24.0	12.0
ENT	1	0	0	0.0
General	51	19	114	6.0
Laboratory	11	1	7	7.0
Gynae/Obs	28	0	0	0.0
Other Service	7	3	21	7.0
Pediatric	55	19	92	4.8
Radiology	4	1	10	10.0
Surgery	6	5	5	1.0
Total	**199**	**56**	**333**	**5.9**

Observations:

- Maintenance of 56 (N=199) government supplied equipment are done at least one time.
- Cumulative number of all equipment that were repaired at least one time is 333 with average number of maintenances of 5.9.
- By services/department, the average number of maintenances of equipment with at least one maintenance is higher in Dental, Anesthesia and Radiology Department with 12,0, 10.0and 10.0 respectively.

4.11 Source of Equipment by Average and Cumulative Maintenance Cost

Table below shows the source of equipment with the number of equipment with maintenance costs, cumulative and average maintenance cost.

Department	Number of Equipment Available	Number of Equipment with Maintenance Cost	Total Cumulative Maintenance Cost (in Rs.)	Average Maintenance Cost (in Rs.)
Hospital Purchase	538	170	4,004,050.00	23,553.20
Received in Donation	96	0	0	0
Government Supply	199	4	240,000.00	60,000.00
Not Available	173	10	102,550.00	10,255.00
Total	**1,006**	**184**	**4,346,600.00**	**23,622.83**

Observations:

- It is found that 170 hospital purchased equipment (N=538) have maintenance cost information available. Of which the total cumulative maintenance cost is Rs. 4 million and average maintenance cost of Rs. 23,553.20.
- All equipment received in donation (N=96) do not have information on maintenance cost. Only 4 (N=199) have information on maintenance cost with cumulative and average maintenance cost of Rs.240, 000.00 and Rs.60,000.00 respectively.
- Only 10 (N=173) equipment with source information not available have cumulative and average maintenance cost of Rs. 102,550.00 and Rs. 10,255.00 respectively.

4.12 Hospital Purchased Equipment Average Cumulative Maintenance Cost by Services (Department)

Table below gives the Hospital purchased equipment by department with number of such equipment, total cumulative and average maintenance cost by services (department).

Department	Number of Equipment Available	Number of Equipment with Maintenance Cost	Total Cumulative Maintenance Cost (in Rs.)	Average Maintenance Cost (in Rs.)
Anesthesia	52	14	685,550.00	48,967.90
Dental	6	5	145,000.00	29,000.00
ENT	10	2	28,250.00	14,125.00
General medicine	201	46	1,318,200.00	28,656.50
Laboratory	27	10	397,700.00	39,770.00
Gynae/Obs	44	6	49,300.00	8,216.70
Orthopedics	5	1	2,450.00	2,450.00
Other Service	19	5	247,900.00	49,580.00
Pediatrics	33	3	12,450.00	4,150.00
Physiotherapy	17	3	18,700.00	6,233.30
Psychiatry	1	1	54,000.00	54,000.00
Radiology	18	6	484,900.00	80,816.07
Dermatology	2	0	0	0
Supporting services	72	65	474,750.00	7,303.80
Surgery	31	3	84,900.00	28,300.00
Total	**538**	**170**	**4,004,050.0**	**23,553.2**

Observations:

- About one-third of the hospital purchased (170/538) equipment have information on maintenance cost. The total maintenance cost across all services/department is Rs. 4millionand average maintenance cost is of Rs.23,553.20.
- General Medicine department has the highest cumulative cost with approximately Rs. 1.3 million. Where Radiology Department has the highest average maintenance cost of Rs. 80,816.17.

4.13 Government Supply Equipment Average Cumulative Maintenance Cost by Services (Department)

Below Table gives the government supplied equipment by department with number of such equipment, total cumulative and average maintenance cost by services (department).

Department	Number of Equipment Available	Number of Equipment with Maintenance Cost	Total Cumulative Maintenance Cost (in Rs.)	Average Maintenance Cost (in Rs.)
Anesthesia	30	1	85,000.00	85,000.00
General Medicine	51	3	155000.00	51,666.70
Total	**81**	**4**	**240,000.00**	**60,000.00**

Observations:

- Only two departments, Anesthesia and General Medicines have information on maintenance cost available for government supplied equipment. Out of the 81 equipment in these two departments only 4 has maintenance cost available with cumulative cost of Rs. 240,000.00 and average cost of Rs. 60,000.00

- Other departments should seek provisions of budget for regular maintenance of medical equipment as well.

4.14 Age of Equipment

Table below gives the average age of medical equipment in all services (department). Ages of equipment are categorized as less than 5, between 5-10, and more than 10 years old.

Services (Department)	Number of Equipment Available	Less than 5 Years Old (%)	Between 5 to 10 Years Old (%)	More than 10 Years Old (%)	Purchase Date not Available (%)
Anesthesia	94	35.1	24.5	0	40.4
Dental	19	31.6	10.5	0	57.9
ENT	11	72.7	0	0	27.3
General Medicine	321	61.4	20.2	0.3	18.1
Laboratory	60	25.0	5.0	6.7	63.3
Gynae/Obs	88	48.9	9.1	0	42.0
Orthopedics	7	71.4	14.3	0	14.3
Other Services	134	44.8	4.5	0	50.7
Pediatric	111	34.2	17.1	0	48.6
Physiotherapy	17	41.2	11.8	11.8	35.3
Psychiatry	1		100.0	0	0
Radiology	22	22.7	18.2	0	59.1
Dermatology	2	0	0	0	100.0
Supporting Services	78	17.9	74.4	0	7.7
Surgery	41	46.3	12.2	0	41.5
Total	**1,006**	**44.7**	**19.6**	**0.7**	**35.0**
N		**450**	**197**	**7**	**352**

Observations:

- A total of 1,006 equipment in all departments were verified of which 44.7% of all equipment across all services (departments) are less than 5 years old.
- Similarly, 19.6 percent of equipment are aged between 5 to ten years. However less than 1% (N=7) of all equipment are more than ten years old. At the time of verification 35% (N=352) of all medical equipment's purchase date were not available.
- This demands proper recording of equipment received for better management.

4.15. Cost of Equipment

Table below gives cost information of equipment with total and average cost of all equipment across all departments that has information available.

Department	Number of Equipment Available	Equipment with Cost not Available (%)	Equipment with Cost Available (%)	Total cost of all equipment by department	Average Cost of equipment by Department
Anesthesia	94	59.6	40.4	63,054,417.00	34,569.31
Dental	19	68.4	31.6	2,878,200.00	59,962.50
ENT	11	27.3	72.7	6,25,945.00	9,780.39
General medicine	321	53.3	46.7	68,369,832.50	2,201.92
Laboratory	60	71.7	28.3	8,982,440.00	27,809.41
Gynae/Obs	88	53.4	46.6	2,362,661.00	1,280.57
Orthopedics	7	42.9	57.1	5,400.00	270.00
Other Services	134	87.3	12.7	6,369,124.00	9,606.52
Pediatric	111	81.1	18.9	5,063,793.00	7,092.14
Physiotherapy	17	35.3	64.7	283,000.00	2,338.84

Psychiatry	1	0.0	100.0	517,000.00	517,000.00
Radiology	22	68.2	31.8	87,392,310.00	1.560,577.00
Dermatology	2	100.0	0.0	0.0	0
Supporting services	78	82.1	17.9	40,007,162.00	204,118.20
Surgery	41	61.0	39.0	2,291,079.00	6,818.69
Total	**1,006**	**65.1 (N=655)**	**34.9 (N=351)**	**288,202,363.50**	**821,089.40**

Observations:

- Out of the 1,006 equipment that were verified 34.9% (N=351)of have cost information available. About two-third (65.1%) of all equipment have no cost information available.
- Total cumulative cost of all equipment of all services (departments) is Rs. 288,202,365.5 with average maintenance cost by services (departments) Rs. 821,089.40. Radiology Department has highest cumulative maintenance cost with Rs. 87.39 million followed by general medicine (Rs. 68.39 million), Anesthesia (Rs. 63.05 million) and Other Services (Rs. 63.69 million).
- Only about one-third of total equipment has cost information available, enhancement of inventory management including recording is required for planning.

4.16 Date Purchased/Received Vs Date of Installation

Table below gives date information of equipment with date of purchase, date of installation or commissioning and difference in duration of received/purchased and installation.

Department	Number of Equipment Available with Installation Date	(#/%) Either Received/Purchased Date or Installation Date not Available		(#/%) Both Purchased/Received Date and Installation Date Available		Difference in duration Received vs. Installation (Average in days)
		N	%	N	%	
Anesthesia	94	37	39	57	61	23.4
Dental	19	11	58	8	42	23.9
ENT	11	3	27	8	73	20.8
General Medicine	321	54	17	267	83	26.7
Laboratory	60	38	63	22	37	25.5
Gynae/Obs	88	37	42	51	58	23.4
Orthopedics	7	1	14	6	86	25.2
Other Services	134	68	51	66	49	38.1
Pediatric	111	54	49	57	51	27.1
Physiotherapy	17	6	35	11	65	32.5
Psychiatry	1		0	1	100	30
Radiology	22	13	59	9	41	22.8
Dermatology	2	2	100		0	0
Supporting services	78	6	8	72	92	28.7
Surgery	41	17	41	24	59	28.1
Total	**1,006**	**347**	34	**659**	66	**27.5**

Observations:

- Only 66% of the equipment across all departments have both purchased/received and installation/commissioned date.
- The average difference in dates of received and installation is 27.5. Once the equipment is procured, the equipment is installed in about one month time.

4.17 Availability of Installation Report and Warranty Period

Table below gives availability of installation report, agreement, and availability of warranty period of equipment across all departments.

Department	Number of Equipment Available	Availability of Installation Report and Agreement (N &%)		Availability of Warranty Period (N &%)	
Anesthesia	94	48	51.1	5	5.3
Dental	19	8	42.1	0	0.0
ENT	11	10	90.9	6	54.5
General medicine	321	177	55.1	85	26.5
Laboratory	60	18	30.0	7	11.7
Gynae/Obs	88	25	28.4	16	18.2
Orthopedics	7	6	85.7	1	14.3
Other Services	134	11	8.2	42	31.3
Pediatric	111	34	30.6	14	12.6
Physiotherapy	17	3	17.6	1	5.9
Psychiatry	1	1	100.0	0	0.0
Radiology	22	10	45.5	4	18.2
Dermatology	2	0	0.0	0	0.0
Supporting services	78	73	93.6	8	10.3
Surgery	41	14	34.1	6	14.6
Total	**1,006**	**438**	**43.5**	**195**	**19.4**

Observations:

- Only 19.4 % (N-195) equipment across all departments have document available on warranty period, while 43.5% of all equipment have information on availability of installation report and service agreement.
- Medical equipment is often quite expensive, so keeping it maintained and functioning properly is a way to protect the investment and ensure they will last for a long time.
- Management of all records associated with the equipment should be available in the hospital.

4.18 Maintenance of Equipment

Table below gives maintenance information of all equipment across all departments

Services/Department	Number of Equipment Available	Total Number of Maintenance	#/% Equipment with at least 1 Time Maintenance		#/% Equipment with no Maintenance Record		Average number of maintenances among the equipment with at least one time maintenance
Anesthesia	94	335	47	50.0	47	50.0	7.1
Dental	19	64	8	42.1	11	57.9	8.0
ENT	11	13	3	27.3	8	72.7	4.3
General Medicine	321	1214	189	58.9	132	41.1	6.4
Laboratory	60	117	14	23.3	46	76.7	8.4
Gynae/Obs	88	172	36	40.9	52	59.1	4.8
Orthopedics	7	20	5	71.4	2	28.6	4.0
Other Services	134	289	51	38.1	83	61.9	5.7
Pediatric	111	279	42	37.8	69	62.2	6.6
Physiotherapy	17	68	11	64.7	6	35.3	6.2
Psychiatry	1	13	1	100.0	0	0.0	13.0
Radiology	22	50	8	36.4	14	63.6	6.3
Dermatology	2	0	0	0.01	2	100.0	0.0
Supporting services	78	682	67	85.9	11	14.1	10.2
Surgery	41	103	20	48.8	21	51.2	5.2
Total	**1,006**	**3419**	**502**	**49.9**	**504**	**50.1**	**6.8**

Observations:

- About half of all equipment (49.9%) is maintained at least once. Similarly, the remaining half of equipment (50.1%) have no records available of maintenance.
- The average number of maintenance equipment that are maintained at least on time is 6.8.

4.19 Cumulative Maintenance Cost (approx.)

Table below gives information on cumulative maintenance cost

Department	Number of Equipment Available	Equipment with Cumulative Maintenance cost (%)		Total Cumulative Maintenance Cost (In NRS)	Average cost among having maintenance cost (In NRS)(As per Available cumulative maintain cost)
Anesthesia	94	16	17.0	855,600.00	53,475.00
Dental	19	5	26.3	145,000.00	29,000.00
ENT	11	2	18.2	282,50.00	14,125.00
General Medicine	321	49	15.3	1,473,200.00	30,065.30
Laboratory	60	10	16.7	397,700.00	39,770.00
Gynae/Obs	88	6	6.8	49,300.00	8,216.70
Orthopedics	7	1	14.3	2,450.00	2,450.00
Other Services	134	14	10.4	265,400.00	18,957.10
Pediatric	111	3	2.7	12,450.00	4,150.00
Physiotherapy	17	3	17.6	18,700.00	6,233.30
Psychiatry	1	1	100.0	54,000.00	54,000.00
Radiology	22	6	27.3	484,900.00	80816.70
Dermatology	2	0	0.0	0	0.0
Supporting Services	78	65	83.3	474,750.00	7,303.80
Surgery	41	3	7.3	84,900.00	28,300.00
Total	**1,006**	**184**	**18.3**	**4,346.600.00**	**23,622.80**

Observations:

- About 18.3% (N=184) equipment have information on maintenance cost.
- The cumulative maintenance cost of all equipment with information available across all departments amounts to Rs. 43.46 million and the average maintenance cost is Rs. 23,622.80.

4.20 Maintenance Information: Annual Contract, Comprehensive Contract and Maintenance Schedule

Services/Department	Number of Equipment Available	Equipment with Annual Contract (N &%)		Equipment with Comprehensive contract (N &%)		Equipment having Maintenance Schedule (N &%)	
Anesthesia	94	5	5.3	2	2.1	70	74.5
Dental	19	1	5.3	0	0.0	18	94.7
ENT	11	0	0.0	0	0.0	9	81.8
General medicine	321	3	0.9	0	0.0	116	36.1
Laboratory	60	0	0.0	0	0.0	54	90.0
Gynae/Obs	88	1	1.1	0	0.0	54	61.4
Orthopedics	7	0	0.0	0	0.0	6	85.7
Other Services	134	0	0.0	0	0.0	11	8.2
Pediatric	111	1	0.9	0	0.0	99	89.2
Physiotherapy	17	0	0.0	0	0.0	5	29.4
Psychiatry	1	0	0.0	0	0.0	1	100.0
Radiology	22	2	9.1	1	4.5	21	95.5
Dermatology	2	0	0.0	0	0.0	2	100.0
Supporting services	78	0	0.0	0	0.0	70	89.7
Surgery	41	1	2.4	0	0.0	16	39.0
Total	**1.006**	**14**	**1.4**	**3**	**0.3**	**552**	**54.9**

Observations:

- Out of the total 1,006 equipment verified across all departments about 1.4% of equipment across all departments have annual maintenance contracts, and 0.3% have comprehensive maintenance.
- Scheduled maintenance 54.9% of equipment is good, but still require improvement.

4.21 Availability of Infrastructure and Catalog/User Manual

Department	Number of equipment available	Physical infrastructure to keep Equipment (N &%)		Catalog/user manual (N &%)		Logbook maintained (N &%)		Average # of service per day
Anesthesia	94	94	100.0	68	74.7	93	98.9	2.3
Dental	19	19	100.0	17	89.5	19	100.0	15.6
ENT	11	11	100.0	8	72.7	11	100.0	4.5
General medicine	321	317	98.8	146	46.5	313	97.5	2.2
Laboratory	60	58	96.7	42	70.0	55	91.7	178
Gynae/Obs	88	87	98.9	53	60.9	88	100.0	5.1
Orthopedics	7	7	100.0	7	100.0	7	100.0	11.6
Other Services	134	134	100.0	78	58.6	91	67.9	0
Pediatric	111	111	100.0	62	56.4	111	100.0	1.8
Physiotherapy	17	17	100.0	16	94.1	14	82.4	3.8
Psychiatry	1	1	100.0	1	100.0	1	100.0	22.0
Radiology	22	22	100.0	18	81.8	22	100.0	43.5
Dermatology	2	2	100.0	2	100.0	2	100.0	17.5
Supporting services	78	77	98.7	66	84.6	74	94.9	5.9
Surgery	41	41	100.0	6	14.6	41	100.0	2.1
Total	**1,006**	**998**	**99.2**	**590**	**59.4**	**942**	**93.6**	**14.2**

Observations:

- About 99.2% of equipment verified (N=1,006) has infrastructure to keep equipment.
- 59.9% of equipment has user catalog available.
- Logbook is maintained for 93.6% of the equipment
- About 14.2 services are provided by all equipment across all departments.

4.22 Availability of Human Resources

Table above gives information on human resource arability to operate medical equipment and whether they have received user training or not.

Department	Number of equipment available	HR Availability (N &%)		Received user training (N &%)	
Anesthesia	94	93	98.9	94	100.0
Dental	19	19	100.0	19	100.0
ENT	11	11	100.0	11	100.0
General medicine	321	318	99.1	318	99.1
Laboratory	60	58	96.7	58	96.7
Gynae/Obs	88	88	100.0	88	100.0
Orthopedics	7	7	100.0	7	100.0
Other Services	134	95	70.9	93	69.4
Pediatric	111	111	100.0	111	100.0
Physiotherapy	17	17	100.0	17	100.0

Psychiatry	1	1	100.0	1	100.0
Radiology	22	22	100.0	22	100.0
Dermatology	2	2	100.0	2	100.0
Supporting services	78	77	98.7	77	98.7
Surgery	41	41	100.0	41	100.0
Total	**1,006**	**960**	**95.4**	**959**	**95.3**

Observations:

- 95.4% of equipment have human resource available to operate the equipment as well as 95.3 of HR operating those equipment have received user training.
- This indicates that medical equipment in Bharatpur hospital are operated by well-trained HR with user training to operate those.

5. SUMMARY OF INTERACTION WITH HEAD OF DEPARTMENTS

Medical equipment management in hospitals are crucial for patient care. Provision of qualified HR to operate, oversee and ensure the optimum functioning of the equipment as well as to conduct preventive and corrective maintenance according to the need is necessary. Up to date record keeping of the available medical equipment including the maintenance record would foster their future procurement plan of the hospital.

The verification team carried out interaction and interview with fifteen (15) Department Heads and Store Managers. The summary of findings is given in the successive tables below:

5.1 Relevant Documents/Infrastructure Availability

S/N	Report Description	Departments with Report and Physical Infrastructure Available		Departments with Report and Physical Infrastructure Not Available	
		#	Name	#	Name
1	Installation Report	3	Dental, ENT, Engineering/Maintenance	12	Medicine, Gynae/Obs, Pediatrics, Physiotherapy, Surgery, Neurosurgery, Anesthesiology, Orthopedics, Emergency, Laboratory, Ophthalmology, Radiology
2	Warranty agreement	4	Dental, ENT, Orthopedics Engineering/Maintenance	11	Medicine, Gynae/Obs, Pediatrics, Physiotherapy, Surgery, Neurosurgery, Anesthesiology, Emergency, Laboratory, Ophthalmology, and Radiology
3.	AMC/CMC Document	2	ENT, Engineering/Maintenance	13	Dental, Orthopedics, Medicine, Gynae/Obs, Pediatrics, Physiotherapy, Surgery, Neurosurgery, Anesthesiology, Emergency, Laboratory, Ophthalmology, Radiology, ENT, Engineering/Maintenance
4.	Record of number of services provided by the equipment	8	Dental, ENT, Medicine, Surgery, Neurosurgery, Laboratory, Ophthalmology, Engineering/Maintenance	7	Orthopedics, Gynae/Obs, Pediatrics, Physiotherapy, Anesthesiology, Emergency, , Radiology
5.	Separation of maintenance cost	1	Engineering/Maintenance	14	Dental, ENT, Medicine, Surgery, Neurosurgery, Laboratory, Ophthalmology, Orthopedics, Gynae/Obs, Pediatrics, Physiotherapy, Anesthesiology, Emergency, , Radiology,

Observations:

- Equipment installation report, warranty agreement, and Annual Maintenance Contract (AMC)/Comprehensive Maintenance Contract (CMC) documents are available in less than 25% of the departments.
- This calls for proper coordination with the administration, store and concerned departments for availing records of installation, warranty, and AMC/CMC reports with the Department.
- More than half of the departments have records of number of services provided by the equipment.
- Only one department, Engineering and Maintenance Department has separate provision of maintenance cost for medical equipment.

5.2 Different Needs/Requirements of Departments

Table below summarizes the different needs/requirements of Departments. HoDs were also asked on different needs such as physical infrastructure for new equipment, HR requirement for operation of new equipment, user training requirement for operation of equipment.

S/N	Description	Department with Need		Department with no Need	
		Number	Name	Number	Name
1	Physical infrastructure requirement for new equipment	9	Medicine, Gynae/Obs, Physiotherapy, Surgery, Anesthesiology, Orthopedics, Engineering/Maintenance, Ophthalmology, Radiology,	6	Dental, ENT, Pediatrics, Neurosurgery, Emergency, Laboratory
2	HR requirement for the new equipment's operation	10	Dental, Orthopedics, Medicine, Gynae/Obs, Physiotherapy, Surgery, Anesthesiology, Laboratory, Radiology, Engineering/Maintenance,	5	Ophthalmology, Neurosurgery, Emergency, ENT, Pediatrics,
3.	User training Requirement for equipment operation	12	Dental, Orthopedics, Medicine, ENT, Gynae/Obs, Pediatrics, Surgery, Anesthesiology, Laboratory, Emergency, Radiology, Engineering/Maintenance	3	Pediatrics, Physiotherapy, Ophthalmology

Observations:

- Sixty (60%) percent of the departments (9 out of 15) need physical infrastructure if new equipment are to be installed there.
- Six (6) departments reported that they do not need physical infrastructure for new equipment.
- Larger departments like the General Medicine, Obstetrician/Gynecology, Physiotherapy, Surgery, Anesthesia, etc. which houses large and many equipment require additional spaces.
- Two-thirds (10 out of 15) of the departments reported that they need HR. One -third (5 out of 15) departments reported they do not require additional HR for new equipment.
- Particularly, smaller departments reported no requirement of additional HR for new equipment.
- Eighty (80%) percent of departments said they require user training for personnel operating the medical equipment.

5.3 Requirement of New and Additional Equipment

HoDs were asked whether the department require additional new equipment for patient care. Table below gives summary of new equipment requirement and benefits of having them. Eleven

departments sought new and advanced equipment for high quality and accurate services to the patients.

S/N	Department	Need of New equipment's	Benefits
1.	ENT	For FESS (Camera + Screen + Telescopes)	New technology helps for both patients and Department
2.	Gynae/Obs.	USG Machine with TVS Probe; Separate laparoscope set with Hysteroscope	Quick service; Clinical service more accurate; Can be done modern way; Human resource will be skilled
3.	Pediatrics	Equipment of PICU	For Treating the care; High quality of service (Medical)
4.	Physiotherapy	CPM for Upper limb; Multigym; Treadmill; Parallel bar	Patient will get better service
5	Surgery	ERCP Set	Patient will get better service
6	Anesthesiology	Fiberoptic video bronchoscopy; Nerve stimulator; video laryngoscope; curvilinear US probe Mindray Z6	Mentioned equipment are basic equipment for standard anesthesia practice.
7	Orthopedics	Shoulder Arthroscopy sets	New quality service to needy people
8	Emergency	Defibrillator, Ventilator	Higher Service Delivery to the patients
9	Ophthalmology	Tonometer, Auto-refractometer. Operating microscope	We could run full-fledged services in our own hospital and eliminate the necessity to refer the patient
10	Radiology	MRI	Routine service
11	Engineering and Maintenance	Assets monitoring system software, Barcode Printer. DC Power supply. Totally equipped Engineering workshop.	Help to monitor and maintain Biomedical and IT equipment.

5.4 Future Recommendation from Department Heads

HoDs were also requested suggestions for better medical equipment management in the hospital. Some of the key suggestions were adequate shift management with appropriate HR to operate medical equipment, regular maintenance, training to personnel for special equipment. The detail suggestions are summarized in the Table below:

S/N	Department	Suggestions for MOHP
1	Dental	Need new equipment and dental assistants.
2	Medicine	Adequate shift management, Equipment updates like Ventilator, Hemodialysis machine
3	Gynae/Obs.	More Infrastructure; More Human resource with more surgery; Training, Education posting, etc.
4	Pediatrics	Trained human resource; Adequate space & upgrading of the existing equipment and timely.
5	Physiotherapy	Regular maintenance service.
6	Surgery	New Trainings and Refresh Trainings
7	Neurosurgery	Sufficient trained manpower; Sufficient space; Sufficient equipment with timely repair whenever needed.

S/N	Department	Suggestions for MOHP
8	Anesthesiology	Immediate attention must be made available for Biomedical equipment fault in Operating Room as Anesthesia is a specialty dealing with all critical events. Simple fault in equipment is dangerous for patient.
9	Orthopedics	Operator of expensive latest equipment should be well trained, fixed preferably from radiology department. Biomedical Engineer should do intermittent servicing and checkup of equipment.
10	Emergency	Bigger space for department.
11	Laboratory	Upgrade of equipment, timely maintenance of equipment.
12	Ophthalmology	Permanent staffs, Auxiliary staffs, additional equipment, and trainings (surgical/medical) are required.
13	Engineering and Maintenance	Not any permanent vacancy from Government's side. So, please manage some vacancy for the department. Not any training and strengthening program from hospital management side. So, please manage the frequent training program to our department also.

6. CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

There are a number of specific standards, guidelines and tools developed to address the need to improve and strengthen the government hospitals of Nepal. Some of them provide the infrastructure standards while others focus on specific technical competencies of the service providers. Minimum Service Standards for District Hospital has been developed to bring together all the previous standards, guidelines, tools, and other documents that are related to the quality of hospital services.

Medical Equipment Management (MEM) takes place within the context of human, material, structural, organizational, and financial resources. It is a process which helps hospitals to develop, monitor, and manage their equipment to promote the safe, effective, and economical use and maintenance of equipment. The hospital equipment management is a management cycle that starts from planning, procurement, acquisition, installation, commission, decommissioning and finally disposal of hospital equipment.

Despite of system is in place hospital equipment management is still in less priority in many hospitals in Nepal. In one of the previous studies by MoHP it was found that on an average 30-33% of the equipment is out-of-order. Almost 4% of the equipment were not commissioned in the facility. Moreover, 2-3% of the equipment were not verified in the health facility. The underlying reasons for the above data to exist were found to be lack of human resource to operate that equipment, lack of proper training for users as well as the technicians and lack of a proper inventory management.

6.2 Recommendations

- 17.2% of equipment's source of receipt is unavailable. It is important to note that records of purchase/receipt, warranty period, AMC/CMC, availability of catalog and user manual were not available at the verification. Hospital Management should work on improving inventory records of medical equipment.
- Information flow between store and departments, hospital management and donor as well as hospital and government bot better supply chain management of equipment.
- Keeping in lieu of 15% (10% unbundled and 5% are not in use) of all medical equipment are not in use either they are in stock for future use or unavailability of working station, and installation not completed. If the equipment are out of order due to unavailability of accessories and or associated parts, and if with valid warranty period, Hospital Management should follow up with the supplier for accessories. Equipment that are completely damaged or irreparable, Hospital Management should proceed with decommissioning as per government rules. This not only frees spaces but also generated revenue to the government.
- Unavailability of HR to operate ECG Machine and Lithotripter in Anesthesia OT Department resulting unused of. If those equipment are needed there, then appropriate human resource should be deployed to use the equipment. If they are not needed there, hospital management should transfer those equipment to the departments where they are needed for more patient care services.
- As half of the equipment received as donation are unbundled. They are either in stock or working station is unavailable specifically for washing machine, dryer, and ironing equipment under other services. Hospital Management, before accepting such equipment should make sure whether they have physical infrastructure to keep and make such equipment operational. Keeping unbundled equipment for longer period of time gradually decreases life span of such equipment. It is suggested that Hospital Management mange resources to make such equipment operational.

- Only about 20% of all equipment have information on maintenance cost. Effective maintenance management of medical equipment is one of the major issues for quality of care, for providing cost-effective health services and for saving scarce resources. Hospital management is thus suggested in the decision-making in support of selection, purchase, repair, and maintenance of medical equipment, especially for capital equipment.
- While purchasing equipment, especially for capital equipment, to include AMC/CMC in the bidding document.
- Medical equipment received as donation comprises 4.4% of total medical equipment. However, no information on cost of maintenance was found. So, it is eminent that Hospital Management, while accepting donated equipment, should also make sure with providers for repair and maintenance provision as well.
- Equipment that requires maintenance frequently, and maintenance cost is id high, Hospital Management should weigh on pros and cons of keeping such equipment or seek for new procurement,
- The healthcare system has become dependent on new technologies developed to facilitate patient care. Old and obsolete equipment are needed to be decommissioned and start for planning new acquisitions. In case of acquisition of new equipment with advanced technology, it is essential to assess the availability of physical infrastructure to house such equipment and train personnel responsible to operate such equipment.

Annex I: Study Tools

Tools are available upon request

Annex II – List of Participants

Bharatpur Hospital- Orientation Program

SN	Participants Name	Designation	Office
1	Dr. Jagannath Tiwari	SCMG	Bharatpur Hospital
2	Er. Chandramani Bashyal	IT	Bharatpur Hospital
3	Bishnu Pd. Sapkota	Store in-Charge	Bharatpur Hospital
4	Sher Jung Thapa	BMET	Bharatpur Hospital
5	Mani Ram Mahato	Lab Technician	Bharatpur Hospital
6	Urmila Kandel	SMLT	Bharatpur Hospital
7	Dr. Sannish Gurung	Consultant Nephrologists	Bharatpur Hospital
8	Rabin K Shrestha	Nayab Subba	Bharatpur Hospital
9	Dr. Kiran Mani Pandit	Pediatrician (11th)	Bharatpur Hospital
10	Dr. Narad pd. Thapaliya	CC Surgeon	Bharatpur Hospital
11	Prakash Panthi	PHI	Bharatpur Hospital
12	Krishna Pd. Gautam	Section Officer	Bharatpur Hospital
13	Salina Khadka	Staff Nurse	Bharatpur Hospital
14	Dr. Sumit Pandey	Consultant	Bharatpur Hospital
15	Meera Adhikari	HNS	Bharatpur Hospital
16	Shanti Devi Sapkota	HNS	Bharatpur Hospital
17	Khem K. Kunwar	HNS	Bharatpur Hospital
18	Kamala Dahal	HNS	Bharatpur Hospital
19	Hira Devi Subedi	Nursing Officer	Bharatpur Hospital
20	Sarita Bhandari	HNS 7th	Bharatpur Hospital
21	Bhawani Shrestha	HNS	Bharatpur Hospital
22	Dr. Prakash Bhandari	Chief Cons Physician	Bharatpur Hospital
23	Dr. Pradeep Adhikari	Sr. Cons Anesthesiologist	Bharatpur Hospital
24	Dr. Ramesh Bhandari	Sr. Cons ENT Surgeon	Bharatpur Hospital
25	Dr. Shrawan K. Thapa	CC Orthopedic Surgeon	Bharatpur Hospital
26	Dr. Pramod Paudel	Sr. Cons Physician	Bharatpur Hospital
27	Dr. K P Prasad		Bharatpur Hospital
28	Amrita Shrestha	SN	Bharatpur Hospital
29	Gopal Pd. Paudel	Focal person	Bharatpur Hospital
30	Hari Pd. Lamsal	AO	Bharatpur Hospital
31	Dr. Sunil Mani Pokhrel	CC Gynecologist	Bharatpur Hospital
32	Dr. Guna Raj Paudel	Surgeon	Bharatpur Hospital

Data Collection Team

1) Gopal Prasad Paudel, Coordinator
2) Er. Chandramani Bashyal
3) Sher Jung Thapa
4) Amrita Shrestha
5) Salina Khadka

Facilitator/Resource Persons

S/N	Participants Name	Designation	Office
1	Dr. Bikash Devkota	Secretary	MoHP, Lumbini Province
2	Dr. Madan K Upadhyaya	Division Chief	QSRD/MoHP
3	Dr. Bhoj Raj Adhikari	Chairman	Bharatpur Hospital
4	Dr. Roshan K Neupane	Chief MS	Bharatpur Hospital
5	Dr. Yubanidhi Basaula	Spokesperson	Bharatpur Hospital
6	Sano Babu Adhikari	Under Secretary	MoHP
7	Dr. Padam Bdr. Chand	Project Advisor	HEAL Group
8	Sushil Karki	CEO/ HEAL Group	HEAL Group
9	Bhula Chandra Rai	Logistics Officer	HEAL Group
10	Er. Sonu Shrestha	Biomedical Engineer	HEAL Group

Annex III – Photographs

Picture: HOD Orientation at Bharatpur Hospital

Picture1: HOD Orientation on Equipment Verification at Bharatpur Hospital

Picture: Hospital Equipment Data Audit Team Member checking the functional status

Picture2: Bharatpur Hospital – Data Collection Team

Picture3: Medical Equipment Verification -Bharatpur Hospital

Picture4: Medical Equipment Verification -Bharatpur Hospital