Republic of Zambia
Ministry of Health

Medical Equipment Management Guidelines

September 2012

FOREWORD

The Ministry of Health together with its partners realizes that efficient and effective delivery of clinical care is highly dependent on the availability of appropriate equipment and accessories which are in good functioning order. Such equipment and accessories should always be properly maintained and calibrated, so as to ensure accurate diagnosis and/or performance.

The main challenges in achieving this include the lack of, appropriate equipment management plans, human resource for equipment management and maintenance, appropriate maintenance facilities and adequate budget funds for maintenance activities at all levels of service delivery. The lack of medical equipment management guidelines to help policy makers and maintenance personal has also been a major challenge.

It is against this background that the Ministry with its partners Health Capital Investment Support Project (HCISP) through Japan International Cooperation Agency (JICA) embarked on drafting the Medical Equipment Management Guidelines. It is hoped that these guidelines will help to standardise management of medical equipment country wide and result in efficient and effective use of these life serving equipment.

It is expected that these guidelines will result in a planned and coordinated approach to equipment management; dissemination and compliance with the established maintenance policy and enhance capacities for management and maintenance of equipment at all levels, through appropriate usage, maintenance and repairs of equipment.

Dr. J. Kasonde
Cabinet Minister
Ministry of Health

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Dr. P. Mwaba
Permanent Secretary
Ministry of Health

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Part I

Medical Equipment Management Guidelines

1.0 Introduction

1.1 Background

The term 'medical equipment' can be interpreted as including a wide range of instruments, equipment, machinery or apparatus used for medical and para-medical purposes. The contributions of medical equipment to health care include:

- Prevention: protecting against disease by preventing or reducing the risk of its occurrence or reoccurrence, or limiting its security, e.g., vaccine-delivery devices, prophylactic devices, and sterilisers;
- Screening: detecting a disease or abnormality, or risk factor associated with these in asymptomatic populations, e.g., mammography for breast cancer, prostate-specific antigen testing for prostate cancer, and colorectal cancer screening devices and tests;
- Diagnosis: identifying the cause and nature or extent of disease, e.g., CT for head injuries, angiography for atherosclerosis, and glucose monitoring tests for diabetes;
- Treatment: restoring maintaining, or improving health, including cure of acute disease, care of chronic conditions, palliation to relieve or alleviate when cure is not possible, or avoidance of deterioration, e.g., drug delivery systems, prosthetic joints radiation therapy for cancer, bio-artificial organs and laparoscopy for minimally invasive surgery;
- Rehabilitation: restoring, maintaining or improving an impaired person’s ability to function, e.g., ambulatory aids, incontinence and ostomy aids, sensory aids, and assistive devices for speech impairment;
- Improvement of Quality of Life: enabling patients to lead a full and more comfortable life, often outside the hospital environment and often returning to full time employment, for example by means of ambulatory infusion pumps and monitoring equipment; and
- Reducing the cost of Healthcare: by reducing the length of hospital stay; shortening surgical and diagnostic procedures; and improving the outcome of treatment.

Medical equipment is usually designed with rigorous safety standards. There are several basic types of medical equipment such as: Diagnostic equipment which includes medical imaging machines used to aid diagnosis e.g. ultrasound, MRI, CT-scans, PET, and x -ray machines. Therapeutic equipment, infusion pumps, medical lasers, surgical machines etc. Life support equipment is used to maintain a patient's bodily function such as medical ventilators, heart-lung machines, ECHO, and dialysis machines. Medical monitors allow medical staff to measure a patient's medical state. Medical laboratory equipment automates or helps analyses of blood, urine and genes.

Demand for medical equipment is increasing in Zambia. At the same time, costs are increasing, and the gap between needs and resources is widening. There is therefore a need for a clear and comprehensive policy on health care technology. However, due to problems arising from financing, lack of understanding of this situation by decision-makers and health care workers in general, inadequate institutional framework and managerial and technical capacities, it is easier to formulate policy than to implement it.

Current trend indicates that major medical equipment is increasingly being deployed in the districts to increase the diagnostic and treatment capabilities of primary health care. The spread of major equipment is reaching facilities below the district hospital level, and the rate of such increase in equipment deployment is accelerating. On the other hand, the capabilities to manage or maintain medical equipment in Zambia remain weak. This weakness is particularly serious in the districts. The growth in capabilities to manage or maintain medical equipment has lagged far behind the rate of deployment of equipment. This situation risks running out of control. Capital investment could become wasted while quality of care would suffer.

Some types of sophisticated medical equipment are designed by industrialised countries where the environment, disease patterns, trained users, and maintenance capabilities are different. When such equipment is used in developing countries, it may not actually give as many benefits as the promoters' claim. Rather, it may bring problems of operating costs, use and maintenance, not to mention the waste of capital expenditure.

1.2 The Challenge

Healthcare technology has become an increasingly visible policy issue, and medical equipment management strategies have repeatedly come under the spotlight in recent years. While the need for improved medical equipment management practice has long been recognised and addressed at numerous international forums, health facilities in many countries are still burdened with many problems, including non-functioning medical equipment as a result of factors such as inadequate planning, inappropriate procurement, poorly organised and managed healthcare technical services, and a shortage of skilled personnel. The situation is similar for other health system physical assets such as buildings, plant and machinery, furniture and fixtures, communication and information systems, catering and laundry equipment, waste disposal, and vehicles.

The (mis-) management of physical assets impacts on the quality, efficiency and sustainability of health services at all levels, be it in a tertiary hospital setting with sophisticated life-support

equipment, or at the primary healthcare level where simple equipment is needed 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. Clear policy, technical guidance, and practical tools are needed for effective and efficient management of healthcare technology for it to impact on priority health problems and the health system's capacity to adequately respond to health needs and expectations.

Apart from problems of human resources and the need to finance recurrent costs, more important issues concerning the administrative, economic and political environments in Zambia impinge on the sustainability of technologies and equipment. The establishment of national policies and strategies and the use of more effective management systems to meet the challenge of increasing use of medical equipment are needed.

1.3 The Need for Medical Equipment Management Guidelines

A medical equipment management system assists with the management of medical equipment, from initial purchase through to decommissioning and replacement. It has been widely reported that a significant proportion of healthcare equipment in developing countries is not used. The World Health Organization (WHO) estimates that up to 60 % of medical equipment in developing countries may not be in service at any given time. The baseline study of MoH/JICA Health Capital Investment Support Project finds that 30% of the medical equipment needs repair, are out of order, or uncommissioned, which need immediate attention. Although many explanations have been offered, it was commonly expressed that better equipment management would improve usage in developing countries.

Successful management of medical equipment includes the following activities:

- Gathering reliable information about medical equipment;
- Planning medical equipment needs and allocating sufficient funds for them;
- Purchasing suitable models and installing them effectively;
- Providing sufficient resources for their use;
- Operating them effectively and safely;
- Maintaining and repairing the equipment;
- Decommissioning, disposing, and replacing unsafe and obsolete items; and
- Ensuring staff have the right skills to get the best use out of your equipment.

This Medical Equipment Management Guidelines provides fundamental criteria to guide decision makers at Provincial Medical Offices (PMOs), District Medical Office (DMOs) and hospitals to set up appropriate medical equipment management at their respective health facilities. Utilisation and management of medical equipment is a multi-phased task. This task is best tackled by giving a multi-disciplinary team a national, community or organisational perspective. Particularly, the guidelines emphasises on the importance of practicing medical equipment life-cycle management, setting up a medical equipment management committee at each PMO/DMO and hospital, allocating a medical equipment officer at each PMO and a medical equipment technician at each DMO and hospital, and complying with medical equipment standards and other related guidelines.

2.0 Detailed Guidelines

To manage medical equipment effectively, suitable and effective procedures should be in place for all activities which impact on the equipment. This part of the guidelines provides detailed practical recommendations on how medical offices and hospitals could set up an appropriate medical management system at their facilities.

2.1 Understanding and the Life-Cycle of Medical Equipment Management

Medical equipment management is essential to ensure that such equipment continues to function effectively in a good working condition. For example, proper maintenance can extend the life of equipment – this is essential for providing good health services and saving scarce resources.

This is why maintenance is such a key technical activity. But, in addition to maintenance, medical equipment management also involves other essential activities which ensure that equipment is effectively planned and budgeted for, procured, and operated, etc. The life-cycle of medical equipment takes place within a health facility and entails the following processes:

- Planning, including need analysis, priority and budgeting;
- Procurement: all actions taken to prepare the tender documents (e.g. technical specifications and terms and conditions) and all purchasing processing up until the equipment is delivered to the health facility;
- Delivery and reception (i.e. site preparation at the health facility): installation at the health facility, operation of equipment (including set-up, calibration and testing), training of operators and engineers to operate and service the equipment and acceptance testing to make sure that the equipment delivered meets the technical specifications of the tender document;
- Monitoring and maintenance: In-house or external service providers give technical support (including inventory control, calibration, preventive and corrective maintenance, parts management and quality assurance checks). The medical equipment is monitored for performance to assess its clinical and cost–effectiveness, using performance indicators such as down time and life-cycle cost. The performance of the equipment manufacturer is monitored for responsiveness, technical support and reliability; and
- Replace and decommission: The final phase is when the equipment has to be replaced and removed from service. This can be due to decreased effectiveness, insufficient safety, non-availability of spare parts, etc.

The Government shall practice all phases of the medical equipment life-cycle, so that practice of medical equipment management will be observed at its health facilities.

2.2 Establishing a Medical Equipment Management Committee

Very often medical equipment management is seen as an independent task with very limited links with the other parts of the health service. This meant that the medical equipment technician at a hospital or DMO is rarely involved in such crucial tasks as investment planning, evaluation of the quality of health services, or organizational issues. Equipment should not be managed in isolation, but must be linked to all the other components which are necessary for health care delivery, including the aims, procedures, finances, staffing levels, supplies, and support systems at each level of the health service.

To achieve this, **each PMO, DMO and hospital shall establish a Medical Equipment Management Committee.** This multi-disciplinary group should report to the health management team, and be responsible for reviewing the equipment situation and planning equipment needs at that level. It should comprise all types of stakeholders that have an important role to play in medical equipment management, such as administrative, medical, finance, supplies, and technical personnel.

Teamwork is very important and collective decisions should be taken on all equipment management matters. Committee members should communicate regularly and help one another solve daily operational problems. The decision making under the Medical Equipment Management Committee could include:

- Identification of health needs;
- Equipment procurement plans;
- Budgeting for equipment procurement and maintenance;
- Establishment and updating of inventories;
- Specification of equipment needs;
- Supervision of procurement processes;
- Logistics support;
- Training of users and technical staff;
- Organization of the supply and storage of accessories, consumables, and spare parts;
- Ensuring maintenance and repair activities take place; and
- Ensuring the efficiency of the Medical Equipment Management Committee

2.3 Assigning Medical Equipment Officer/Technician

Technical skills and knowledge are necessary to maintain and repair medical equipment at a health facility. However, shortage of skilled personnel makes it difficult to assign an engineer to do maintenance and repair work for all the medical equipment at the facility.

Each First-Level Hospital and DMO shall create a position for a Medical Equipment Technician and assign a qualified staff. The following is the job description of the technician at this level:

- Collection of all service manuals for all equipment in the health facilities to set-up and adopt the routine maintenance plan of these facilities;
- Planning the daily priority list and working plan of the maintenance;
- Doing routine maintenance according to their maintenance levels and the service manuals;
- Report all faulty equipment to the maintenance supervisor;
- Update hospital inventory and routine maintenance plan;
- Provide technical assistance for the operation and daily maintenance of medical equipment to health care providers;
- Contact external technicians through the Medical Equipment Officer at PMO for consultation or to do maintenance above the maintenance level of the technician;
- Plan and organise the stock of regular needed spares and consumables;
- Participating the Medical Equipment Management Committee for medical equipment action plan; and
- Choosing of appropriate new equipment according to the standard equipment list in co-operation with Provincial Medical Equipment Officer.

Each second-level, third level hospital and PMO shall assign a Medical Equipment Technologist and Medical Equipment Officer, respectively. The following is the job description of the officer at this level:

- Follow up and supervision of maintenance activities according to the daily and routine plan at the district level;
- Provide technical assistance for the operation and daily maintenance of medical equipment to health care providers;
- Doing high-level maintenance and repair tasks on medium-level technologies;
- Calling external technicians for consultation or to do maintenance above the maintenance level of the officer;
- Facilitating to allocate maintenance budget at the district and provincial levels;

- Participating the Medical Equipment Management Committee for medical equipment action plan;
- Doing long term planning in co-operation with the doctor in charge, the treasurer, and the cooperating partners to replace old equipment or equipment beyond repair; and
- Assisting DMOs and hospitals to choose appropriate new equipment according to the standard equipment list.

The Medical Equipment Officers and Technicians shall receive technical training annually to refresh their medical equipment management skills and acquire new technical knowledge.

2.4 Complying Standards and Guidelines Associated with Medical Equipment Management

Several standards and guidelines exist which relate to medical equipment. All PMOs, DMOs and hospitals shall comply with them for planning, procuring, maintaining and decommissioning medical equipment at the health facilities. The standards and guidelines include:

- Medical Equipment Standard Lists (2006 and 2012) – Available for Health Posts, Urban and Rural Health Centres (UHC/RHC), 1st-Level Hospitals (updated in 2008), and 2nd-Level and 3rd-Level Hospitals (developed in 2012).
- *Basic Health Care Package from Community to 4th level (1st edition)*, July, 2009 – Defines affordable care for each level (community, health post, health centre, 1st-Level Hospital, 2nd-Level Hospital and 3rd-Level Hospital).
- *Guidelines on Donations of Equipment to Ministry of Health*, August 2002 – Describes responsibilities of both donor and recipient for medical equipment to ensure 1) economic purchasing of spare parts and appropriate storage; 2) availability of instruction manuals; 3) availability of local expertise in operation and maintenance procedures; and 4) selection of appropriate equipment (Refer to the annex).
- *Guidelines on Receiving of New Equipment and Equipment Donations*, August 2002 – Intended to help hospitals develop proper procedures in receiving medical equipment, thereby ensuring that the equipment only becomes the property of the hospitals after it has been commissioned and a certification signed to indicate that it has passed the relevant checks and tests (Refer to the annex).

3.0 References

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Annex 1

MINISTRY OF HEALTH

DRECTORATE OF CLINICAL CARE AND DIAGNOSTIC SERVICES.

GUIDELINES ON DONATIONS OF EQUIPMENT TO MINISTRY OF HEALTH.

MEDICAL EQUIPMENT UNIT.

Ministry of Health Guidelines on Medical Equipment Donations.

Introduction.

Although donations of equipment and materials may improve the efficiency of our health facilities, experience has shown that equipment donation in some case cause us more problems than benefits. Some of these equipment have no installation or service manuals, if able to function they may not have any source of spare parts owing to old age or that the manufacturers do not exist any more and in some cases have even passed their usefulness. We therefore wish to bring to the attention of those receiving , donating equipment to Government institutions, guidelines on equipment donations. It is our hope and wish that you will all respect them and understand them to mean well for both the donor and the recipient. Assuming that the donor means well in the donation and the recipient must benefit from the donation, and that the former did not want to make unnecessary publicity which results in turning the recipient into a dumping ground.

Ministry of Health has developed Standard Equipment Lists (SEL) for the various levels of service provision based on among others, the Basic Health Care Package, availability of local expertise in operation and maintenance, appropriate equipment for the identified services. As such donations will as much as possible have to conform to the standards thus developed.

Central Board of Health also assumes donations are made as a result of:

a) A genuine desire to help.
b) A desire to utilize functional equipment not necessarily required by the donor.
c) A response to a perceived or assessed need of the recipient.

Guidelines.

1. All donations should be channeled through Ministry of Health.
2. Before any donations are made thorough evaluations of the items to be donated must be made by the donor and Ministry of Health.
3. All donated equipment should include a full set of installation, operation and maintenance manuals in English.
4. All donated equipment should include document of warranty for replacement or repair of faulty equipment.
5. All donations should include an agreed quantity of spare parts and necessary consumables.
6. Before a donation agreement is settled Ministry of Health encourages would be donors to furnish it with detailed specifications of items to be donated, age, shelf life, maker and model.
7. Ministry of Health has available a list of requirements of equipment falling short of the standard lists to which donors may be referred to on request.
8. All donated equipment must be tested for functionality before shipment.
9. As much as is possible the donor and the recipient (MoH) must discuss the donation on an equal partner basis to work out how the effort and goodwill involved in making a donation can be put to best use.
10. The donor will be responsible for the installation and commissioning of complicated donated equipment at the end of which the recipient will receive a functional equipment. This may take the form of paying for the installation where local expertise to install is available or sending experts from the country of origin of the equipment.

Rights of Ministry of Health.

1. Ministry of Health reserves the right to say "**No thank you**" to a donation on behalf of its affiliates or on its own behalf.

Issues to Consider

1. Staff experience, and training required for installation, operation and maintenance of the equipment you are about to receive as donation.
2. Climatic and environmental conditions, such as heat, humidity, dust, ventilation, etc.
3. Maintenance costs: in terms of spare parts, level of expertise of local technical staff required.
4. Availability of consumables: some equipment may require consumables which are not available locally

To help build a comprehensive statement of requirement, the following list of criteria may be useful. Working through the list by both recipient and donor, may make it easier to decide whether or not to accept a donation, make a purchase, or make a particular donation. However, each partner needs to understand what is expected of them and their counterpart.

RECIPIENT RESPONSIBILITY

1. Standardize Equipment.

Equipping a medical unit is more than simply obtaining the equipment. Maintenance is vital, and maintaining a vast array of different equipment can be problematic.

Some countries have service centers to provide technical support for health services. These centers may have compiled a national Standard equipment list to keep the number of different makes of equipment to a minimum .

The list is useful because:

a) Equipment included on the list can be fully supported in terms of spare parts, maintenance and operating instructions.
b) Installation and operation arrangements for users, and maintenance procedures for technical personnel are simplified.
c) Lower prices due to bulk purchasing is possible, and planning for storage space is easier.

Before making a request, *check whether the equipment requested is on the national standard equipment list.*

If a national Standard Equipment List is unavailable, it is advisable to develop one for the unit or hospitals, or working as a team, for a related group of hospitals. Associations or coordinating agencies may make a list for their members. Such cooperation encourages sharing of resources and experiences.

Important issues to consider with regard to standardization include:

- **Staff** experience, and training required for installation, operation, and maintenance. Consider both the clinical staff and technical service staff required to operate the equipment.
- **Location** for the equipment including site accessibility and the space available.
- **Climatic and environmental conditions,** such as heat (temperature), humidity, dust, ventilation, etc.
- **Utilities:** Power supply (electric, gas, generator, fossil fuel, wood fuel, solar, windmill, bio-gas, etc.), reliability of supply (fluctuating power, interruptions, rationing, etc.), type of power (voltage, frequency, phase AC/DC); type of water (polluted, salty, hard, soft, etc.) and means of delivery (piped, stored, well, river, rain, etc.).
- **Support services** required for operation, procedures, and clinical use of the equipment. Keep in mind that modern equipment may offer a wide variety of operational modes and may simplify the performance of certain procedures but it is often very expensive, and may need both health specialists and a manufacturers' service network for maintenance and repair. When these are available, spare parts and special maintenance tools that are costly may be required. Also remember that sophisticated equipment often has very sensitive parts. Also remember that sophisticated modes offered by the equipment are utilized.
- **Maintenance costs:** in terms of spare parts, downtime during normal servicing and level of expertise of technical staff required.
- **Availability of consumables:** Some equipment may require consumables which are not available locally, for example, special papers, films, filters etc. These are recurrent cost items and their availability must be assured.
- **Other specific requirements** related to equipment. For example, whether a new addition will conform with existing equipment, whether a cold room is required for computerized equipment, or especially solid walls for x-ray machines, or boiler for autoclaves, or power stabilizers for electronic equipment etc.
- **Experience of others** with similar equipment, brands or sources. Check whether equipment is manufactured locally or imported on a regular basis.

The list may not be exhaustive. It aims at providing criteria to help define equipment that is technologically and clinically appropriate to the intended use. By following this list, the final choice of equipment is likely to be of high quality, solid and robust and of a standard that will withstand both environment and operational conditions.

2. Involve technical departments

In preparing the Standard Equipment Lists or ordering equipment, the technical personnel must be involved. As experts, they will consider and advise upon:

- All aspects of requirements for installation, operation and maintenance.
- Essential spare parts and other special requirements, their availability, and costs.
- Availability of technical personnel and level of training required.
- Estimated lifespan of equipment based on the model, year of manufacture and whether it is new or reconditioned.
- Appropriateness of the equipment in terms of running costs and design.
- If a financial contribution would be more appropriate than a donation of equipment.

3. Specify clearly items to accompany the equipment.

- All equipment must be provided with a full set of technical documents. That is, documentation for installation, for user operation, for repair and maintenance (manuals), a list of spare parts and diagrams and technical data. Clearly indicate the language in which the documents should be made available. (Most developing countries use either English , French, Spanish or Portuguese as a second language. If documents cannot be made available in the local language, insist that these are made available in whichever of the above four main languages is most appropriate).
- All equipment must be accompanied by a reasonable quantity of spare parts and consumable items. This should take into account the "lead period" (i.e. period between placing an order and receipt of spare parts). If the lead period is two years then the spares and consumables are needed to cover that period.
- All new equipment must be accompanied by documents of warranty (guarantee). Get a legal expert to read and interpret the conditions if necessary.

4. Make a check list.

Compiling a check list will include consideration of all issues discussed above. It will ensure that the donor receives all the information required in order to make an appropriate donation.

5. Communication alternative preferences.

If a financial contribution to allow local or regional purchase would be more appropriate, cheaper or easier, state this information clearly. Issues on which the donor is unable to comply can then be discussed. The solution should be understood and agreed upon by both parties. As a result, the donors will not substitute items believing that such alternatives would equally suitable. If donations of equipment that are not needed are received, inform the donor immediately. It is also advisable top contact a national coordinating agency.

DONOR RESPONSIBILITY.

Donated equipment will only be useful if it is properly installed, operated, maintained, and appropriately used.

1. Communicate with the recipient.

Before supplying any equipment, request for a comprehensive description of the equipment required by the recipient (including their check list). Ensure that the conditions that cannot be fulfilled are communicated to the recipient. An agreement on all conditions should be reached before shipping the equipment. This ensures that the equipment supplied is clinically, economically, and technologically appropriate.

2. Supply fully functional equipment.

Equipment whether new or reconditioned, should be tested and all essential parts, accessories and working materials included before shipment. A basic list of components must be provided to the recipient. Second-hand equipment should be fully rebuilt or reconditioned. It should be established that the manufacturer continues to produce spare parts and the "life expectancy" of the equipment should be indicated.
Old, broken, outmoded, and redundant equipment for which spares parts and consumables are no longer available, or equipment which is no longer supported by the manufacturer, is as useless in the developing country as it would be in the industrialized. If it is difficult for the donor to service the equipment, it will be impossible for the recipient. Do not supply such items as. It is kinder to send them to the junk yard.

3. Supply all technical documents.

These include installation, operation, maintenance, and repair manuals. It is particularly important to include technical diagrams as the symbols used are usually international.. The technical documents should be supplied in the language of the permanent employees of the recipient enterprises. The need for these documents applies even when expatriate staff are provided to help in the initial stages. Expatriates tend to leave juts before equipment develops problems, and local maintenance personnel will find that documents are most valuable.

4. Supply an initial requirement of consumables and spare parts.

Recipients often face lengthy and complicated procurement procedures. Equipment should therefore be supplied with initial consignment of consumables and spare parts expected to last at least two years (or as requested), and a full list of spare parts. The list must clearly indicate the part name and number, and full name and address (including phone, fax and e-mail, if possible) of the manufacturer or authorized dealer. Vagueness over the description and source of spare parts can cause months of delay in an already long process.

5 Ensure proper packing.

The consignment is likely to endure long periods in ships, aeroplanes, trains, motor vehicles, bicycles and even on animal backs or by hand. The packing must therefore be strong and sturdy to withstand rough handling and to minimize damage during transportation. It should also:

- Include a clear packing list identifying all components.
- Be of a size that can be handled using simple mechanical devices and manual labour.

6. Supply shipping Documents promptly.

Consignments have been known to remain at air port for months, facing possible damage and accumulating demurrage charges (penalty for delayed action) due to late submission of shipping documents. Prompt submission of documents is essential and should be sent by express insured mail. If possible, send advance copies by fax.

7 Offer technical assistance.

Where possible, promote, recommend and provide training for the use and maintenance of the equipment. On site training is usually very useful.

8 Understand import regulations of the recipient country.

There may be regulations which restrict who can receive donations, and which indicate taxes and other charges. It is important to know about these conditions. It is also important to assess the **ability of the recipient to pay** the accompanying local costs.

9 Environmental conditions

Zambia uses 220-240 Volts 50Hz AC, our water is hard, we have dust concerns, the humidity level is on average not of concern. Equipment coming from areas that use other voltage supplies must have transformers with them.

Guidelines on Medical Equipment Donations.

A Publication of The Pharmaceutical Program-World Council of Churches (WCC) & Community Initiatives Support Services(CISS).

A guide for those accepting and making donations. It is also useful for those planning to buy equipment.

Why do both recipients and donors need guidelines on the donation of equipment ?

Although donations of equipment and materials may improve the efficiency of health facilities, experience has shown that equipment donation my cause the recipient more problems than benefits. Recipients should therefore develop clear policies on their equipment requirements. These should be shown to donors, who should respect them. Before a donation agreement is settled, donors and recipients should make a thorough evaluation of requirements of both parties. The final choice of equipment will be limited by cost, environmental and operational conditions, the availability of supplies of spare parts and the quality of maintenance services.

SUMMARY

Recipient:

1. **Standardize equipment.**

This ensures a greater likelihood of:

- Economic purchasing of spare parts and appropriate storage.
- Availability of instruction manuals.
- Availability of local expertise in operation and maintenance procedures.
- Selection of appropriate equipment.

2. **Involve technical departments.**

Technicians can be asked to consider and advise upon:

- Installation, operation and maintenance requirements.
- Staff and training requirements for users and technicians.
- The essential spare parts required.
- Appropriateness of equipment in terms of running costs and technical design

3. **Specify clearly items to accompany the equipment.**

These should include:

- A full set of technical documents in a specified language.
- An agreed quantity of spare parts and supplies.
- A document of warranty (guarantee) for the replacement or repair of faulty equipment.

4. **Make a check-list (see over) including all the above.**

This ensures that the donor receives enough information to make an appropriate response.

5. **Communicate alternative preferences**

For example, if a financial contribution would be more appropriate than a donation of equipment from abroad, make this clear to the donor.

Donor.

1. **Communicate with recipient.**
   Make sure that the potential recipient has provided a comprehensive description of the equipment required.

2. **Supply full functional equipment.**
   Test the equipment and make sure all necessary spare parts and supplies are included in the package before making shipment. Do not supply worn-out, broken or redundant equipment.

3. **Supply all technical documents.**
   Installation, operation, maintenance and repair manuals and diagrams should be made available in a language understood by the users and the technicians.

4. **Supply enough consumables and spare parts to last at least two years.**
   Include a complete list of spare parts and indicate the name and address of the authorized dealer.

5. **Ensure proper packaging and shipping.**
- Use strong sturdy and easy to handle packing materials.
- Include a comprehensive packing list.
- Supply shipping documents promptly.

6. Offer technical assistance.
   This should include promoting, recommending and providing training for users and for maintenance personnel.

7. **Understand the import regulations in the recipient's country.**
   Make sure that the recipient is able to cover the costs of custom duties and any other charges associated with importation.

Guidelines on Medical Equipment Donations.

Donations of equipment are made as a result of:

- A genuine desire to help.
- A response to a request by a recipient.
- A desire to utilize functional equipment not necessarily required by donor.
- A need for financial gain.

However problems arise when:

- Donors of medical equipment may have no background in health issues, or an understanding of the structure of health services of the recipient (usually based in developing country), and do not recognise the need to seek expert advise.
- New but inappropriate equipment is donated as a means of promoting and marketing it.
- Companies, hospitals or private doctors donate outmoded, outdated equipment as it provides them with tax exemptions or a s a means of getting rid of redundant equipment.
- Potential donors with patronizing attitudes towards recipients, regard them as beggars desperate for any equipment and therefore do not consider it worthwhile to consult them. The recipient may compound this problem by feeling obliged to accept any donation, even though the equipment is unnecessary, or where charges such as import taxes and transport costs, are prohibitive.

What can be done.

The donor and the recipient must get together as equal partners to work out how the effort and goodwill involved in making a donation can be put to best use. The recipient's policy on equipment requirements should be known to the staff and the donors.

The right to give and receive a " **No thank you**" should be expressed, appreciated and accepted. A refusal (or acceptance) that is justified by a comprehensive statement of requirements is often much appreciated by the donor.

To help build a comprehensive statement of requirement, the following list of criteria may be useful. Working through the list by both recipient and donor, may make it easier to decide whether or not to accept a donation, make a purchase, or make a particular donation. However, each partner needs to understand what is expected of them and their counterpart.

RECIPIENT RESPONSIBILITY

1. **Standardize equipment.**

Equipping a medical unit is more than simply obtaining the equipment. Maintenance is vital, and maintaining a vast array of different equipment can be problematic.

Some countries have service centres to provide technical support for health services. These centres may have compiled a national Standard equipment list to keep the number of different makes of equipment to a minimum .

The list is useful because:

a) Equipment included on the list can be fully supported in terms of spare parts, maintenance and operating instructions.
b) Installation and operation arrangements for users, and maintenance procedures for technical personnel are simplified.
c) Lower prices due to bulk purchasing is possible, and planning for storage space is easier.

Before making a request, *check whether the equipment requested is on the national standard equipment list.*

If a national Standard Equipment List is unavailable, it is advisable to develop one for the unit or hospitals, or working as a team, for a related group of hospitals. Associations or coordinating agencies may make a list for their members. Such cooperation encourages sharing of resources and experiences.

Important issues to consider with regard to standardization include:

- **Staff** experience, and training required for installation, operation, and maintenance. Consider both the clinical staff and technical service staff required to operate the equipment.
- **Location** for the equipment including site accessibility and the space available.
- **Climatic and environmental conditions,** such as heat (temperature), humidity, dust, ventilation, etc.
- **Utilities:** Power supply (electric, gas, generator, fossil fuel, wood fuel, solar, windmill, biogas, etc.), reliability of supply (fluctuating power, interruptions, rationing, etc.), type of power (voltage, frequency, phase AC/DC); type of water (polluted, salty, hard, soft, etc.) and means of delivery (piped, stored, well, river, rain, etc.).
- **Support services** required for operation, procedures, and clinical use of the equipment. Keep in mind that modern equipment may offer a wide variety of operational modes and may simplify the performance of certain procedures but it is often very expensive, and may need both health specialists and a manufacturers' service network for maintenance and repair. When these are available, spare parts and special maintenance tools that are costly may be required. Sophisticated equipment often has very sensitive parts. Also remember that sophisticated equipment often has very sensitive parts. Also remember that sophisticated modes offered by the equipment are utilized.
- **Maintenance costs:** in terms of spare parts, downtime during normal servicing and level of expertise of technical staff required.
- **Availability of consumables:** Some equipment may require consumables which are not available locally, for example, special papers, films, filters etc. These are recurrent cost items and their availability must be assured.
- **Other specific requirements** related to equipment. For example, whether a new addition will conform with existing equipment, whether a cold room is required for computerized equipment, or especially solid walls for x-ray machines, or boiler for autoclaves, or power stabilizers for electronic equipment etc.
- **Experience of others** with similar equipment, brands or sources. Check whether equipment is manufactured locally or imported on a regular basis.

The list may not be exhaustive. It aims at providing criteria to help define equipment that is technologically and clinically appropriate to the intended use. By following this list, the final choice of equipment is likely to be of high quality, solid and robust and of a standard that will withstand both environment and operational conditions.

2. Involve technical departments

In preparing the Standard Equipment Lists or ordering equipment, the technical personnel must be involved. As experts, they will consider and advise upon:

- All aspects of requirements for installation, operation and maintenance.
- Essential spare parts and other special requirements, their availability, and costs.
- Availability of technical personnel and level of training required.
- Estimated lifespan of equipment based on the model, year of manufacture and whether it is new or reconditioned.
- Appropriateness of the equipment in terms of running costs and design.
- If a financial contribution would be more appropriate than a donation of equipment.

3. Specify clearly items to accompany the equipment.

- All equipment must be provided with a full set of technical documents. That is, documentation for installation, for user operation, for repair and maintenance (manuals), a list of spare parts and diagrams and technical data. Clearly indicate the language in which the documents should be made available. (Most developing countries use either English , French, Spanish or Portuguese as a second language. If documents cannot be made available in the local language, insist that these are made available in whichever of the above four main languages is most appropriate).
- All equipment must be accompanied by a reasonable quantity of spare parts and consumable items. This should take into account the "lead period" (i.e. period between placing an order and receipt of spare parts). If the lead period is two years then the spares and consumables are needed to cover that period.
- All new equipment must be accompanied by documents of warranty (guarantee). Get a legal expert to read and interpret the conditions if necessary.

4. Make a check list.

Compiling a check list will include consideration of all issues discussed above. It will ensure that the donor receives all the information required in order to make an appropriate donation.

5. Communication alternative preferences.

If a financial contribution to allow local or regional purchase would be more appropriate, cheaper or easier, state this information clearly. Issues on which the donor is unable to comply can then be discussed. The solution should be understood and agreed upon by both parties. As a result, the donors will not substitute items believing that such alternatives would equally suitable. If donations of equipment that are not needed are received, inform the donor immediately. It is also advisable top contact a national coordinating agency.

DONOR RESPONSIBILITY.

Donated equipment will only be useful if it is properly installed, operated, maintained, and appropriately used.

1. Communicate with the recipient.

Before supplying any equipment, request for a comprehensive description of the equipment required by the recipient (including their check list). Ensure that the conditions that cannot be fulfilled are communicated to the recipient. An agreement on all conditions should be reached before shipping the equipment. This ensures that the equipment supplied is clinically, economically, and technologically appropriate.

2. Supply fully functional equipment.

Equipment whether new or reconditioned, should be tested and all essential parts, accessories and working materials included before shipment. A basic list of components must be provided to the recipient. Second-hand equipment should be fully rebuilt or reconditioned. It should be established that the manufacturer continues to produce spare parts and the "life expectancy" of the equipment should be indicated.
Old, broken, outmoded, and redundant equipment for which spares parts and consumables are no longer available, or equipment which is no longer supported by the manufacturer, is as useless in the developing country as it would be in the industrialized. If it is difficult for the donor to service the equipment, it will be impossible for the recipient. Do not supply such items as. It is kinder to send them to the junk yard.

3. Supply all technical documents.

These include installation, operation, maintenance, and repair manuals. It is particularly important to include technical diagrams as the symbols used are usually international.. The technical documents should be supplied in the language of the permanent employees of the recipient enterprises. The need for these documents applies even when expatriate staff are provided to help in the initial stages. Expatriates tend to leave juts before equipment develops problems, and local maintenance personnel will find that documents are most valuable.

4. Supply an initial requirement of consumables and spare parts.

Recipients often face lengthy and complicated procurement procedures. Equipment should therefore be supplied with initial consignment of consumables and spare parts expected to last at least two years (or as requested), and a full list of spare parts. The list must clearly indicate the part name and number, and full name and address (including phone, fax and e-mail, if possible) of the manufacturer or authorized dealer. Vagueness over the description and source of spare parts can cause months of delay in an already long process.

5 Ensure proper packing.

The consignment is likely to endure long periods in ships, aeroplanes, trains, motor vehicles, bicycles and even on animal backs or by hand. The packing must therefore be strong and sturdy to withstand rough handling and to minimize damage during transportation. It should also:

- Include a clear packing list identifying all components.
- Be of a size that can be handled using simple mechanical devices and manual labour.

6. Supply shipping Documents promptly.

Consignments have been known to remain at air port for months, facing possible damage and accumulating demurrage charges (penalty for delayed action) due to late submission of shipping documents. Prompt submission of documents is essential and should be sent by express insured mail. If possible, send advance copies by fax.

7 Offer technical assistance.

Where possible, promote, recommend and provide training for the use and maintenance of the equipment. On site training is usually very useful.

8 Understand import regulations of the recipient country.

There may be regulations which restrict who can receive donations, and which indicate taxes and other charges. It is important to know about these conditions. It is also important to assess the **ability of the recipient to pay** the accompanying local costs.

Example of an Equipment Check List

1 Name of equipment

2 Description of Equipment

3 Equipment type included on national Standard Equipment List.

4 Technical specifications

5 Functions Required

6 Special requirements

7 Staff available for:

a) *Installation*
b) *Operation*
c) *Maintenance*
d) *Other Specify*

8 Location:
a) *Site*
b) *Size*
c) *Accessibility*
d) *Type of Building*
e) *Other factors (specify)*

9 Climate:
a) *Temperature range -Day/Night*
b) *Humidity-Maximum/Minimum*
c) *Ventilation System.*
d) *Other Factors.*

10 Utilities:
a) *Power supply*
b) *Fuel type*
c) *Voltage*
d) *Frequency*
e) *Phase*
f) *Water System*
g) *Water type*
h) *Other issues*

11 Any other comments.

Annex 2

MINISTRY OF HEALTH

DRECTORATE OF CLINICAL CARE AND DIAGNOSTIC SERVICES.

GUIDELINES ON RECEIVING OF NEW EQUIPMENT AND EQUIPMENT DONATIONS.

MEDICAL EQUIPMENT UNIT.

TABLE OF CONTENTS

Foreword

The need for guide lines on receiving equipment as well as guidelines on donations has been prompted by frequent reports and experiences where equipment received has shortfalls. These guidelines will help ensure that:-

- Equipment is effectively and promptly cleared through customs
- Equipment is handled effectively on arrival at the hospital.
- A formal Acceptance Process is carried out for all equipment.
- Training of staff is carried out on the arrival of equipment.
- Goods are only paid for when they have been formally accepted into service.

On the other hand where as donations of equipment and materials may improve the efficiency of our health facilities, experience has shown that equipment donation in some cases cause us more problems than benefits. Some of these equipment have no installation or service manuals, if able to function they may not have any source of spare parts owing to old age or that the manufacturers do not exist any more and in some cases have even passed their usefulness. We therefore wish to bring to the attention of those receiving , donating equipment to Government institutions, guidelines on equipment donations. It is our hope and wish that you will all respect them and understand them to mean well for both the donor and the recipient. Assuming that the donor means well in the donation and the recipient must benefit from the donation, and that the former did not want to make unnecessary publicity which results in turning the recipient into a dumping ground.

Ministry of Health has developed Standard Equipment Lists (SEL) for the various levels of service provision based on among others, the Basic Health Care Package, availability of local expertise in operation and maintenance, appropriate equipment for the identified services. As such donations will as much as possible have to conform to the standards thus developed.

Ministry of Health also assumes donations are made as a result of:

a) A genuine desire to help.
b) A desire to utilize functional equipment not necessarily required by the donor.
c) A response to a perceived or assessed need of the recipient.

In the absence of a national policy on equipment this document will provide the necessary guidance and direction for all stake holders during the process of receiving new equipment or donations.

Dr. V.C. Mtonga.
Director Clinical Care and Diagnostic Services.

Ministry of Health Guide Lines on Receiving Equipment.

Time and again we have had situations where equipment has been received only to realize later that a few items are missing or the equipment has not been commissioned. Meanwhile the supplier has been paid and gone. This problem in some cases leads to poor utilization of our meager resources. The following guide lines are intended to help hospitals develop proper procedures in receiving equipment, thereby ensuring that the equipment only becomes the property of the Hospital after it has been commissioned and a certification signed to indicate that it has passed the relevant checks and tests.

These guide lines assume the reader is conversant with the procedures that are followed when buying equipment. It is important to emphasize at the outset that equipment only becomes a property of the Hospital after it has been commissioned. Commissioning on the other hand means the equipment has been installed, function tested and handed over after it has passed the function test and a certificate to confirm that has been issued to the supplier.

Personnel Involved in Basic Features of Receiving New Equipment.

(a) Purchasing and Supplies Manager (PSM).

The PSM or their equivalent will ensure proper handling and scrutiny of shipping and delivery documents, particularly that their details correspond with purchase orders. The PSM will liaise with any organization procuring equipment on behalf of the hospital.

(b) The commissioning team.

The commissioning team will be comprised of the following:-

Maintenance Manager/Head of Maintenance.
Biomedical Equipment Technician.
Purchasing and Supplies Manager.
Stores Controller.
Support Services Manager.
Co-opted members from user departments.
Installation Engineer (s) from the supplier (if applicable).

The commissioning team will follow formal acceptance process for newly received equipment. They will ensure that items received meet the specifications, and that they are complete will all the accessories, consumables, spare parts and technical documents. They will ensure that all services (installation, commissioning, training) are delivered as requested. They will complete the **Acceptance Test Log-sheet (ATL) (see Annex 1)** to certify this effect.

Accepting the Equipment.

The requirements

Principles:-

The Hospital's commissioning team will be responsible for organizing and carrying out the official acceptance of new equipment on its arrival. Where such a team does not exist it must be constituted.

Steps.

The hospital's Commissioning Team will compile the following to assist with the acceptance process:-

- The order/contract with all details of the goods to be supplied;
- The shipping documents and delivery notes;
- A stock of blank copies of the 'Acceptance Test Log-sheet';
- An equipment file where details of the equipment will be entered.
- A safety analyzer for use on all electro-medical equipment to test that the equipment conforms to IEC 601-1 electrical and medical safety standards (If one is not available arrangements must be made to hire one through Central Board of Health. If the installations are carried out by an agent or the supplier they are required to test their equipment to this standard, as such should have their own safety tester (must).

The acceptance process.

Principles:-

An acceptance process will be carried out on all new equipment arriving in the Hospital before such equipment can be put to use. The actual process is a series of checks and tests to ensure that the equipment is complete, safe, functioning properly and entered into the various hospital records. The **'Acceptance Test Log-sheet' (ATL)** will be used which has sections that cover all components of the Acceptance Process, and where a record is made of successful completion of these activities. The signing-off of the completed ATL by the **Commissioning Team** certifies that the goods and services are satisfactory, have been formally accepted by the hospital and payments can be made.

Steps:-

- The Commissioning team will undertake the Acceptance Process by ensuring that the following issues have been satisfactorily checked and activities have been successfully completed:-

* The goods are not damaged.
* All contents are present
* That the equipment is complete as ordered.
* The equipment was installed
* The equipment was commissioned
* The equipment works.
* The required training (user and maintenance) was carried out.
* Manuals were received and distributed to correct departments.

Damage to goods or unsatisfactory supply of goods or services.

Principles:-

If there is damage to goods, the carrier's standard transport insurance may cover the problem. However, if the freighting method and terms chosen by the hospital were CIF, full insurance cover will be available and the insurance company must be notified.

If there is unsatisfactory supply of goods or services, then the suppliers need to be notified in order to ensure they rectify the faults, and are not paid in full until they have done so.

The Hospitals reserve the right to accept or reject the installation, commissioning, user training and maintenance training provided by the supplier (or their representative) if it is below standard or does not conform to the agreed details/contents. When any of these services have been rejected the supplier providing them must redo the work.

If there are problems with the supply of goods or services, the Hospital will inform the relevant bodies (supplier, carrier, insurance company etc.) directly. However if other organizations were purchasing on behalf of the Hospital (such as MoH, CBoH, external funding agencies or a procurement agent) the Hospital will inform the relevant organization who will negotiate the contractual obligations on behalf of the Hospital.

Steps:-

1. When there are problems with goods or services the commissioning team will not sign off the "Acceptance Test Log-sheet but will write a 'Fault Report' explaining the short comings and advising that payment be with held until the problems have been rectified.

2. If any goods have been damaged, the commissioning team will include a description of the problems with the Fault Report (any photographs that can be taken will always help with future claims).

3. The PSM will immediately contact the carrier directly so that the necessary parties

(insurance company and supplier) can be advised and appropriate action taken, or contact the organization purchasing on behalf of the Hospital who will pursue the matter.

4. The commissioning team will submit the Fault Report to the Chief Accountant in order to put on hold the payments.

5. Only when the problem has been resolved will the commissioning team finally complete and sign-off the ATL and submit it to the chief Accountant to trigger payment.

6. The above will apply for unsatisfactory provision of services (installation, commissioning or training).

Installation, Commissioning and Training.

Principles:-

Installation is a series of tasks undertaken to fix equipment into place, and can range from building the equipment into the fabric of the room to simply connecting it to the electricity supply.

Commissioning is a series of tests performed , after the equipment has been installed, to check and ensure that the equipment is functioning correctly at the start of its operation life.

Initial Training is required after commissioning, in order for staff to attain knowledge of the newly arrived equipment.

The Hospital in its procurement package indicate who will provide the above services and ensure during the receiving process that they been provided.

Payment.

This comes here for mention as it is important to link the payments to the full delivery of the service. The process for making financial provision for goods and services will have started when the orders were placed and the payment process will be completed during the receiving of the equipment. Often, it is advisable to be paid for goods in phases to ensure the effective delivery of goods and services. Retention terms will have been detailed in the Payment Arrangements and conditions as specified in the purchase contract document. It is important to emphasize here that the submission of both the completed and signed Acceptance Test Logsheet (ATL) and Goods Received Note (GRN) should be the trigger for the final payment. There are exceptions to this such as when a supplier requires cash on delivery or when a cheque is made before goods are supplied on the basis of a local purchase order. These exceptions are only entertained when the situation demands compromise on the standard procedure described here.

Annex 1

MINISTRY OF HEALTH ACCEPTANCE TEST LOGSHEET FOR MEDICAL EQUIPMENT

REGISTRATION BOX

ALLOCATED INVENTORY NUMBER.....

EQUIPMENT TYPE.....

DESTINATION LOCATION.....

ACCEPTANCE DATE.....

WARRANTY EXPIRY DATE.....

MAINTENANCE CONTRACT WITH.....

HOSPITAL.....

NAME OF EQUIPMENT.....

TYPE/MODEL.....

SERIAL NUMBER.....DATE RECEIVED.....

COST IN US$.....FUNDING SOURCE.....

MANUFACTURER.....SUPPLIER/AGENT.....

ADDRESS.....ADDRESS.....

....

....

....

....

PHONE..... PHONE.....

FAX..... FAX.....

e-MAIL..... e-MAIL.....

ACCEPTANCE CHECKS

1 DELIVERY

Undertaken by:-.....

Witnessed by:-Name.....Position.....Date.....

2. UNPACKING (refer to invoices and shipping documents)

Undertaken by:-.....

Witnessed by:-Name.....Position.....Date.....

	Yes	No	Correctable
a) Visible damage to the equipment			
b) Equipment complete as ordered			
c) User/operator manual as ordered			
d) Service/technical manual as ordered			
e) Accessories as ordered			
f) Consumables as ordered			
g) Spare parts as ordered			

Comments.....

.....

3) ASSEMBLY (see manuals)

Undertaken by:-.....

Witnessed by:- Name.....Position.....Date.....

	Yes	No	Correctable
a) Are parts components available			
b) Do they fit together			
c) Mains lead with plug included			
d) Do all accessories fit			
e) Are markings and labels OK			
f) Any damage			

Comments.....

.....

4) INSTALLATION (see manuals)

Undertaken by:-.....

Witnessed by:-Name.....Position.....Date.....

	Yes	No	Corrected
a) Was work carried out satisfactorily?			
b) Were technical staff present as learners?			

Comments.....

.....

5) COMMISSIONING/TESTING (see manuals and relevant technical standards)

5.1. ELECTRICAL INTERGRITY TESTS.

Undertaken by.....

Witnessed by:-Name .....Position.....Date.....

Classification (applies to medical equipment only)

	Fill as applicable.
a) Class I -II -III	.....
b) Type B- BF- CF	.....
c) Type AP-APG	.....

Mains connection	Yes	No	Correctable
a) Are cables and plugs intact?			
b) Is cable color code correctly connected?			
c) Are connectors intact?			
d) Are fuses correct?			
e) Is equipment protection correct?			
f) Is voltage setting correct?			
g) Is there an earth terminal?			

Electrical Measurements with safety Analyzer	**Yes**	**No**	**Corrected**
a) Is protective earth continuity correct?			
b) Is insulation resistance correct?			
c) Are the leakage currents correct?			
d) Is the voltage measurement correct?			

Comments.....

.....

5.2. MECHANICAL INTERGRITY TETS

Undertaken by:.....

Witnessed by:-Name..... Position.....Date.....

	Yes	No	Corrected
a) Are knobs and switches intact?			
b) Do the wheels and castors move?			
c) Are the handles intact?			
d) Re the mechanical movements OK?			

5.3 GAS INTERGRITY TESTS

Undertaken by:-.....

Witnessed by:-Name.....Position.....Date.....

	Yes	No	Corrected
a) Are the cylinders full?			
b) Are appropriate gauges available?			
c) Are there cylinder keys?			
d) Is the pressure reading correct?			
e) Are cylinder color codes correct?			
f) Are the hoses and fittings correct?			
g) Is the system leaking?			

5.4. RADIATION INTERGRITY TESTS

Undertaken by:-.....

Witnessed by:-Name.....Position.....Date.....

	Yes	No	Corrected
a) Is the KV calibration correct?			
b) Is the mAS calibration correct?			
c) Was the line voltage compensation done?			
d) Were the step wedge test results correct?			
e) Were the small and large focus calibrations done?			

Comments.....

.....

5.5 PERFORMANCE TESTS (see manuals for manufacturers recommendations)

Undertaken by:-.....

Witnessed by:-Name.....Position.....Date.....

	Yes	No	Corrected
Note: carry out all operational tests as specified by the manufacturer			
a) Are the function verification tests correct?			
b) Is the equipment calibration acceptable?			

Comments.....

.....

6) ACCEPTANCE (to be certified by the head of maintenance)

	Yes	No	corrected
a) Is the equipment accepted?			
b) If rejected, have the short comings been documented?			
c) If so has a report gone to senior management and formal grievance procedures started?			
d) Should payment be withheld pending corrections?			
e) Is payment approved?			

Comments.....

.....

7. TRAINING

Undertaken by:-.....

Witnessed by:-Name.....Position.....Date.....

	Yes	No	Corrected
a) Were expected training courses given?			
b) Were the training courses satisfactory?			
c) Were suitable operators present?			
d) Were suitable technical staff present?			

Comments.....

.....

.

8) DESCRIBE AND QUANTIFY ALL ITEMS RECEIVED

ACCESSORIES

1	2
3	4
5	6
7	8
9	10

CONSUMABLES

1	2
3	4
5	6
7	8
9	10

SPARE PARTS

1	2
3	4
5	6
7	8
9	10

TECHNICAL LITERATURE

1	2
3	4

9. REGISTRATION. (to be undertaken by the head of maintenance)

	Yes	No	Corrected
a) If accepted has the equipment been put on the hospital inventory?			
b) Has the registration box at the top of this form been filled in?			
c) Have the accessories, consumables, spare parts, manuals all been given to the correct holding department?			

NAME .....

SIGNATURE .....

DATE.....

NOW PLACE THIS FORM AS THE FIRST RECORD IN THE EQUIPMENT SERVICE HISTORY FILE.

Ministry of Health Guidelines on Medical Equipment Donations.

Introduction.

As stated in the foreword donations of equipment and materials may improve the efficiency of our health facilities, experience has shown that equipment donation in some cases cause us more problems than benefits. Some of these equipment have no installation or service manuals, if able to function they may not have any source of spare parts owing to old age or that the manufacturers do not exist any more and in some cases have even passed their usefulness. We therefore wish to bring to the attention of those receiving , donating equipment to Government institutions, guidelines on equipment donations. It is our hope and wish that you will all respect them and understand them to mean well for both the donor and the recipient. Assuming that the donor means well in the donation and the recipient must benefit from the donation, and that the former did not want to make unnecessary publicity which results in turning the recipient into a dumping ground.

Ministry of Health has developed Standard Equipment Lists (SEL) for the various levels of service provision based on among others, the Basic Health Care Package, availability of local expertise in operation and maintenance, appropriate equipment for the identified services. As such donations will as much as possible have to conform to the standards thus developed.

Central Board of Health also assumes donations are made as a result of:

a) A genuine desire to help.
b) A desire to utilize functional equipment not necessarily required by the donor.
c) A response to a perceived or assessed need of the recipient.

Guidelines.

1. All donations should be channeled through Ministry of Health.
2. Before any donations are made thorough evaluations of the items to be donated must be made by the donor and Ministry of Health.
3. All donated equipment should include a full set of installation, operation and maintenance manuals in English.
4. All donated equipment should include document of warranty for replacement or repair of faulty equipment.
5. All donations should include an agreed quantity of spare parts and necessary consumables.
6. Before a donation agreement is settled Ministry of Health encourages would be donors to furnish it with detailed specifications of items to be donated, age, shelf life, maker and model.
7. Ministry of Health has available a list of requirements of equipment falling short

of the standard lists to which donors may be referred to on request.

8. All donated equipment must be tested for functionality before shipment.
9. As much as is possible the donor and the recipient (MoH) must discuss the donation on an equal partner basis to work out how the effort and goodwill involved in making a donation can be put to best use.
10. The donor will be responsible for the installation and commissioning of complicated donated equipment at the end of which the recipient will receive a functional equipment. This may take the form of paying for the installation where local expertise to install is available or sending experts from the country of origin of the equipment.

Rights of Ministry of Health.

1. Ministry of Health reserves the right to say "**No thank you**" to a donation on behalf of its affiliates or on its own behalf.

Issues to Consider

1. Staff experience, and training required for installation, operation and maintenance of the equipment you are about to receive as donation.
2. Climatic and environmental conditions, such as heat, humidity, dust, ventilation, etc.
3. Maintenance costs: in terms of spare parts, level of expertise of local technical staff required.
4. Availability of consumables: some equipment may require consumables which are not available locally

To help build a comprehensive statement of requirement, the following list of criteria may be useful. Working through the list by both recipient and donor, may make it easier to decide whether or not to accept a donation, make a purchase, or make a particular donation. However, each partner needs to understand what is expected of them and their counterpart.

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- **Support services** required for operation, procedures, and clinical use of the equipment. Keep in mind that modern equipment may offer a wide variety of operational modes and may simplify the performance of certain procedures but it is

often very expensive, and may need both health specialists and a manufacturers' service network for maintenance and repair. When these are available, spare parts and special maintenance tools that are costly may be required. Also remember that sophisticated equipment often has very sensitive parts. Also remember that sophisticated modes offered by the equipment are utilized.

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- **Availability of consumables:** Some equipment may require consumables which are not available locally, for example, special papers, films, filters etc. These are recurrent cost items and their availability must be assured.
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- If a financial contribution would be more appropriate than a donation of equipment.

3. Specify clearly items to accompany the equipment.

- All equipment must be provided with a full set of technical documents. That is, documentation for installation, for user operation, for repair and maintenance (manuals), a list of spare parts and diagrams and technical data. Clearly indicate the language in which the documents should be made available. (Most developing countries use either English , French, Spanish or Portuguese as a second language. If documents cannot be made available in the local language, insist that these are made available in whichever of the above four main languages is most appropriate).

- All equipment must be accompanied by a reasonable quantity of spare parts and consumable items. This should take into account the "lead period" (i.e. period between placing an order and receipt of spare parts). If the lead period is two years then the spares and consumables are needed to cover that period.
- All new equipment must be accompanied by documents of warranty (guarantee). Get a legal expert to read and interpret the conditions if necessary.

4. Make a check list.

Compiling a check list will include consideration of all issues discussed above. It will ensure that the donor receives all the information required in order to make an appropriate donation.

5. Communication alternative preferences.

If a financial contribution to allow local or regional purchase would be more appropriate, cheaper or easier, state this information clearly. Issues on which the donor is unable to comply can then be discussed. The solution should be understood and agreed upon by both parties. As a result, the donors will not substitute items believing that such alternatives would equally suitable. If donations of equipment that are not needed are received, inform the donor immediately. It is also advisable top contact a national coordinating agency.

DONOR RESPONSIBILITY.

Donated equipment will only be useful if it is properly installed, operated, maintained, and appropriately used.

1. Communicate with the recipient.

Before supplying any equipment, request for a comprehensive description of the equipment required by the recipient (including their check list). Ensure that the conditions that cannot be fulfilled are communicated to the recipient. An agreement on all conditions should be reached before shipping the equipment. This ensures that the equipment supplied is clinically, economically, and technologically appropriate.

2. Supply fully functional equipment.

Equipment whether new or reconditioned, should be tested and all essential parts, accessories and working materials included before shipment. A basic list of components must be provided to the recipient. Second-hand equipment should be fully rebuilt or reconditioned. It should be established that the manufacturer continues to produce spare parts and the "life expectancy" of the equipment should be indicated.
Old, broken, outmoded, and redundant equipment for which spares parts and consumables are no longer available, or equipment which is no longer supported by the manufacturer, is as useless in the developing country as it would be in the industrialized. If it is difficult for the donor to service the equipment, it will be impossible for the recipient. Do not supply such items as. It is kinder to send them to the junk yard.

3. Supply all technical documents.

These include installation, operation, maintenance, and repair manuals. It is particularly important to include technical diagrams as the symbols used are usually international.. The technical documents should be supplied in the language of the permanent employees of the recipient enterprises. The need for these documents applies even when expatriate staff are provided to help in the initial stages. Expatriates tend to leave juts before equipment develops problems, and local maintenance personnel will find that documents are most valuable.

4. Supply an initial requirement of consumables and spare parts.

Recipients often face lengthy and complicated procurement procedures. Equipment should therefore be supplied with initial consignment of consumabl;es and spare parts expected to last at least two years (or as requested), and a full list of spare parts. The list must clearly indicate the part name and number, and full name and address (including phone, fax and e-mail, if possible) of the manufacturer or authorized dealer. Vagueness

over the description and source of spare parts can cause months of delay in an already long process.

5 Ensure proper packing.

The consignment is likely to endure long periods in ships, aeroplanes, trains, motor vehicles, bicycles and even on animal backs or by hand. The packing must therefore be strong and sturdy to withstand rough handling and to minimize damage during transportation. It should also:

- Include a clear packing list identifying all components.
- Be of a size that can be handled using simple mechanical devices and manual labour.

6. Supply shipping Documents promptly.

Consignments have been known to remain at air port for months, facing possible damage and accumulating demurrage charges (penalty for delayed action) due to late submission of shipping documents. Prompt submission of documents is essential and should be sent by express insured mail. If possible, send advance copies by fax.

7 Offer technical assistance.

Where possible, promote, recommend and provide training for the use and maintenance of the equipment. On site training is usually very useful. In complicated equipment provide expertise to install and commission equipment.

8 Understand import regulations of the recipient country.

There may be regulations which restrict who can receive donations, and which indicate taxes and other charges. It is important to know about these conditions. It is also important to assess the **ability of the recipient to pay** the accompanying local costs.

References.

Equipment Management Policies and Procedures Manual by Caroline Temple-Bird and Tsibu J. Bbuku.

A Publication of The Pharmaceutical Program-World Council of Churches (WCC) & Community Initiatives Support Services (CISS).

Part II

Medical Equipment Management Manual

1.0 Introduction

1.1 Purposes of Medical Equipment Management

What is the purpose of Medical Equipment Management? Purposes of Medical Equipment Management are as follows:

(1) Keep medical equipment in good and ready-to-use condition
Medical equipment is an essential tool for providing good medical service. In this case, this medical equipment should be in good condition. Otherwise, it will fail to provide good medical service due to the trouble of the equipment. Medical equipment should always be in good and stable condition. Good medical equipment management is necessary to keep equipment in ready-to-use condition.

(2) Operate Equipment Effectively by Affordable Budget.
It is also important to operate equipment by the manner of good service, appropriate cost, and effectively.

Equipment is essential to provide good medical service to patients. However, equipment operation costs should be affordable to the facility. The cost of operation and maintenance budget can be reduced by effective management. If the equipment operation cost is over the affordable budget, alternative methods to provide medical service should be considered.

1.2 Reliability of Medical Equipment

Medical equipment is used to the human body. If it doesn't work properly, sometimes, it may affect a patients' life. Reliability of equipment is an important factor to use the equipment as desired. Reliability of medical equipment should be considered in relation with medical equipment management.

Figure 1 shows characteristics of failure rate by equipment usage time. If frequency of equipment trouble increased the equipment should be replaced because it means the equipment entered into "wear-out failure" stage which is the last stage of medical equipment life cycle. Generally, the life of equipment is considered around 10 years if maintained well. At this stage, it is not wise to continue using the equipment because it will present trouble repeatedly even if the equipment is repaired.

Furthermore, you should notice high failure rate in the "early failure" stage. At this stage, some unknown trouble may also be in the equipment. This is the reason why warranty period (usually one year) is included to all equipment. It is recommended to start using equipment immediately after procurement. Otherwise, early failure trouble might show (present) after the completion of the warranty period. Therefore, it is not wise to store equipment for a long time after procurement.

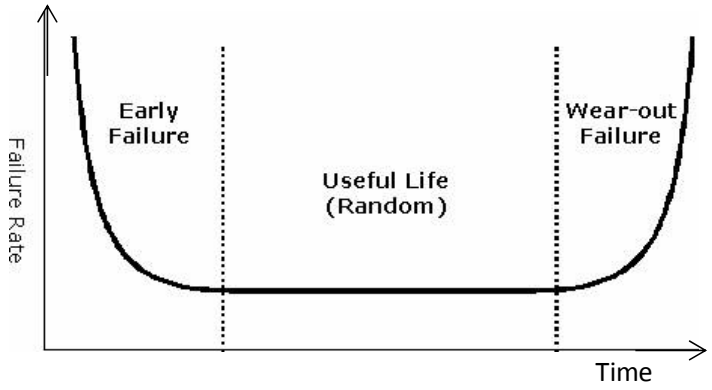

Figure 1. Bathtub Curve (Curve of Reliability)

1.3 Medical Equipment Life Cycle

Medical equipment has a life cycle. It is similar to that of human beings. It will grow older and time to die (or dispose) will come. Equipment should be managed based on this life cycle.

Figure 2 shows a life cycle of medical equipment. The life of equipment starts from planning of procurement. It is same as we are born from our mothers. After procurement, the equipment is installed and accepted by the facility through acceptance test. Equipment is operated by users and it should be monitored and maintained by users and technicians. When life of equipment finishes, it is time to decommission. The life of equipment should be terminated when it comes to "wear-out failure" stage. Otherwise, reliability of equipment decreases and costs of maintenance increases significantly.

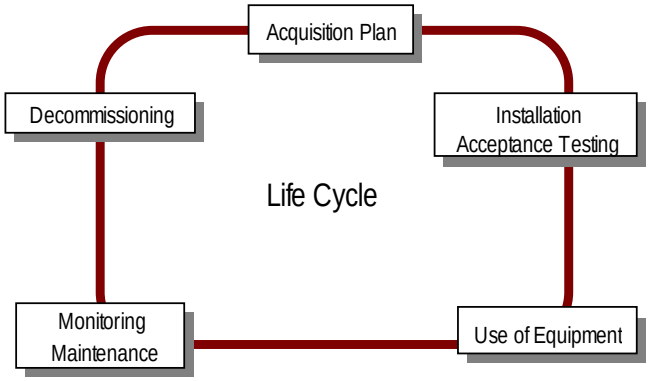

Figure 2. Life Cycle of Medical Equipment

[Maintenance Cycle]

In connection with life cycle, it is necessary to consider cycle of maintenance (Figure 3). All equipment needs maintenance. Otherwise, equipment life becomes short and goes to "wear-out failure" stage quickly. On maintenance cycle, we should consider preventive maintenance. Preventive maintenance is a means of providing maintenance before the equipment presents (or shows) any trouble or abnormality. Preventive maintenance is the only method to prolong the equipment life.

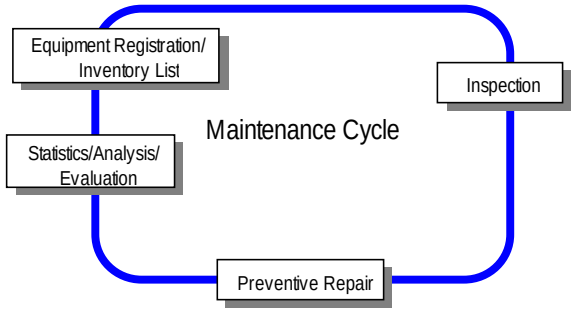

Figure 3. Medical Equipment Maintenance Cycle

[Consumables and Spare Parts Management Cycle]

Consumables and spare parts are essential items for operation and maintenance of equipment. A lot of equipment requires consumables for normal operation. If the equipment is operated without proper consumables, it does not work as required and reliability becomes worse. Consumables costs should be calculated and procured based on usage of the equipment. Its procurement should be on time or in advance. The procurement should never start after all consumables are used up.

Spare parts are necessary for corrective maintenance and Planned Preventive Maintenance (PPM). It is not easy to estimate when and what spare parts become necessary. The estimation can be made based on the experiments and estimations in previous years. Generally, 7% of procurement cost is

necessary to maintain (including consumables and spare parts) all equipment. Budget for spare parts should be allocated based on our estimation. Procurement can be done based on demand.

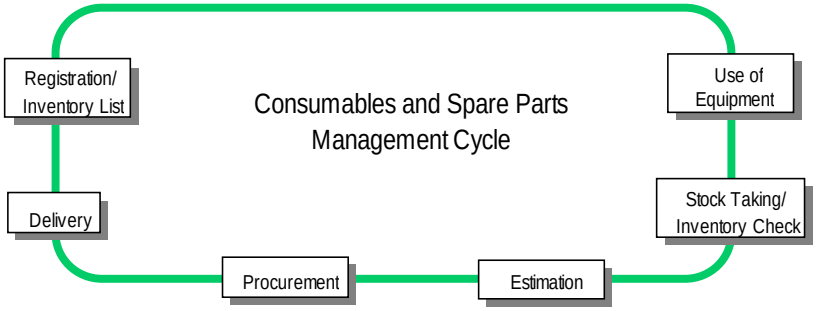

Figure 4. Consumables and Spare Parts Management Cycle

[Combination of 3 Cycles]

If we operate equipment, we should understand and combine the above 3 cycles as shown in Figure 5. Without considering each cycle, we won't be able to operate and maintain equipment effectively.

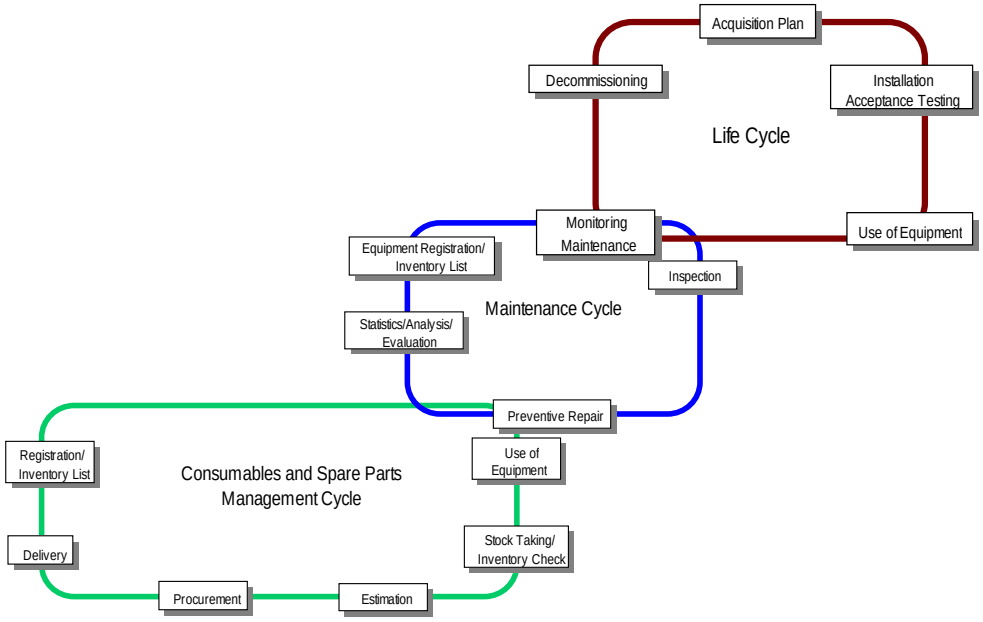

Figure 5. Combination of 3 Management Cycles

1.4 Process of Medical Equipment Management

Equipment Management should be designed based on equipment life cycle. In each stage, management process can be designed as follows.

[Acquisition Plan]

On this stage, medical equipment development plan should be discussed and decided by facility management. Equipment development plan is comprehensive planning for equipment, consumables, and spare parts.

The following items shall be considered as precondition of equipment planning:

- Sufficient budget for operation and maintenance is allocated;
- Sufficient human resource for operation and maintenance is allocated;
- Users are capable to operate the equipment. Or they can be trained before or after equipment arrival; and
- Willingness to use the equipment is high.

Plan of acquisition is made based on the following categories:

- New Procurement – Procurement of new equipment based on new requirement of medical services;
- Replacement – This means replace old equipment with new one. Because old equipment is already in "wear-out failure" stage and is not sufficient to use it anymore. Old equipment should be decommissioned;
- Addition – If existing and functional equipment do not fully cover the capacity of providing medical service, additional purchase should be planned; and
- Decommission – Old and obsolete equipment should be decommissioned and removed from the facility. Otherwise, it occupies important space for work and service. All unnecessary equipment should be disposed through administrative process.

[Installation and Acceptance Testing]

Installation is made by a technician, supplier or manufacturer based on manufacturer's instructions. Acceptance test also should follow manufacturer's guidance. However, the facility should check the equipment carefully by the following aspects:

- Equipment meets required specifications;
- Equipment meets international safety standard; and
- Equipment functions as required specification.

It is recommended to establish a committee for acceptance test. National or regional policy and/or guideline for installation and acceptance of equipment should be prepared to manage this process effectively.

[Operation]

User training should be arranged before operation. Misuse or no use of the equipment should be avoided. No use may occur by limited knowledge of users to equipment or poor management of planning. If user capacity is not enough to use the equipment, it should be considered during the planning process. Outsourcing, additional manpower, or additional training for user should be considered. Otherwise, it is necessary to consider alternative method to provide medical service.

In the equipment operation process, daily maintenance should be implemented by user or any other staff (technician, cleaner, etc.). User should well recognize responsibility on the equipment.

[Monitor and Maintenance]

This process should be considered in connection with "Medical Equipment Maintenance Cycle" and "Consumables and Spare Parts Management Cycle".

[Decommissioning]

Decommissioning items should be checked periodically through updating of medical development plan. The decommissioning of equipment should be approved by committee in the facility. The request of decommissioning will be made to the Ministry of Works and Services through DMO or directly.

1.5 Process of Medical Equipment Maintenance

Maintenance of medical equipment requires technical and medical knowledge. Deep understanding of medical equipment application is necessary to perform good medical equipment maintenance. Medical knowledge is necessary to understand the application. Otherwise, maintenance may be made mistakenly. In the case of large scale and very complicated equipment such as CT, angiography, radiotherapy equipment, and large scale laboratory analyzer, which there is specialist for application, medical application knowledge is not essential. Furthermore, it becomes necessary that administrative and management knowledge is applied.

(1) Styles

There are various patterns on maintenance management system. They can be categorized as: (a) Outsourcing style; (b) In-house style; and (c) mixture of (a) and (b).

(a) Outsourcing Style

This style is to contract maintenance work with an outsourcer and the maintenance work is carried out by outsourced people. Contract patterns can be divided into the following 3 patterns:

- On call contract – When service is required, contracted engineer and technician is called to visit and work at the facility for maintenance work. The range of work should be based on contract.
- Resident contract – Contracted engineer and technician stay in the facility permanently and work for medical equipment maintenance work.
- Contract for selected equipment - Make maintenance contract on selected equipment. On call or periodical visit will be made by the contractor.

(b) In-house Style

Staff engineer and/or technician are in charge of maintenance of all equipment.

(c) Mixed Styles

(a) and (b) can be mixed to perform maintenance.

- In-house style + on call contract – In-house engineer/technician takes overall responsibility of medical equipment maintenance. If necessary, they can obtain technical assistance from the outsourcer.
- In-house style + residence contract – One or few engineer/technicians work with in-house engineer/technician. They can work for medical equipment management as one team.

Other mixes style can be chosen depending on the condition of facility and human resources.

(2) Organization

Whatever the maintenance style is, a facility needs strong organization for medical equipment management. Figure 6 shows typical organization of a maintenance department. In this organization, manager and medical equipment group are responsible for medical equipment. In the case of outsourcing style, maintenance manager should be allocated and the manager should supervise outsourcer's work.

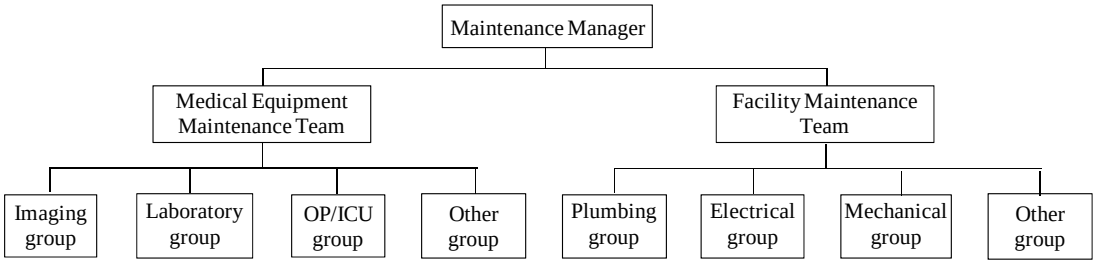

Figure 6. Organisational Chart for Medical Equipment Maintenance

(3) Style of Subcontract

Medical equipment technology is developing rapidly. Highly sophisticated equipment cannot be not handled by in-house engineer/technician only. It contains complicated high technology and its software is always updating. In this case, it is recommended to make maintenance through contract. Table-1 shows categorization of maintenance style.

Table 1. Maintenance Method by Category

Category of medical equipment	Type of equipment (example)	Maintenance method
Higher technology	CT scan, Angiography, Large scale automatic analyzer, etc.	Maintenance contract with manufacturer or distributor is necessary.
Medium technology	General X-ray, Fluoroscopy, Mobile X-ray, Patient monitor, Electrosurgical unit, Ventilator, etc.	If human resources and instruments are available, in-house maintenance is possible
Lower technology	Suction unit, Operation light, etc.	In-house maintenance is available.

(4) Capacity of Technician

A medical equipment maintenance technician requires technical, medical, and management knowledge and ability.

(a) Technical knowledge and ability

Technical knowledge is essential to implement medical equipment maintenance. Deep knowledge on electronics, electrics, and mechanics are required. It can be obtained through proper self-development and affordable training.

(b) Medical knowledge and ability

Usually this kind of knowledge is overseen or disregarded by engineer/technician, management, and medical staff. Because medical equipment is considered same as other equipment like automobile, factory machine, generator, etc. Maintenance of these kinds of equipment requires technical knowledge only. Application is not complicated for the equipment. However, in the case of medical equipment, situation is different. Medical equipment is used on patients by users. In this case, the users should be familiar with medical and technical matters. However, usually, user's knowledge is always limited and user can not study deeply on technical matter because specialty is different and it is too complicated to users. Only the technician can bridge the gap between medical and technical. The technician should learn application of equipment and basic background of medical matters. In general, 70 – 80% of equipment trouble is caused by misuse or misunderstanding of equipment. This situation can be upgraded by technician's medical/application knowledge.

(c) Management ability

Management ability is necessary to medical equipment maintenance. Equipment condition data can be collected through management system. Analysis and report for medical equipment should be made and reported on time. Daily work should be maintained properly through good management ability.

(5) Flow of Medical Equipment Maintenance

Medical equipment maintenance should start from preventive maintenance. Otherwise, life of medical equipment does not extend by maintenance work. In many cases, maintenance department concentrate only in corrective (repair) maintenance. Figure 7 shows overall work of maintenance process.

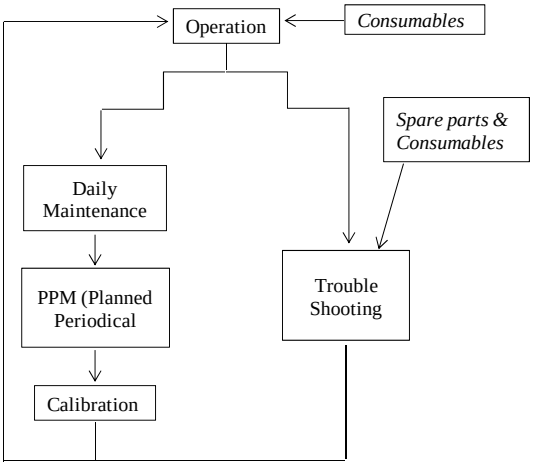

Figure 7. Work Flow of Medical Equipment Maintenance

- Daily Maintenance – Daily maintenance is the basic and beginning of preventive maintenance. This work can be done by users. It contains cleaning and basic functional check of the equipment. Users should make daily maintenance based on check sheet and the result should be recorded in the log book. This simple data becomes source of preventive maintenance.

- Planned Preventive Maintenance – Planned preventive maintenance is essence of preventive maintenance. Engineer / technician make cleaning (inside and outside), detailed function check, and safety checks are made. If any abnormality or warning of trouble is found, corrective maintenance will be done simultaneously. By doing this, equipment can be maintained properly before it presents trouble. Furthermore, all this process and result will be recorded and used for medical equipment development plan.

- Trouble Shooting – Frequently, troubleshooting (corrective maintenance) is misunderstood as all work of maintenance. Maintenance = trouble shooting (corrective maintenance). It is not correct. Corrective maintenance is part of a large work of maintenance. Corrective maintenance is repairing equipment including diagnosis of equipment abnormality. The result of corrective maintenance should be recorded properly for medical equipment management data. Sometimes, it needs spare parts to repair. Furthermore, it may be necessary to conduct user training to assure correct operation.

1.6 Process of Consumable and Spare Parts Management

Procurement is implemented by the procurement department due to character of the work. However, monitoring of the procurement process is responsibility of equipment management. Without consumables and spare parts, we cannot maintain equipment in good and ready-to-use condition.

Procurement plan is made based on the equipment development plan. The plan is prepared by technician/user and approved by management. Usually the budget is limited, and the priority of consumables and spare parts is low. Food for patient, medicine, and salary for staff is priority in the budget. However, budget for maintenance should be considered as one of the important issues to provide good medical service to patient.

1.7 Workshop, Tools and Instruments

Provide proper workshop, tools and instruments is important to qualify the engineer / technician's work. The workshop should have sufficient light, ventilation, air conditioning, working table, and furniture. Medical equipment maintenance can be performed with general tools for electronics. Sometimes special jig is needed and it may be obtained from manufacturer only. Instruments are important to medical equipment maintenance. Many of medical equipment functions are not visible and they should be simulated or checked by various specially designed instruments. These instruments can be used for calibration. However, these instruments need calibration by authorized agency or manufacturer every year.

2.0 Setting up a Medical Equipment Management System

2.1 Establishment of Medical Equipment Management Committee

(1) Member

The Medical Equipment Management Committee (MEMC) should be established based on MOH's TOR and consisted of the following members. Additional members can be added to these member based on requirements of each facility. All members should take partial work of MEMC's responsibility.

(a) Head of the institution/Director Clinical Care and Diagnostic Services (Chair Person)
(b) Responsible person for medical equipment maintenance[1] (Secretariat)
(c) Head of Accounting
(d) Clinical Heads (in case of 2nd-Level Hospital and above)
(e) Head of Procurement
(f) Head of Medical Imaging
(g) Head of Laboratory Services
(h) Head of Nursing Services
(i) Head of Human Resources

(2) Responsibility

MEMC covers all works related to medical equipment.

(a) Inventory Management
(b) Inventory Analysis
(c) Inventory Update
(d) Develop Equipment Development Plan
(e) Develop Consumables and Spare Parts List
(f) Decommission of not Repairable and/or Obsolete Equipment
(g) Planned Preventive Maintenance
(h) Inspection and Acceptance of Equipment

(3) Organization

MEMC is under direct control of PMO, DMO, or medical superintendent. For any matter related to medical equipment management, MEMC has the right to supervise and/or instruct all departments and people.

[1] Medical Equipment Officer, Electrician, EPI Technician, EHT, etc.

(4) 2.2 Roles of Medical Equipment Management Committee

Table 2 and Figure 8 show the roles and structure of MEMC.

Table 2. Roles of MEMC

Organization	Role
MOH	Policy /Guideline Human Resources Policy Procurement (Equipment / Spare parts/ Consumables)
PMO	Monitoring and Technical Guidance for Medical Equipment Management (including Preventive Maintenance) Summarize and Consolidate DMO and Hospital's Action Plan (Equipment, Spare Parts, and Consumables)
DMO/Hospital	Inventory Data Collection and Analysis Planning (Equipment, Spare Parts, and Consumables) Installation and Decommissioning Preventive Maintenance

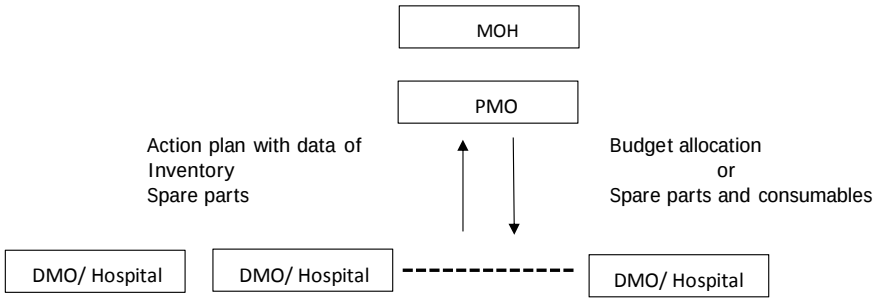

Figure 8. Structure of Medical Equipment Management

2.2 Action Planning of Medical Equipment Management Committee

Planning is beginning of work. It is essential to implement the work by desired time frame and obtain successful output. On the medical equipment management, Table 3 shows desired items to be planned and implement every year. It contains management work and preventive/corrective maintenance work.

Table 3. Maintenance Method by Category

Planning Item	Schedule for Planning Work	Planning Completion Date
1. Meeting schedule 2. Inventory update schedule (twice a year) 3. Inventory analysis update schedule (Update Equipment Development Plan, Consumable List, and Spare Parts List) 4. User training schedule 5. Daily maintenance monitoring schedule 6. Planned preventive maintenance schedule 7. Decommissioning schedule		

2.3 Medical Equipment Inventory

The Equipment Inventory for medical equipment is different from an inventory of assets registry. Inventory data of medical equipment is collected using Medical Equipment Inventory Form shown in Figure 9. This form contains comprehensive information to medical equipment management. The inventory should be reviewed every 6 months by each organization.

Equipment Inventory Checksheet (Hospitals)						**Checked by :**															
Facility Name :			Facility Code :			Day/Month /Year		Sheet of : / (e.g. 1/12)													
Department	Item (Equipment name)	Manufacture	Model	Serial No.	Country	Manufacturing Year	Commission Year	**Manuals (Mark (x), if available.)**		**Condition (Mark (x) for applicable status.)**					**Frequency of usage**					Temporary Inventory No.
								Service Manual	Operation Manual	Working	Minor repairer	Major repairer	Not working	Uncommissioned	Everyday	Few times per week	Few times per month	Not used (Choose the reasons from the list in the instruction.)		

Figure 9. Medical Equipment Inventory Form

2.4 Inventory Analysis

Inventory analysis should be based on the following criteria:

(a) The MEMC will clarify the function of service delivery at each level and determine the vision of the facility;

(b) The MEMC will compare the vision with the Standard Equipment List for any given facility (only available for level one hospital, HC and HP for now);

(c) The MEMC will calculate the equipment shortfall per facility by comparing with the Standard Equipment List;

(d) The MEMC will review and identify any new services to be offered by the facility and will assess the equipment needs for these additional services;

(e) The MEMC will determine the equipment rehabilitation needs using the Equipment Development Plan (EDP) format shown in Figure10; and

(f) The MEMC will present these requirements in the EDP.

Name of facility :

Date of draft :

Short term : 1-2 years

Middle/long term : 3-5 years

No.	Information of Equipment							Technical team advice		Judgement by MEMC					
										Short term action			Middle term action		
	Department/HC/HP	Equipment name	Manufacturer	Model	S/No.	Condition of equipment	Commissioning year (estimate)	Short term action	Middle term action	Cost	Action decided by MEMC	Expected source of funds	Cost	Action decided by MEMC	Expected source of funds

Figure 10. Equipment Development Plan (EDP) Form

The inventory analysis will be used to create EDP. The layout of the EDP form brings to the hospital's attention the following information:

- Current stock of equipment
- Condition of the equipment
- Basic shortfalls in equipment
- Action required rehabilitating or purchasing both in short term and in long term

The EDP is a planning tool which will be a help for annual and longer planning periods. It focuses on the actions required by the hospitals, and provides assistance to managers in clarifying the direction of development for the hospitals. It also allows making cost estimation for the actions required. It highlights where the hospitals needs to allocate funds as such helps the hospitals to rationalize and focus where to spend money. It also provides a time frame for equipment repair and replacement work.

The EDP form has six columns as described below:

Column 1:

- Information on existing medical equipment including: Type; Model; Maker; Serial No., etc.
- Additional medical equipment needed to provide basic services

Column 2: Detailed condition of the equipment including cause of break down

Column 3: MEMC's recommendation for short-term action (within a year)

Column 4: Cost of short-term action and source of funding

Column 5: MEMC's recommendation for middle-term action (3-5 years)

Column 6: Cost of middle-term action and source of funding

The evidence for the short-term action includes:

- Corrective Maintenance
- Planned Preventive Maintenance (PPM)
- Consumables and Spare Parts Lists (Figure 11 and 12)

The evidence for the middle/long-term action includes:

- Corrective Maintenance
- Planned Preventive Maintenance (PPM)
- Consumables and Spare Parts Lists (Figure 11 and 12)

The MEMC is expected to analyse the possible equipment needs, both in capital and recurrent, to create a long-term expenditure plan. These needs must be prioritised across the facility as a whole for the coming years. This will reflect the annual procurement rehabilitation activities when they consolidate all the above in the EDP.

Name of facility : 1 - Not functioning 3- few times per month

Date of draft : 2 - Working properly 4-few times per year

No.	Department/HC/HP	Equipment name	Manufacturer	Model	S/No.	Equipment condition	Name of spare parts	Reference No. if any	Required quantity	Date of trouble	Frequency of usage	Estimated unit cost	Estimated total	Re-order level

Figure 11. Consumables List Form

1-every day

2-few times per week

Name of facility : 1 - Not functioning 3- few times per month

Date of draft : 2 - Working properly 4-few times per year

No.	Department/HC/HP	Equipment name	Manufacturer	Model	S/No.	Equipment condition	Name of consumables	Reference No. if any	Usage (quantity) per year	Required quantity	Frequency of usage	Estimated unit cost	Estimated total cost/year	Re-order level

Figure 12. Spare Parts List Form

Name of facility :

No.	Department / HC / HP	Equipment	Consumables / spare parts	Quantity	Unit cost (estimate)	Total cost (estimate)	Required due date	Note

Figure 13. Procurement Plan Form

Medical equipment standard lists are available for Health Posts, Health Centres, and 1st-, 2nd- and 3rd-Level Hospitals. The EDP should be prepared referring to the standard lists.

2.5 Preventive Maintenance

Preventive maintenance work consists of daily maintenance and Planned Preventive Maintenance (PPM). The purposes of preventive maintenance are:

- Keep equipment always clean;
- Find any abnormality that appears on equipment;
- Users recognize ownership and responsibility to the equipment;
- Cooperation between user and technician become consolidated;
- Extend lifespan of medical equipment. Consequently it reduce capital and recurrent costs;
- Provision of service to patient becomes better; and
- Patient, user, and equipment safety.

[Daily Maintenance]

The main purpose of daily maintenance is to keep medical equipment clean and in operational condition all the time. Daily maintenance is performed in the following steps:

(1) Select equipment required daily maintenance.
(2) Decide a person or group in charge of daily maintenance (usually users).
(3) Prepare **Daily Maintenance Check Sheet**.
(4) Prepare **Daily Maintenance Log Sheet**.
(5) Prepare schedule of user training using **Planned Preventive Maintenance and User Training Planning Form**.
(6) Follow the instruction written in **Daily Maintenance Check List**.
(7) Prepare **Job Request Form** and submit it to the technician.
(8) Conduct regular monitoring by technician (daily maintenance procedure and log book).

Daily maintenance should be implemented every morning except non-working days. The results of the daily maintenance should be recorded on Daily Maintenance Log Sheet. However, considering the volume of recording, it is recommended to use a notebook.

[Planned Preventive Maintenance]

The purposes of PPM are to keep medical equipment in good condition and extend its life span. The calibration of equipment is performed during the PPM. PPM is performed in the following steps:

（1） Select equipment required PPM.
（2） Prepare annual schedule of PPM using **Planned Preventive Maintenance Check List**.
（3） Prepare **Planned Preventive Maintenance Check List**.
（4） Prepare necessary tools, instruments and consumables.
（5） Periodically review the PPM procedure.

At least every 6 months and should follow manufacturer's instruction (operation and maintenance manuals). PPM requires technical skills to implement. The procedure and results of PPM should be recorded on a log book. The results of PPM should be analysed and used for the development of EDP.

2.6 Corrective Maintenance

Corrective maintenance is performed on call basis. It is trouble shooting and repair work of medical equipment. The results of corrective maintenance need to be recorded as a reference for EDP. Corrective maintenance is performed in the following steps:

（1） Prepare **Job Request Form**.
（2） Identify abnormality of the medical equipment.
（3） Request service using the **Job Request Form**.
（4） The technician does the corrective maintenance work.
（5） Record the process and results of the maintenance on the **Job Request Form**.

The Job Request Forms recorded the corrective maintenance should be filed, kept, and analysed monthly.

2.7 Decommissioning

Based on the inventory analysis, the MEMC recommends to the board of survey from the Ministry of Works and Supply (MWS) on the equipment decommission lists. Relevant authorities should be notified of this activity. Decommissioning will be implemented by following procedure:

(1) List up decommissioning items.
(2) Submit the proposal of decommission to regional MWS.
(3) MWS acknowledges the proposal and decide the schedule of survey mission.
(4) Survey mission confirms decommissioning equipment item by item.
(5) MWS sends Approval letter of decommission with BOD number.

2.8 Other Issues on Medical Equipment Management

[Inspection and Acceptance of Medical Equipment]

Some hospitals are facing problems associated with newly-procured or donated medical equipment due to the following reasons:

- Essential accessories are not included to the delivered equipment.
- Consumables are not available in Zambia.
- No technical service is available in Zambia.
- Technical information for maintenance is not included to the delivered equipment.
- Equipment does not function at all after installation.
- Equipment is not fit to existing infrastructure (electrical voltage, water supply, drainage, etc.)
- Lack of capacity building for the technical personnel.

These kinds of trouble could be avoided if the equipment is well prepared and checked at the time of delivery and installation against the specifications.

MEMC is responsible and has the authority to accept or reject delivered equipment on behalf of the health facility. At the time of delivery or installation, MEMC should make inspection based on the manufacturer's standards and/or international technical standards. Furthermore, MEMC should make inspection in accordance with MOH's guidelines and international technical standards when the health facility receives the medical equipment. The following guidelines are essential to keep quality of equipment in health facility:

- Guidelines on Donations of Equipment to Ministry of Health
- Guidelines on Receiving of New Equipment and Equipment Donations

Equipment Acceptance Record can be used to accept newly-procured or donated medical equipment. The records must be filed for the future reference.

[Access to Internet]

Internet is a very useful tool for medical equipment management and maintenance. It makes possible to obtain following information through the web:

- Latest information on medical equipment at manufacturer's web site
- Maintenance information: operation/maintenance manual; standards and regulations; and latest studies on medical equipment maintenance
- E-mail communication among technicians

Internet services have already been available at many hospitals and DMOs and the coverage should be expanded. Internet is becoming an essential tool to maintain medical equipment on good condition. It is strongly recommended communicating with fellow technicians and share experiences. And it is necessary to obtain updated information on medical equipment issues.

[Means of Transportation to Health Centres and Health Posts]

Means of transportation is necessary for medical equipment management for Health Centres and Health Posts. The person in charge of medical equipment management is expected to visit these facilities periodically and discuss with their staff and inspect their equipment. In case that the facilities are located in flat terrain and easily accessible, a motor cycle is appropriate to this purpose. However, those located in mountainous remote places need a 4WD vehicle for the visits.

Visiting Health Centres and Health Posts can be done in conjunction with Performance Assessment (PA) and Technical Support (TS) activities. Medical equipment management activities might be included to TS visits. However, due to the nature of PA and TS, appropriate persons do not always visit the health facilities.

[Integration of Medical Equipment Planning with Infrastructure Planning]

Medical equipment planning can be considered in conjunction with infrastructure. The following points should be assessed from infrastructure side of planning:

- Power supply (capacity, single phase or 3 phase, and stability of voltage)
- Water supply (location, piping, flow, volume, pressure, water quality, etc.)
- Drainage (location, piping, and size of pipe)
- Ventilation and air conditioning (at laboratory, dark room, X-ray equipment, ultrasound, etc.)
- X-ray protection
- Water supply to users and patients (hand wash, treatment, and cleaning, etc.)

[Monitoring and Evaluation]

MEMC is in charge of monitoring and evaluation of medical equipment management. MEMC shall check the inventory, EDP, and Monthly Report and Annual Report. The evaluation of medical equipment management shall be made using outputs of these documents.

Annex 1. TOR for Medical Equipment Management Committee

The following TOR is issued by Ministry of Health. This is the basis for organization and implementation of medical equipment management committee.

TERMS OF REFERENCE FOR THE EQUIPMENT COMMITTEES AT PROVINCIAL OR HOSPITAL LEVEL

Premise.

The management and maintenance of HealthCare Technology (Medical Equipment) is facing a lot of challenges in Zambia as such it needs to be brought to the fore of management issues. Once its priority is recognized the resources that are put in its acquisition can be guaranteed to be put to good use. It is for this reason that the Ministry of Health recommends that equipment committees be constituted at Ministry of Health, Provincial Level as well as at facility level. This amplifies further the notion that maintenance and management of Health Care Technology (Medical Devices) is a collective responsibility and that if any of the stake holders in the life cycle of equipment does not play their role the management and maintenance of this valuable asset will be compromised.

The terms of reference of these committees will include the following:

- To look into all issues pertaining to equipment standards.
- To look into all issues pertaining to equipment acquisition.
- To look into all issues pertaining to equipment acceptance after procurement.
- To look into all matters pertaining to equipment installation and commissioning.
- To look into all issues pertaining to training on equipment usage and maintenance.
- To look into all issues pertaining to equipment usage.
- To look into all issues pertaining to equipment maintenance and management.
- To review and advise on contracts for equipment management and maintenance.
- To serve as subcommittees of the Board of Survey.
- To perform any such functions incidental to or relevant to equipment issues.

The main stake holders and suggested members of the equipment committees will include the following:

- Head of the institution/Director Clinical Care and Diagnostic Services (Chair Person)
- Responsible person for medical equipment maintenance (Secretariat)
- Chief Accountant (head of financial)
- Clinical Heads if it is at Level II and above.
- Head of Procurement.
- Head of Medical Imaging.
- Head of Laboratory Services.
- Head of Nursing Services.
- Head of Human Resources.

Annex 2. Recommended Workshop, Tool Kit and Test Instruments for Medical Equipment Maintenance

1. Workshop

（1） Sufficient working space with working table and chair

（2） Air ventilation and lighting

（3） Power supply

（4） Sink with running water

（5） Office desk with chair

（6） Locker or shelf for measuring instruments and manuals

（7） Fire extinguisher

（8） Air compressor

2. Tool Kit

No.	Name of Tool	Unit
1	Vice Grip	1
2	Hacksaw (Big)	1
3	Hacksaw (Mini)	1
4	Digital Multimeter	1
5	Temperature Probe	1
6	Adjustable Wrench (Big)	1
7	Adjustable Wrench (Mini)	1
8	Short Nose Pliers	1
9	Long Nose Pliers	1
10	Pen Knife	1
11	Diagonal Cutter (Big)	1
12	Diagonal Cutter (Small)	1
13	Set of Allen KEY	1
14	Multi Function KEY	1
15	Wire Stripper	1
16	Set of Screw Driver (Include precision type)	6
17	Voltage Tester Screen Driver	1
18	Adjustable Wire Stripper	1
19	Pen Light	1
20	Plumber's Pliers	1
21	Measuring Tape	1
22	Solder sucker	1
23	Brush (for dust removal)	1
24	Blower	1

3. Test Instruments

No.	Name of Test Instrument	Units
1	Electrical safety analyzer	1
2	ECG simulator	1
3	Oxygen analyzer	1
4	Defibrillator analyzer	1
5	Electro surgical unit analyzer	1
6	Infusion pump analyzer	1
7	Pulse oximeter simulator	1
8	Ventilator analyzer	1
9	Phantom for ultrasound diagnosis	1
10	Phantom for X-ray test	1
11	QC kits for X-ray	1
12	Anesthesia gas analyzer	1

Annex 3. Forms and Sheets for Medical Equipment Management

Form - 1 Annual Planning Form

Annual Planning Form (for action plan of medical equipment management)

Planning item	Schedule for Planning Work	Planning Completion Date
1 Medical equipment committee meeting		
2 Inventory update schedule		
3 Update inventory analyses schedule (Update equipment development plan, consumable list, spare parts list)		
4 User training schedule		
5 Daily maintenance monitoring schedule		
6 Planned Preventive Maintenance Schedule		
7 Decommissioning work		

Facility name :

Planned by (date)

Checked by (date)

Planning work completion checked by (date)

Form - 2

Instruction for medical equipment inventory check sheet (for Hospitals)

Item in the check sheet	Required information on the item
Checked by	Record your name and position
Facility name	Record facility name
Facility code	Record facility code
Day/Month/Year	Record date of inventory check. If it is carried out over a few days, record the last day of the work.
Sheet of	Write down sequential number of your inventory check sheet.
Department	Write down the name of the department where the equipment exist.
Equipment name	Write down the equipment name. Use the standardized name found in the standard medical equipment list.
Manufacture	Record the company name which manufactured the equipment. Usually, it is indicated on rating plate on the back or side of the equipment.
Country	Record the country where the equipment was manufactured. Usually, it is indicated on rating plate on the back or side of the equipment.
Model	Model name of equipment.
Serial No.	Record the serial number of the equipment. Usually, it is indicated on rating plate on the back or side of the equipment.
Year of production	Equipment production year. Usually it is indicated on rating plate on the back or side of the equipment.
Year of installation	When was the equipment delivered and installed at your hospital? Check your record or ask someone who may have that information (e.g. Sister in Charge).
Condition	Check the equipment condition through interview with the user or technician. Choose the condition from the following category. Working : Working normally and perfectly. Minor repairer : Working but there are some problems. Major repairer : Out of order. Waiting for repair or spare parts. Not working : Out of order. No way to repair it. Ready for boarding/decommissioned. Uncommissioned : Not yet installed.
Frequency of usage	Ask the user the frequency of usage of the equipment. Everyday : Used almost everyday Few times per week : Used a few times per week Few times per month : Used a few times per month No use : Not used. If the equipment is "not used", please choose the reasons from the list below (multiple answers are allowed). 1. Broken - Needs major repair (out of order. waiting for repair or spare parts) 2. Broken - Out of order. No way to repair it. 3. Working - No consumables. 4. Working - No need to use the equipment. 5. Working - Equipment is too old 6. Working - Clinically unreliable. 7. Uncommissioned (Not installed/No instruction/No training) 8. Any other reasons.
Inventory number	If your facility uses inventory number on the equipment, please write it down. (If not, leave this space blank.)

Medical Equipment Inventory Checksheet for Hospitals

Equipment Inventory Checksheet (Hospitals)								**Checked by :**													
Facility Name :			Facility Code :			Day/Month /Year		Sheet of : / (e.g. 1/12)													
Department	Item (Equipment name)	Manufacture	Model	Serial No.	Country	Manufacturing Year	Commission Year	**Manuals (Mark (x), if available.)**		**Condition (Mark (x) for applicable status.)**					**Frequency of usage**				Temporary Inventory No.
								Service Manual	Operation Manual	Working	Minor repairer	Major repairer	Not working	Uncommissioned	Everyday	Few times per week	Few times per month	Not used (Choose the reasons from the list in the instruction.)	

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Instruction for the medical equipment inventory check sheet (for HC/HP)

This form is designed to assist you in taking inventory of medical equipment with detailed information. **For the equipment listed in the form**, fill in the information.
If your facility has more number of equipment than the provided space in the form, use the blank space to fill in the information.

Item in the check sheet	Required information on the item
Checked by	Record your name and position
Facility name	Record facility name
Facility code	Record facility code
Day/Month/Year	Record date of inventory check. If it is carried out over a few days, record the last day of the work.
Manufacture	Record the company name which manufactured the equipment. Usually, it is indicated on rating plate on the back or side of the equipment.
Country	Record the country where the equipment was manufactured. Usually, it is indicated on rating plate on the back or side of the equipment.
Model	Model name of equipment.
Serial No.	Record the serial number of the equipment. Usually, it is indicated on rating plate on the back or side of the equipment.
Year of production	Equipment production year. Usually it is indicated on rating plate on back or side of equipment.
Year of installation	When was the equipment delivered and installed at your hospital? Check your record or ask someone who may have the information (e.g. Health centre in charge).
Condition	Check equipment condition through interview with the user or technician. Choose the condition from the following category. Working : Working normally and perfectly. Minor repairer : Working but there are some problems. Major repairer : Out of order. Waiting for repair or spare parts. Not working : Out of order. No way to repair it. Uncommissioned : Not yet installed.
Frequency of usage	Ask the user the frequency of usage of the equipment. Everyday : Used almost everyday Few times per week : Used a few times per week Few times per month : Used a few times per month No use : Not used for some reasons.
Inventory number	If your facility uses inventory number on the equipment, please write it down. (If not, leave this space blank.)

Equipment Inventory Checksheet (Urban Health Centre)									Checked by:												
Facility Name				Facility Code				Day/Month /Year													
Department	Item (Equipment name)	Quantity	Manufacture	Model	Serial No.	Country	Manufacturing Year	Commission Year	Manuals (Mark (x), if available.)		Condition (Mark (x) for applicable status.)					Frequency of usage				Temporary Inventory No.
									Service Manual	Operation Manual	Working	Minor repairer	Major repairer	Not working	Uncommissioned	Everyday	Few times per week	Few times per month	Not used(Indicate the reasons from	
OPD and wards, including maternity																					
OPD and wards, including maternity	**Check the following equipment in OPD and wards (including maternity). If any of the following equipment exists, please record the information for each piece of equipment.**																				
	Ambu bag for adults (resuscitator)																				
	Ambu bag for adults (resuscitator)																				
	Ambu bag for adults (resuscitator)																				
	Ambu bag for adults (resuscitator)																				
	Ambu bag for adults (resuscitator)																				
	Ambu bag for adults (resuscitator)																				
	Ambu bag for children (resuscitator)																				
	Ambu bag for children (resuscitator)																				
	Ambu bag for children (resuscitator)																				
	Autoclave, electric, small																				
	Autoclave, electric, small																				
	Autoclave, electric, small																				
	Autoclave, non electrical, 39litres																				
	Autoclave, non electrical, 39litres																				
	Autoclave, non electrical, 39litres																				
	BP machine, adult																				
	BP machine, adult																				
	BP machine, adult																				
	BP machine, adult																				
	BP machine, adult																				
	BP machine, adult																				

Facility Name				Facility Code			Day/Month /Year															
Department	Item (Equipment name)	Quantity	Manufacture	Model	Serial No.	Country	Manufacturing Year	Commission Year	**Manuals (Mark (x), if available.)**		**Condition (Mark (x) for applicable status.)**					**Frequency of usage**				Temporary Inventory No.
									Service Manual	Operation Manual	Working	Minor repairer	Major repairer	Not working	Uncommissioned	Everyday	Few times per week	Few times per month	Not used (Indicate the reasons from	
OPD and wards, including maternity	BP machine, adult																			
	BP machine, adult																			
	Delivery bed																			
	Delivery bed																			
	Delivery bed																			
	Delivery bed																			
	Diagnostic set																			
	Diagnostic set																			
	Diagnostic set																			
	Examination light																			
	Examination light																			
	Indicator TST control spot, pac-300																			
	Otoscope set in case																			
	Otoscope set in case																			
	Salter scale																			
	Salter scale																			
	Salter scale																			
	Salter scale																			
	Sterilising drum, medium																			
	Stove, kerosene, single burner																			
	Stretcher, foldable																			
	Suction pump, electrical																			
	Suction pump, electrical																			
	Suction pump, electrical																			

Facility Name				Facility Code			Day/Month /Year																
Department	Item (Equipment name)	Quantity	Manufacture	Model	Serial No.	Country	Manufacturing Year	Commission Year	**Manuals (Mark (x), if available.)**		**Condition (Mark (x) for applicable status.)**					**Frequency of usage**				Temporary Inventory No.
									Service Manual	Operation Manual	Working	Minor repairer	Major repairer	Not working	Uncommissioned	Everyday	Few times per week	Few times per month	Not used (Indicate the reasons from	
	Suction pump, foot operated																			
	Suction pump, foot operated																			
	Suction pump, foot operated																			
	Vacuum aspirator, manual (MVA)																			
	Vacuum aspirator, manual (MVA)																			
	Vacuum aspirator, manual (MVA)																			
	Vacuum aspirator, manual (MVA)																			
	Weighing scale, adult																			
	Weighing scale, adult																			
	Weighing scale, infant, beam type																			
	Weighing scale, infant, beam type																			
	Weighing trousers																			
	Weighing trousers																			
	For the following equipment, please count and write down the total number of equipment in OPD and wards, including maternity.																			
OPD and wards, including maternity	Bed pan																			
	Bed side cabinet locker, health centre model																			
	Bed side screen																			
	Bowl, lotion, large																			
	Bowl, lotion, medium																			
	Bowl, lotion, small																			
	Bucket, stainless steel																			
	Chair for consulting staff																			
	Chair for patient																			
	Desk for consulting staff																			

Facility Name				Facility Code			Day/Month /Year													
Department	Item (Equipment name)	Quantity	Manufacture	Model	Serial No.	Country	Manufacturing Year	Commission Year	**Manuals (Mark (x), if available.)**		**Condition (Mark (x) for applicable status.)**					**Frequency of usage**				Temporary Inventory No.
									Service Manual	Operation Manual	Working	Minor repairer	Major repairer	Not working	Uncommissioned	Everyday	Few times per week	Few times per month	Not used (Indicate the reasons from	
OPD and wards, including maternity	Drainage set																			
	Dressing set																			
	Dressing tray																			
	Drip stand																			
	Ear Syringe																			
	Equipment cabinet																			
	Examination couch without leg holders																			
	Examination couch, gynaecological																			
	Foot stool, one step																			
	Gallipots, large																			
	Gallipots, medium																			
	Hospital bed back rest																			
	Hospital bed bednet treated																			
	Hospital bed (health centre/health post model with mattress)																			
	Infant cot bednet, treated																			
	Infant cot with mattress																			
	Infection prevention trolley																			
	Instrument tray, large																			
	Instrument tray medium																			
	Instrument trolley																			
	Kidney dish, large																			
	Kidney dish, medium																			
	Mayo table																			
	Medicine trolley																			

Facility Name				Facility Code			Day/Month /Year													
Department	Item (Equipment name)	Quantity	Manufacture	Model	Serial No.	Country	Manufacturing Year	Commission Year	**Manuals (Mark (x), if available.)**		**Condition (Mark (x) for applicable status.)**					**Frequency of usage**				Temporary Inventory No.
									Service Manual	Operation Manual	Working	Minor repairer	Major repairer	Not working	Uncommissioned	Everyday	Few times per week	Few times per month	Not used (Indicate the reasons from	
OPD and wards, including maternity	Sterilising drum, medium																			
	Sterilising drum, small																			
	Stethoscope																			
	Stethoscope, foetal, Pinard																			
	Stretcher, foldable																			
	Suturing set																			
	Thermometer jar																			
	Thermometer, digital																			
	Timer, 60min																			
	Torch, medical, pen sized																			
	Urinal, male																			
	Vaginal delivery/episiotomy set																			
	Vaginal speculum, large																			
	Vaginal speculum, medium																			
	Vaginal speculum, small																			
	Wall clock																			
	Wastebin with lid																			
	Please use the space below, if there are any other equipment in the OPD and wards, including maternity.																			

Facility Name				Facility Code			Day/Month /Year														
Department	Item (Equipment name)	Quantity	Manufacture	Model	Serial No.	Country	Manufacturing Year	Commission Year	Manuals (Mark (x), if available.)		Condition (Mark (x) for applicable status.)					Frequency of usage				Temporary Inventory No.
									Service Manual	Operation Manual	Working	Minor repairer	Major repairer	Not working	Uncommissioned	Everyday	Few times per week	Few times per month	Not used (Indicate the reasons from	
Dental equipment																				
Dental Equipment	**Check the following dental equipment. If any of the following equipment exists, please record the information for each piece of equipment.**																			
	Bench top autoclave																			
	Dental amalgamator																			
	Dental Chair																			
	Dental Compressor																			
	Dental film processor or developer																			
	Dental light																			
	Dental light curing unit																			
	Dental x-ray unit																			
	Treatment unit																			
	Ultrasonic dental scaler																			
	For the following dental equipment, please count and write down the total number of equipment.																			
	Dental instrument cabinet																			
	Dental instrument set																			
	Dental instrument tray																			
	Dental syringe																			
	Dentist stool																			
	Please use the space below, if there are any other dental equipment.																			

Facility Name				Facility Code			Day/Month /Year															
Department	Item (Equipment name)	Quantity	Manufacture	Model	Serial No.	Country	Manufacturing Year	Commission Year	**Manuals (Mark (x), if available.)**		**Condition (Mark (x) for applicable status.)**					**Frequency of usage**				Temporary Inventory No.
									Service Manual	Operation Manual	Working	Minor repairer	Major repairer	Not working	Uncommissioned	Everyday	Few times per week	Few times per month	Not used (Indicate the reasons from	
Pharmacy equipment																						
Pharmacy equipment	**Check the following equipment in the pharmacy. If any of the following equipment exists, please record the information for each piece of equipment.**																					
	Refrigerator, domestic																					
	For the following pharmacy equipment, please count and write down the total number of equipment.																					
	20ml medicine cup																					
	Drug cabinet, lockable																					
	Tablet counting tray																					
	Please use the space below, if there are any other pharmacy equipment.																					
Cold chain equipment																						
Cold chain equipment	**Check the following cold chain equipment. If any of the following cold chain equipment exists, please record the information for each piece of equipment.**																					
	Refrigerator for vaccines																					
	Vaccine carrier																					
	Vaccine coldbox																					
	Please use the space below, if there are any other cold chain equipment.																					

Facility Name				Facility Code			Day/Month /Year														
Department	Item (Equipment name)	Quantity	Manufacture	Model	Serial No.	Country	Manufacturing Year	Commission Year	Manuals (Mark (x), if available.)		Condition (Mark (x) for applicable status.)					Frequency of usage				Temporary Inventory No.
									Service Manual	Operation Manual	Working	Minor repairer	Major repairer	Not working	Uncommissioned	Everyday	Few times per week	Few times per month	Not used (Indicate the reasons from	
Laboratory equipment																					
Laboratory Equipment	**Check the following equipment in laboratory. If any of the following equipment exists, please record the information for each piece of equipment.**																				
	Analytical balance																				
	Autoclave for laboratory, small																				
	Blood bank refrigerator																				
	Bunsen burner																				
	CD 4 counting machine																				
	Centrifuge, electrical																				
	Centrifuge, manual																				
	Chemistry analyser																				
	Differential counter																				
	Flammable liquid cabinet																				
	Glucometer																				
	Haematology analyser																				
	Haemoglobinometer, Colorimeter type																				
	Haemoglobinometer, Haemocue Hb 201+																				
	Haemoglobinometer, Colour scale WHO																				
	Hand tally counter																				
	Hot air oven																				
	Laboratory refrigerator/ freezer																				
	Microhaematocrit centrifuge																				
	Microscope, binocular																				
	Microscope, binocular																				
	pH meter																				

Facility Name				Facility Code			Day/Month /Year															
Department	Item (Equipment name)	Quantity	Manufacture	Model	Serial No.	Country	Manufacturing Year	Commission Year	**Manuals (Mark (x), if available.)**		**Condition (Mark (x) for applicable status.)**					**Frequency of usage**				Temporary Inventory No.
									Service Manual	Operation Manual	Working	Minor repairer	Major repairer	Not working	Uncommissioned	Everyday	Few times per week	Few times per month	Not used (Indicate the reasons from	
Laboratory Equipment	Rapid Diagnostic test for malaria																			
	RPR rotator																			
	Spirit lamp																			
	Water bath																			
	Water distiller for laboratory																			
	Water filter for laboratory																			
	For the following laboratory equipment, please count and write down the total number of equipment.																			
	Chair for administrative duties																			
	Hand tally counter																			
	Stool for laboratory worker																			
	Table for administrative duties																			
	Timer																			
	Please use the space below, if there are any other laboratory equipment.																			

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Facility Name				Facility Code			Day/Month /Year															
Department	Item (Equipment name)	Quantity	Manufacture	Model	Serial No.	Country	Manufacturing Year	Commission Year	Manuals (Mark (x), if available.)		Condition (Mark (x) for applicable status.)					Frequency of usage				Temporary Inventory No.
									Service Manual	Operation Manual	Working	Minor repairer	Major repairer	Not working	Uncommissioned	Everyday	Few times per week	Few times per month	Not used (Indicate the reasons from	
Environmental health equipment																				
Environmental health equipment	**Check the following environmental health equipment. If any of the following equipment exists in your health facility, please record the information for each piece of equipment.**																			
	Lovibond Comparator																			
	Meat inspection kit																			
	Meat inspection kit																			
	Vector control sprayer																			
	Vector control sprayer																			
	Vector control sprayer																			
	Water level meter																			
	For the following environmental health equipment, please count and write down the total number of equipment.																			
	Bucket for mixing chemicals																			
	Food and water sample box																			
	Measuring Jar																			
	Meat inspection kit																			
	Personal protective equipment																			
	Rodent control apparatus																			
	Squirt gun																			
	Tape measure																			
	Please use the space below, if there are any other environmental health equipment.																			

Facility Name				Facility Code			Day/Month /Year														
Department	Item (Equipment name)	Quantity	Manufacture	Model	Serial No.	Country	Manufacturing Year	Commission Year	**Manuals (Mark (x), if available.)**		**Condition (Mark (x) for applicable status.)**					**Frequency of usage**				Temporary Inventory No.
									Service Manual	Operation Manual	Working	Minor repairer	Major repairer	Not working	Uncommissioned	Everyday	Few times per week	Few times per month	Not used (indicate the reasons from	
Kitchen equipment																					
Kitchen equipment	**Check the following equipment in the kicthen. If any of the following equipment exists, please record the information for each piece of equipment.**																				
	Cooking pot of 10 litres																				
	Cooking pot of 20 litres																				
	Cooking pot of 40 litres																				
	Food trolley																				
	Freezer, domestic, chest model for kitchen																				
	Heated Bain Marie Trolley																				
	Preparation table																				
	Stove, domestic, gas																				
	Stove, industrial																				
	Weighing scale for kitchen (0-120kg)																				
	For the following kitchen equipment, please count and write down the total number of equipment.																				
	Bain Marie																				
	Boiling pot																				
	Please use the space below, if there are any other kitchen equipment.																				

Facility Name				Facility Code			Day/Month /Year															
Department	Item (Equipment name)	Quantity	Manufacture	Model	Serial No.	Country	Manufacturing Year	Commission Year	Manuals (Mark (x), if available.)		Condition (Mark (x) for applicable status.)					Frequency of usage				Temporary Inventory No.
									Service Manual	Operation Manual	Working	Minor repairer	Major repairer	Not working	Uncommissioned	Everyday	Few times per week	Few times per month	Not used (Indicate the reasons from	
Laundry equipment																						
Laundry equipment	**Check the following equipment in laundry. If any of the following equipment exists, please record the information for each piece of equipment.**																					
	Industrial ironer																					
	Laundry press																					
	Sewing machine																					
	Tumble Dryer																					
	Washer-extractor																					
	Water heater																					
	For the following laundry equipment, please count and write down the total number of equipment.																					
	Clean linen trolley																					
	Laundry trolley																					
	Please use the space below, if there are any other laundry equipment.																					
Mortuary equipment																						
Mortuary Equipment	**Check the following equipment in mortuary. If any of the following equipment exists, please record the information for each piece of equipment.**																					
	Mortuary fridge/unit (4 trays)																					
	For the following mortuary equipment, please count and write down the total number of equipment.																					
	Mortuary trolley																					
	Please use the space below, if there are any other mortuary equipment.																					

Facility Name				Facility Code			Day/Month /Year														
Department	Item (Equipment name)	Quantity	Manufacture	Model	Serial No.	Country	Manufacturing Year	Commission Year	Manuals (Mark (x), if available.)		Condition (Mark (x) for applicable status.)					Frequency of usage				Temporary Inventory No.
									Service Manual	Operation Manual	Working	Minor repairer	Major repairer	Not working	Uncommissioned	Everyday	Few times per week	Few times per month	Not used (Indicate the reasons from	
Miscellaneous																					
Miscellaneous	**Check the following equipment. If any of the following equipment exists in your facility, please record the information for each piece of equipment.**																				
	Solar power supply system for light, cold chain and laboratory	X																			
	Health post/health centre maintenance kit																				
	Health post/health centre maintenance kit																				
	For the following equipment, please count and write down the total number of equipment.																				
	Camping equipment set																				
	Fire extinguisher																				
	Hurricane lamp																				
	Please use the space below, if there are any other equipment.																				

Equipment Inventory Checksheet (Rural Health Centre)									Checked by:											
Facility Name				Facility Code			Day/Month /Year													
Department	Item (Equipment name)	Quantity	Manufacture	Country	Model	Serial No.	Manufacturing Year	Commission Year	Manuals (Mark (x), if available.)		Condition (Mark (x) for appropriate status.)					Frequency of usage				Inventory No.
									Service Manual	Operation Manual	Working	Minor repairer	Major repairer	Not working	Uncommissioned	Everyday	Few times per week	Few times per month	Not used	
OPD and wards, including maternity																				
OPD and wards, including maternity	**Check the following equipment in OPD and wards (including maternity). If any of the following equipment exists, please record the information for each piece of equipment.**																			
	Ambu bag for adults (resuscitator)																			
	Ambu bag for adults (resuscitator)																			
	Ambu bag for children (resuscitator)																			
	Autoclave, electric, small																			
	Autoclave, electric, small																			
	Autoclave, non electrical, 39litres																			
	BP machine, adult																			
	BP machine, adult																			
	BP machine, adult																			
	Delivery bed																			
	Delivery bed																			
	Diagnostic set																			
	Diagnostic set																			
	Examination light																			
	Examination light																			
	Examination light																			
	Indicator TST control spot, pac-300																			
	Otoscope set in case																			
	Otoscope set in case																			
	Salter scale																			
	Salter scale																			
	Salter scale																			
	Salter scale																			
	Stove, kerosene, single burner																			

Facility Name				Facility Code			Day/Month /Year															
Department	Item (Equipment name)	Quantity	Manufacture	Country	Model	Serial No.	Manufacturing Year	Commission Year	**Manuals (Mark (x), if available.)**		**Condition (Mark (x) for appropriate status.)**					**Frequency of usage**				Inventory No.
									Service Manual	**Operation Manual**	**Working**	**Minor repairer**	**Major repairer**	**Not working**	**Uncommissioned**	**Everyday**	**Few times per week**	**Few times per month**	**Not used**	
	Suction pump, electrical																			
	Suction pump, electrical																			
	Suction pump, electrical																			
	Suction pump, foot operated																			
	Suction pump, foot operated																			
	Weighing scale, adult																			
	Weighing scale, adult																			
	Weighing scale, infant, beam type																			
	Weighing scale, infant, beam type																			
	Weighing trousers																			
	Weighing trousers																			
	For the following equipment, please count and write down the total number of equipment in OPD and wards, including maternity.																			
OPD and wards, including maternity	Bed pan																			
	Bed side cabinet locker, health centre model																			
	Bed side screen																			
	Bowl, lotion, large																			
	Bowl, lotion, medium																			
	Bowl, lotion, small																			
	Bucket, stainless steel																			
	Chair for consulting staff																			
	Chair for patient																			
	Desk for consulting staff																			
	Drainage set																			
	Dressing set																			
	Dressing tray																			
	Drip stand																			

Facility Name				Facility Code			Day/Month /Year															
Department	Item (Equipment name)	Quantity	Manufacture	Country	Model	Serial No.	Manufacturing Year	Commission Year	**Manuals (Mark (x), if available.)**		**Condition (Mark (x) for appropriate status.)**					**Frequency of usage**				Inventory No.
									Service Manual	**Operation Manual**	**Working**	**Minor repairer**	**Major repairer**	**Not working**	**Uncommissioned**	**Everyday**	**Few times per week**	**Few times per month**	**Not used**	
OPD and wards, including maternity	Ear Syringe																			
	Equipment cabinet																			
	Examination couch without leg holders																			
	Examination couch, gynaecological																			
	Foot stool, one step																			
	Gallipots, large																			
	Gallipots, medium																			
	Hospital bed back rest																			
	Hospital bed bednet treated																			
	Hospital bed (health centre/health post model with mattress)																			
	Infant cot bednet, treated																			
	Infant cot with mattress																			
	Infection prevention trolley																			
	Instrument tray, large																			
	Instrument tray medium																			
	Instrument trolley																			
	Kidney dish, large																			
	Kidney dish, medium																			
	Medicine trolley																			
	Sterilising drum, medium																			
	Sterilising drum, small																			
	Stethoscope																			
	Stethoscope, foetal, Pinard																			
	Stretcher, foldable																			
	Suturing set																			
	Thermometer jar																			

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Facility Name				Facility Code			Day/Month /Year														
Department	Item (Equipment name)	Quantity	Manufacture	Country	Model	Serial No.	Manufacturing Year	Commission Year	Manuals (Mark (x), if available.)		Condition (Mark (x) for appropriate status.)					Frequency of usage				Inventory No.
									Service Manual	Operation Manual	Working	Minor repairer	Major repairer	Not working	Uncommissioned	Everyday	Few times per week	Few times per month	Not used	
	Thermometer, digital																			
	Timer, 60min																			
	Torch, medical, pen sized																			
	Urinal, male																			
	Vaginal delivery/episiotomy set																			
	Vaginal speculum, large																			
	Vaginal speculum, medium																			
	Vaginal speculum, small																			
	Wall clock																			
	Wastebin with lid																			
	Please use the space below, if there are any other equipment in the OPD and wards, including maternity.																			

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Facility Name				Facility Code			Day/Month /Year														
Department	Item (Equipment name)	Quantity	Manufacture	Country	Model	Serial No.	Manufacturing Year	Commission Year	Manuals (Mark (x), if available.)		Condition (Mark (x) for appropriate status.)					Frequency of usage				Inventory No.
									Service Manual	Operation Manual	Working	Minor repairer	Major repairer	Not working	Uncommissioned	Everyday	Few times per week	Few times per month	Not used	
Dental equipment																				
Dental Equipment	**Check the following dental equipment. If any of the following equipment exists, please record the information for each piece of equipment.**																			
	Dental chair	X																		
	For the following dental equipment, please count and write down the total number of equipment.																			
	Dental syringe																			
	Mirror set																			
	Molar extraction set																			
	Probe set																			
	Set of tweezers																			
	Upper incisor forceps set																			
	Please use the space below, if there are any other dental equipment.																			
Pharmacy																				
Pharmacy	**Check the following equipment in the pharmacy. If any of the following equipment exists, please record the information for each piece of equipment.**																			
	Refrigerator, domestic	X																		
	For the following pharmacy equipment, please count and write down the total number of equipment.																			
	20ml medicine cup																			
	Drug cabinet, lockable																			
	Tablet counting tray																			
	Please use the space below, if there are any other pharmacy equipment.																			

Facility Name				Facility Code			Day/Month /Year														
Department	Item (Equipment name)	Quantity	Manufacture	Country	Model	Serial No.	Manufacturing Year	Commission Year	Manuals (Mark (x), if available.)		Condition (Mark (x) for appropriate status.)					Frequency of usage				Inventory No.
									Service Manual	Operation Manual	Working	Minor repairer	Major repairer	Not working	Uncommissioned	Everyday	Few times per week	Few times per month	Not used	
Laboratory																				
Laboratory	**Check the following equipment in laboratory. If any of the following equipment exists, please record the information for each piece of equipment.**																			
	Autoclave, portable																			
	Binocular microscope																			
	Flammable liquid cabinet																			
	Glucometer																			
	Haemoglobinometer																			
	Manual centrifuge																			
	Rapid Diagnostic Test for malaria																			
	RPR rotator																			
	Spirit lamp																			
	Triple beam balance																			
	Water distiller																			
	Water filter																			
	For the following laboratory equipment, please count and write down the total number of equipment.																			
	Chair for administrative duties																			
	Hand tally counter																			
	Stool for laboratory worker																			
	Timer																			
	Please use the space below, if there are any other laboratory equipment.																			

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Facility Name				Facility Code			Day/Month /Year														
Department	Item (Equipment name)	Quantity	Manufacture	Country	Model	Serial No.	Manufacturing Year	Commission Year	Manuals (Mark (x), if available.)		Condition (Mark (x) for appropriate status.)					Frequency of usage				Inventory No.
									Service Manual	Operation Manual	Working	Minor repairer	Major repairer	Not working	Uncommissioned	Everyday	Few times per week	Few times per month	Not used	
Environmental health																				
Environmental health	**Check the following equipment. If any of the following equipment exist in your health facility, please record the information for each piece of equipment.**																			
	Lovibond Comparator																			
	Vector control sprayer																			
	Water level meter																			
	For the following environmental health equipment, please count and write down the total number of equipment.																			
	Bucket for mixing chemicals																			
	Food and water sample box																			
	Measuring Jar																			
	Meat inspection kit																			
	Personal protective equipment																			
	Rodent control apparatus																			
	Squirt gun																			
	Tape measure																			
	Please use the space below, if there are any other environmental health equipment.																			

Facility Name				Facility Code			Day/Month /Year														
Department	Item (Equipment name)	Quantity	Manufacture	Country	Model	Serial No.	Manufacturing Year	Commission Year	Manuals (Mark (x), if available.)		Condition (Mark (x) for appropriate status.)					Frequency of usage				Inventory No.
									Service Manual	Operation Manual	Working	Minor repairer	Major repairer	Not working	Uncommissioned	Everyday	Few times per week	Few times per month	Not used	
Miscellaneous																				
Miscellaneous	**Check the following equipment. If any of the following equipment exist in your facility, please record the information for each piece of equipment.**																			
	Solar power supply system for light, cold chain and laboratory																			
	Health post/health centre maintenance kit																			
	For the following equipment, please count and write down the total number of equipment.																			
	Camping equipment set																			
	Fire extinguisher																			
	Hurricane lamp																			
	Please use the space below, if there are any other equipment.																			
Cold chain																				
Cold chain Equipment	**Check the following cold chain equipment. If any of the following cold chain equipment exists, please record the information for each piece of equipment.**																			
	Refrigerator for vaccines																			
	Vaccine carrier																			
	Vaccine coldbox																			
	Please use the space below, if there are any other cold chain equipment.																			

Equipment Inventory Checksheet (Health Post)							Checked by:																
Facility Name				Facility Code			Day/Month /Year																
Department	Item (Equipment name)	Quantity	Manufacture	Country	Model	Serial No.	Manufacturing Year	Commission Year	Manuals (Mark (x), if it is available.)		Condition (Mark (x) for appropriate					Frequency of usage				Inventory No.
									Service Manual	Operation Manual	Working	Minor repairer	Major repairer	Not working	Uncommissioned	Everyday	Few times per week	Few times per month	Not used	
Screening room and pre- and postnatal room																							
Screening room and pre- and postnatal room	**Check the following equipment in the screening room and pre- and postnatal room. If any of the following equipment exists in your health facility, please record the information for each piece of equipment.**																						
	Ambu bag for adults (resuscitator)																						
	Ambu bag for children (resuscitator)																						
	Autoclave, electric, small																						
	Autoclave, non electrical, 39litres																						
	BP machine, adult																						
	Examination light																						
	Indicator TST control spot, pac-300																						
	Otoscope set in case																						
	Stove, kerosene, single burner																						
	Suction pump, foot operated																						
	Torch, medical, pen sized																						
	Weighing scale, adult																						
	Weighing scale, infant																						
	Weighing trousers																						
	Weighing trousers																						
	Weighing trousers																						

Facility Name				Facility Code			Day/Month /Year														
Department	Item (Equipment name)	Quantity	Manufacture	Country	Model	Serial No.	Manufacturing Year	Commission Year	**Manuals (Mark (x), if it is available.)**		**Condition (Mark (x) for appropriate**					**Frequency of usage**				Inventory No.
									Service Manual	**Operation Manual**	**Working**	**Minor repairer**	**Major repairer**	**Not working**	**Uncommissioned**	**Everyday**	**Few times per week**	**Few times per month**	**Not used**	
Screening room and pre- and postnatal room	**For the following equipment, please count and write down the total number of equipment in the screening room and pre- and postnatal room.**																			
	Arm circumference tape																			
	Bed side screen																			
	Chair for consulting staff																			
	Chair for patient																			
	Desk for consulting staff																			
	Drainage set																			
	Dressing set																			
	Dressing tray																			
	Ear Syringe																			
	Equipment cabinet																			
	Examination couch without leg holders																			
	Gallipots, large																			
	Gallipots, medium																			
	Hospital bed (health centre/health post model with																			
	Instrument tray, large																			
	Instrument tray medium																			
	Instrument trolley																			
	Kidney dish, large																			
	Kidney dish, medium																			
	Sterilising drum, small																			
	Stethoscope																			
	Stretcher, foldable																			

Facility Name				Facility Code			Day/Month /Year																
Department	Item (Equipment name)	Quantity	Manufacture	Country	Model	Serial No.	Manufacturing Year	Commission Year	**Manuals (Mark (x), if it is available.)**		**Condition (Mark (x) for appropriate**					**Frequency of usage**				Inventory No.
									Service Manual	**Operation Manual**	**Working**	**Minor repairer**	**Major repairer**	**Not working**	**Uncommissioned**	**Everyday**	**Few times per week**	**Few times per month**	**Not used**	
Screening room and pre- and postnatal room	Suturing set																			
	Thermometer jar																			
	Thermometer, digital																			
	Timer, 60min																			
	Torch, medical, pen sized																			
	Vaginal speculum, large																			
	Vaginal speculum, medium																			
	Vaginal speculum, small																			
	Wastebin with lid																			
	Please use the space below, if there are any other equipment in the screening room and pre- and postnatal room. .																			

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Facility Name				Facility Code			Day/Month /Year																
Department	Item (Equipment name)	Quantity	Manufacture	Country	Model	Serial No.	Manufacturing Year	Commission Year	**Manuals (Mark (x), if it is available.)**		**Condition (Mark (x) for appropriate**					**Frequency of usage**				Inventory No.
									Service Manual	**Operation Manual**	**Working**	**Minor repairer**	**Major repairer**	**Not working**	**Uncommissioned**	**Everyday**	**Few times per week**	**Few times per month**	**Not used**	
Delivery room																							
Equipment specifically for delivery room	**Check the following equipment. If any of the following equipment exist in the delivery room, please record the information for each piece of equipment.**																						
	Delivery bed																						
	Delivery bed																						
	Weighing scale, infant, beam type																						
	For the following equipment in the delivery room, please count and write down the total number of equipment.																						
	Bed pan																						
	Bowl, lotion, large																						
	Bowl, lotion, medium																						
	Bowl, lotion, small																						
	Bucket, stainless steel																						
	Footstool, one step																						
	Stethoscope, foetal, Pinard																						
	Vaginal delivery/episiotomy set																						
	Wall clock																						
	Please use the space below, if there are any other equipment in the delivery room.																						

Facility Name				Facility Code			Day/Month /Year																
Department	Item (Equipment name)	Quantity	Manufacture	Country	Model	Serial No.	Manufacturing Year	Commission Year	**Manuals (Mark (x), if it is available.)**		**Condition (Mark (x) for appropriate**					**Frequency of usage**				Inventory No.
									Service Manual	**Operation Manual**	**Working**	**Minor repairer**	**Major repairer**	**Not working**	**Uncommissioned**	**Everyday**	**Few times per week**	**Few times per month**	**Not used**	
Ante-/postnatal room																							
	For the following equipment in the Ante-/postnatal room, please count and write down the total number of equipment.																						
	Bed side cabinet locker, health centre model																						
Ante-/postnatal room	Bed side cabinet locker, health centre model																						
	Hospital bed bednet treated																						
	Hospital bed (health centre model with mattress)																						
	Infant cot bednet, treated																						
	Infant cot with mattress																						
	Please use the space below, if there are any other equipment in the ante-/postnatal room.																						

Facility Name				Facility Code			Day/Month /Year															
Department	Item (Equipment name)	Quantity	Manufacture	Country	Model	Serial No.	Manufacturing Year	Commission Year	**Manuals (Mark (x), if it is available.)**		**Condition (Mark (x) for appropriate**					**Frequency of usage**				Inventory No.
									Service Manual	**Operation Manual**	**Working**	**Minor repairer**	**Major repairer**	**Not working**	**Uncommissioned**	**Everyday**	**Few times per week**	**Few times per month**	**Not used**	
Pharmacy																				
	Check the following equipment in the pharmacy. If any of the following equipment exist, please record the information for each piece of equipment.																			
	Refrigerator for vaccines	X																		
Pharmacy	Vaccine carrier																			
	Vaccine coldbox																			
	For the following equipment in the pharmacy, please count and write down the total number of equipment.																			
	Drug cabinet, lockable																			
	20ml medicine cup																			
	Please use the space below, if there are any other equipment in the pharmacy room.																			
Laboratory																				
	Check the following equipment. If any of the following equipment exist in the laboratory, please record the information for each piece of equipment.																			
	Glucometer	X																		
Laboratory	Haemoglobinometer																			
	Rapid Diagnostic Test kit for malaria																			
	RPR shaker																			
	Please use the space below, if there are any other laboratory equipment.																			

Facility Name				Facility Code			Day/Month /Year															
Department	Item (Equipment name)	Quantity	Manufacture	Country	Model	Serial No.	Manufacturing Year	Commission Year	**Manuals (Mark (x), if it is available.)**		**Condition (Mark (x) for appropriate**					**Frequency of usage**				Inventory No.
									Service Manual	**Operation Manual**	**Working**	**Minor repairer**	**Major repairer**	**Not working**	**Uncommissioned**	**Everyday**	**Few times per week**	**Few times per month**	**Not used**	
Environmental health																				
	Check the following equipment. If any of the following equipment exist in your health facility, please record the information for each piece of equipment.																			
	Lovibond Comparator																			
	Vector control sprayer																			
	Water level meter																			
	For the following environmental health equipment, please count and write down the total number of equipment.																			
Environmental health	Bucket for mixing chemicals																			
	Food and water sample box																			
	Measuring Jar																			
	Meat inspection kit																			
	Personal protective equipment																			
	Rodent control apparatus																			
	Squirt gun																			
	Tape measure																			
	Please use the space below, if there are any other environmental health equipment.																			

Facility Name				Facility Code			Day/Month /Year																
Department	Item (Equipment name)	Quantity	Manufacture	Country	Model	Serial No.	Manufacturing Year	Commission Year	Manuals (Mark (x), if it is available.)		Condition (Mark (x) for appropriate					Frequency of usage				Inventory No.
									Service Manual	Operation Manual	Working	Minor repairer	Major repairer	Not working	Uncommissioned	Everyday	Few times per week	Few times per month	Not used	
Miscellaneous																				
Miscella-neous	**Check the following equipment. If any of the following equipment exist in your health facility, please record the information for each piece of equipment.**																			
	Solar power supply system for light, cold chain and laboratory	X																		
	Health post/health centre maintenance kit																			
	Hurricane lamp																			
	For the following equipment, please count and write down the total number of equipment.																			
	Camping equipment set																			
	Fire extinguisher																			
	Hurricane lamp																			
	Please use the space below, if there are any other equipment.																			

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Form 3 Medical Equipment Developing Plan planning sheet

Name of facility :

Date of draft :

Short term : 1-2 years

Middle/long term : 3-5 years

No.	Information of Equipment							Technical team advice		Judgement by MEMC					
										Short term action			Middle term action		
	Department/HC/ HP	Equipment name	Manufacturer	Model	S/No.	Condition of equipment	Commissioning year (estimate)	Short term action	Middle term action	Cost	Action decided by MEMC	Expected source of funds	Cost	Action decided by MEMC	Expected source of funds

Form 4 Spare parts planning form

Name of facility :

Date of draft :

1 - Not functioning

2 - Working properly

1-every day

2-few times per week

3- few times per month

4-few times per year

No.	Department/HC/ HP	Equipment name	Manufacturer	Model	S/No.	Equipment condition	Name of spare parts	Reference No. if any	Required quantity	Date of trouble	Frequency of usage	Estimated unit cost	Estimated total	Re-order level

Form 5 Consumables planning form

1-every day
2-few times per week
3- few times per month
4-few times per year

Name of facility :

1 - Not functioning

Date of draft :

2 - Working properly

No.	Department/HC/HP	Equipment name	Manufacturer	Model	S/No.	Equipment condition	Name of consumables	Reference No. if any	Usage (quantity) per year	Required quantity	Frequency of usage	Estimated unit cost	Estimated total cost/year	Re-order level

Form 6 Procurement plan

Name of facility :

No.	Department / HC / HP	Equipment	Consumables / spare parts	Quantity	Unit cost (estimate)	Total cost (estimate)	Required due date	Note

Form 7 Daily Maintenance Check Sheet (SAMPLE)

DAILY MAINTENANCE INSTRUCTIONS

(PATIENT MONITOR)

Daily and before use:
1. Cleaning checking:
Check the equipment is clean. Especially, all connectors, surface, and display of equipment should be clean. (On detail, please refer to instruction manual.)
2. General inspection:
Visually inspect unit, all switches, connections, and accessories (Patient cable, Disposable electrode, NIBP set, SpO2 probe, and Power cable) for signs of damage or abnormalities. Check cleanness of them.
3. Accessory checking:
Verify all accessories (Patient cable, Disposable electrode, NIBP set, and SpO2 probe) are ready to use.
4. Functional checking:
Verify all switch work normally
5. Operational checking :
Verify equipment pass self test at power on. There is no abnormal sound or vibration when operated. And ECG wave, heart rate, SpO2 etc. are displayed normally.
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the main power supply before cleaning. When you disconnect power cable, switches should be off and plug should be held. However, always connect the equipment to power supply and make it on, if rechargeable battery is equipped on the patient monitor.

Form 8 Daily Maintenance Log Sheet

Department or HC/HP: _____ Month: _____

Equipment	Date																													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Note:																															

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Form 9 Planned Preventive Maintenance Check and Log Sheet (SAMPLE)

PREVENTIVE MAINTENANCE CHECK LIST

Equipment : Patient Monitor	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date/time:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully by technician's eye.		
2	Cleaning and Lubrication		
	(1) Clean overall of the equipment. Especially confirm the cleanness of paddle and display.		
	(2) Clean ECG cable and electrode connection part.		
3	General Check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect overall physical damage.		
	(3) Inspect patient cable and electrodes do not damaged or rusted.		
	(4) Inspect all accessories (ECG cable, patient cable, NIBP cuff with tube, SpO2 sensor, temperature sensor etc.) and signs of damage		
4	Electrical Check		
	(1) Inspect all cables, cords, plugs and connectors are not broken or damaged. Measure ground continuity.		
	(2) Inspect power supply voltage.		
	(3) Measure line voltage regulation.		
	(4) If you have electrical leak tester, measure the leak current and confirm it is within the regulation.		
	- grounding wire (normal/single failure)		
	- exterior (normal/single failure)		
	- patient leakage (normal/single failure)		
5	Function Check		
	(1) Power ON and confirm lamp on and if there is no abnormal sound or vibration.		
	(2) Inspect the equipment pass self check.		
	(3) Inspect all switch and key work normally.		
	(4) Record operational time/frequency from test menu (if this function equipped).		
	- Operating time		
	- Temperature adjusted operation time		
	- Battery operation time		
	- NIBP measurement frequency		
	- Maximum internal temperature		
	- Recording time		
6	Operation Check		
	(1) If you have ECG simulator, connect it to the patient monitor and confirm ECG signal is displayed by I to III lead. If you do not have the ECG simulator, perform the test without input signal.		
	(2) Inspect function of NIBP, SpO2, and temperature sensor manually.		
7	Trouble Shooting		
	(1) All abnormal parts which are found on the periodical check should be replacedby consumables and spare parts of new or good condition.		

Form-10 PPM/User training planning form

Name of facility : ______________________ Date of draft : ____________

Department / HC / HP	Equipment	Month	1	2	3	4	5	6	7	8	9	10	11	12
		Plan												
		Actual												
		Plan												
		Actual												
		Plan												
		Actual												
		Plan												
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		Plan												
		Actual												
		Plan												
		Actual												
		Plan												
		Actual												
		Plan												
		Actual												

Form-11

JOB REQUEST FORM

(User)

Date: Location:

Name of in-charge:

Equipment name:

Major complaint:

(Maintenance Department)

Job category: ☐ Pre-installation ☐ Installation ☐ Corrective maintenance

Received / Request Date / Time: By :

Model:

Serial No.:

Problem:

Work done/required

Material used/required Cost of material:

(Administrator)

Instruction:

Date / Signature

(Store/Procurement)

Instruction received date: By:

Date of procurement: By:

(Maintenance)

Material received Date: By:

Work result:

Work completion date: By:

(User verification/witness)

Received Date:

Test confirmation signature:

Form-12

Equipment Acceptance Record

Date of Acceptance	
Equipment Information	
(1) Equipment name	
(2) Model name	
(3) Serial number	
(4) Manufacturing date	
(5) Actual or estimated cost	
Manufacturer's information	
(1) Manufacturer name	
(2) Supplier name	
(3) Contact of Suppler	
(4) Name of person	
(5) Telephone	
Documents	
(1) Operation manual	☐Yes ☐ No, Type: ☐Hard copy ☐ CD / soft copy
(2) Service manual	☐Yes ☐ No, Type: ☐Hard copy ☐ CD / soft copy
(3) Other documents	
	Type: ☐Hard copy ☐ CD / soft copy
	Type: ☐Hard copy ☐ CD / soft copy
	Type: ☐Hard copy ☐ CD / soft copy

Composition

No.	Name	Q'ty

Accessories

No.	Name	Q'ty

Maintenance instruction		
No.	Required maintenance work	Frequency

Consumables			
No.	Name of consumable	Consumed per / Need to replace every	

Spare parts			
No.	Name of spare parts	Parts number, Note for replacement	

Form-13

Monthly Report (Medical Equipment Maintenance)

Month:

Name of Health Facility:

1. Summary of maintenance work

No.	Department/ HC / HP	Daily		PPM			Job request		
		Selected	Attended	Planned	Imple-mented	Plan (next month)	Receive	Complete	Pending
01									
02									
03									
04									
05									
06									
07									
08									
09									
10									
11									
12									
13									
14									

2. Comments

Name:

Designation: Date:

Form-14

Annual Report (Medical Equipment Maintenance)

Year:

Name of Health Facility:

1. Summary of maintenance work

No.	Department/ HC / HP	Daily	PPM			Job request		
		Implemented ratio (implemented/ plan) (%)	Planned	Imple-mented	Implemented ratio (implemented/ plan) (%)	Receive	Complete	Pending
01								
02								
03								
04								
05								
06								
07								
08								
09								
10								
11								
12								
13								
14								

2. Comments

Name:

Designation: Date:

Form 15. Daily Maintenance Instructions

DAILY MAINTENANCE INSTRUCTIONS

(WATER BATH)

Daily and before use:
1. Cleaning checking:
Check the equipment is clean especially inside of water bath and water.
2. General inspection:
Visually inspect unit for signs of damage or abnormalities.
3. Accessory checking:
Check thermometer if it is required.
4. Functional checking:
Verify all switch, lamp, and dial work normally. Change water at least one time per week.
5. Operational checking :
Verify there is no abnormal sound, vibration, or burning smell when operated. Confirm water is circulated and temperature go up to desired value.
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning or when the equipment is not being used. When you disconnect power cable, switches should be off and plug should be held.

DAILY MAINTENANCE INSTRUCTIONS

(WATER DISTILLER)

Daily and before use:
1. Cleaning checking:
Check that equipment, tubing, and water collection container are clean and not rusted.
2. General inspection:
Visually inspect unit for signs of damage or abnormalities. Check no water leak from tubing and clean condition (no scale) of heater. If calcium accumulated on heater, removing procedure should be processed.
3. Accessory checking:
Not required.
4. Functional checking:
Verify all switch and lamp work normally.
5. Operational checking :
Verify there is no abnormal sound, smell, or vibration when operated. And verify water flow smoothly and distillation start when operated.
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning or when the equipment is not being used. When you disconnect power cable, switches should be off and plug should be held.

DAILY MAINTENANCE INSTRUCTIONS

(HEMATCRIT CENTRIFUGE)

Daily and before use:
1. Cleaning checking:
Check the equipment is clean on surface, rotor, rotor base, and under the centrifuge
2. General inspection:
Visually inspect unit, all screws are there is no bumpy part.
3. Accessory checking:
Visually inspect unit for signs of damage or abnormalities. Check door can be closed properly, rotor has no crack or damage, rotor rubber is good condition, and rotor rotate smoothly by hand.
4. Functional checking:
Verify there is sealing material and hematocrit measuring scale.
5. Operational checking :
Operate 12,000rpm / 5min. by no sample and verify there is no abnormal sound, burning smell, or vibration.
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning or when the equipment is not being used. When you disconnect power cable, switches should be off and plug should be held.

DAILY MAINTENANCE INSTRUCTIONS

(CENTRIFUGE)

Daily and before use:
1. Cleaning checking:
Check the equipment is clean on surface, rotor, rotor base, and under the centrifuge.
2. General inspection:
Visually inspect unit for signs of damage or abnormalities. Check cover can be closed properly and locked, rotor has no crack or damage, and rotor rotate smoothly by hand.
3. Accessory checking:
Not required.
4. Functional checking:
Verify all switch, lamp, and dial work normally.
5. Operational checking :
Operate 3,000rpm. / 5min. and verify there is no abnormal sound, burning smell, or vibration.
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning or when the equipment is not being used. When you disconnect power cable, switches should be off and plug should be held.

DAILY MAINTENANCE INSTRUCTIONS

(INCUBATOR) / (DRYING OVEN)

Daily and before use:
1. Cleaning checking:
Check the equipment is clean. Especially inside of chamber.
2. General inspection:
Visually inspect unit for signs of damage or abnormalities. Check door can be closed properly (no space), gasket is good condition, and door handle work properly.
3. Accessory checking:
Not required.
4. Functional checking:
Verify all switch, lamp, and dial work normally
5. Operational checking :
Verify there is no abnormal sound, vibration, or burning smell when operated (power switch on). Verify temperature reach to desired (adjusted) temperature.
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning or when the equipment is not being used. When you disconnect power cable, switches should be off and plug should be held.

DAILY MAINTENANCE INSTRUCTIONS

(AUTOCLAVE)

Daily and before use:
1. Cleaning checking:
Check that equipment is clean and not rusted.
2. General inspection:
Visually inspect unit for signs of damage or abnormalities. Especially visually check chamber inside and door gasket. The chamber should not be rusted and door gasket should be clean and not damaged. Furthermore, door can be closed properly.
3. Accessory checking:
Verify all consumables and instruments are ready to use.
4. Functional checking:
Not required.
5. Operational checking :
Verify there is no abnormal sound, smell, or vibration when operated. Confirm temperature go-up to desired value and all process correct.
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning or when the equipment is not being used. When you disconnect power cable, switches should be off and plug should be held.

DAILY MAINTENANCE INSTRUCTIONS

(AUTOCLAVE VERTICAL)

Daily and before use:
1. Cleaning checking:
Check that equipment is clean and not rusted.
2. General inspection:
Visually inspect unit for signs of damage or abnormalities. Especially visually check chamber inside and door gasket. The chamber should not be rusted and door gasket should be clean and not damaged. Furthermore, door can be closed properly.
3. Accessory checking:
Not required.
4. Functional checking:
Verify all switch, lamp, and dial work normally and there is no water leak. Change water of chamber inside.
5. Operational checking :
Verify there is no abnormal sound, smell, or vibration when operated. Confirm temperature go-up to desired value and all process correct.
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning or when the equipment is not being used. When you disconnect power cable, switches should be off and plug should be held.

DAILY MAINTENANCE INSTRUCTIONS

(REFRIGERATOR)

Daily and before use:
1. Cleaning checking:
Check the equipment surface and air filter is clean.
2. General inspection:
Visually inspect unit, all screws are there is no bumpy part.
3. Accessory checking:
Not required.
4. Functional checking:
Not required.
5. Operational checking :
Verify when power on, room lamp and refrigerator run (confirmed by sound) on and cooling start. Furthermore, there is no abnormal sound or vibration when operated. Temperature recording : record inside temperature 2 times/day (morning and afternoon)
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning or when the equipment is not being used. When you disconnect power cable, switches should be off and plug should be held.

DAILY MAINTENANCE INSTRUCTIONS

(INFANT INCUBATOR)

Daily and before use:
1. Cleaning checking:
Check the equipment is clean. Especially, outside, cover, gasket of cover, mattress, all access port, and humidifying water should be clean.
2. General inspection:
Visually inspect for signs of damage or abnormalities. Check there should be no gas on cover, smooth movement of cover, and all access port can be closed properly. Equipment move smoothly and can be locked (i.e. good condition of caster)
3. Accessory checking:
Not required.
4. Functional checking:
Verify power, all lamp on, fan rotate, and temperature / humidity go up. Set alarm lower than the inside temp. and confirm it activated.
5. Operational checking :
Verify equipment maintain the temperature at 34 degree (setting at 34 degree).
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning or when the equipment is not being used. When you disconnect power cable, switches should be off and plug should be held.

DAILY MAINTENANCE INSTRUCTIONS

(DENTAL UNIT)

Daily and before use:
1. Cleaning checking:
Check that equipment is clean. Especially verify cleanness of drain filter, vacuum filter, lighting, and spittoon. Drain condensed water of compressor air tank.
2. General inspection:
Visually inspect unit, all screws are there is no bumpy part.
3. Accessory checking:
Verify all consumables and instruments are ready to use.
4. Functional checking:
Verify all lever, arm, chair rotation, switch, and dial work normally.
5. Operational checking :
Verify there is no abnormal sound or vibration when power on. Verify compressed air pressure is enough for operation. Verify normal movement of chair up/down, lamp on/off, function of air turbine/motor, vacuum and scaler.
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning or when the equipment is not being used. When you disconnect power cable, switches should be off and plug should be held.

DAILY MAINTENANCE INSTRUCTIONS

(MICROSCOPE)

Daily and before use:
1. Cleaning checking:
Check the equipment is clean. Especially check specimen table, eye piece, and objective lens, condenser lens, are clean and no dust.
2. General inspection:
Verify there is no bumpy part.
3. Accessory checking:
Verify heat absorbance filter is installed and oil for x100 is prepared.
4. Functional checking:
Verify all switch and dial work normally.
5. Operational checking :
Verify lamp turn on and it's intensity is controlled by dial. Confirm cleanliness of view.
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning or when the equipment is not being used. When you disconnect power cable, switches should be off and plug should be held.

DAILY MAINTENANCE INSTRUCTIONS

(SUCTION UNIT)

Daily and before use:
1. Cleaning checking:
Check the equipment is clean. Especially bottle, float, and all tubing should be clean.
2. General inspection:
Visually inspect unit, control devices (including foot switch), bottle, cap, float, tubing, and power cable for signs of damage or abnormalities. All tubing should be connected tightly.
3. Accessory checking:
Verify all accessories (suction catheter and extension tube) are ready to use.
4. Functional checking:
Verify all switch, dial, and screw are fixed tightly. Verify that pressure gauge reading indicates 0 before and after aspirator is switched off. Verify overflow float is freely working, if equipped. Verify filter is good condition, if equipped The gasket of bottles is well cleaned, in good condition and good position. Verify that bottles are fitted tightly.
5. Operational checking :
Verify there is no abnormal sound or vibration when switch on. Switch on the aspirator with patient tubing closed and verify that maximum vacuum is reached on the pressure gauge reading.
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning or when the equipment is not being used. When you disconnect power cable, switches should be off and plug should be held.

DAILY MAINTENANCE INSTRUCTIONS

(SPHYGMOMANOMETER)

Daily and before use:
1. Cleaning checking:
Check that equipment is clean. Especially verify gauge or mercury meter are clean.
2. General inspection:
Visually inspect unit for signs of damage or abnormalities especially tubing and connection. Verify all screws are connection are tight and there is no bumpy part. In the case of mercury type, mercury is clean and no abnormality.
3. Accessory checking:
Not required.
4. Functional checking:
Verify inhalation and exhalation of air by hand bulb smooth, and the cock screw move smoothly. In the case of mercury type, the stop knob work properly.
5. Operational checking :
Operate and verify the pressure gauge or mercury go up and down smoothly.
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

DAILY MAINTENANCE INSTRUCTIONS

(BLOOD PRESSURE MACHINE)

Daily and Before Use:
1. Cleaning Check:
Check that equipment is clean.
2. General Inspection:
Verify there are no damage or abnormalities on main unit, rubber tube, hand bug, and cuff.
In the case of electrical type, you can check cuff only.
3. Accessory Checking:
Not required.
4. Functional Checking:
In the case of electrical type, verify if there is no abnormal sound or vibration when power on.
5. Operational checking :
Measure blood pressure and confirm normal function.
Daily and After Use:
6. Cleaning check :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning or when the equipment is not being used. When you disconnect power cable, switches should be off and plug should be held.

DAILY MAINTENANCE INSTRUCTIONS

(OPERATION TABLE)

Daily and before use:
1. Cleaning checking:
Check the equipment is clean. Especially, check and clean under mattress, under frame, and under base.
2. General inspection:
Verify there are no damages or abnormalities on main unit of operation table.
3. Accessory checking:
Verify all accessories (clamp, leg support, arm support etc.) are ready to use
4. Functional checking:
Verify function of up/down, tilting, trendenberug and confirm its does not down with patient.
5. Operational checking :
In the case of electrical table, check all movement is smooth.
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning or when the equipment is not being used. When you disconnect power cable, switches should be off and plug should be held.

DAILY MAINTENANCE INSTRUCTIONS

(OPERATION LIGHT MOBILE)

Daily and before use:
1. Cleaning checking:
Check the equipment is clean. Especially, heat absorbance filter, lamp window, and lamp itself are clean. Clean upside of operation light.
2. General inspection:
Visually inspect unit, control switches, and power cable for signs of damage or abnormalities. Verify there is no crack on lamp cover, filter and / or housing. Verify there are no missing or looseness for screws and handles.
3. Accessory checking:
Not required.
4. Functional checking:
Verify all switch, light intensity dial, focusing and positioning mechanism work normally.
5. Operational checking :
Verify there is no abnormal sound or vibration and all lamp power on when operated. Verify focusing and light intensity control work.
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning or when the equipment is not being used. When you disconnect power cable, switches should be off and plug should be held.

DAILY MAINTENANCE INSTRUCTIONS

(OXYGEN CONCENTRATOR)

Daily and before use:
1. Cleaning checking:
Check the equipment is clean. Especially, water bottle and tubes should be checked.
2. General inspection:
Verify there are no damages or abnormalities on main unit, switches, dials, water bottle, tubes, and power cable. Verify air filter is within usable period and not become dirty, if it is equipped.
3. Accessory checking:
Verify tube and mask are ready to use on good condition.
4. Functional checking:
Verify all switch, indication lamp, timer, and controller work normally. Verify there is no bumpy for stand and good condition of caster.
5. Operational checking :
Verify there is no abnormal sound or vibration and lamp power on when operated. Verify oxygen is generated and discharged. If possible, measure concentration of oxygen.
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning or when the equipment is not being used. When you disconnect power cable, switches should be off and plug should be held.

DAILY MAINTENANCE INSTRUCTIONS

(PATIENT MONITOR)

Daily and before use:
1. Cleaning checking:
Check the equipment is clean. Especially, all connectors, surface, and display of equipment should be clean.
2. General inspection:
Visually inspect unit, all switches, connections, and accessories (Patient cable, Disposable electrode, NIBP set, SpO2 probe, and Power cable) for signs of damage or abnormalities. Check cleanness of them.
3. Accessory checking:
Verify all accessories (Patient cable, Disposable electrode, NIBP set, and SpO2 probe) are ready to use.
4. Functional checking:
Verify all switch work normally
5. Operational checking :
Verify equipment pass self test at power on. There is no abnormal sound or vibration when operated. And ECG wave, heart rate, SpO2 etc. are displayed normally.
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning. When you disconnect power cable, switches should be off and plug should be held. However, always connect equipment to power supply and make it on, if chargeable battery is equipped on the patient monitor.

DAILY MAINTENANCE INSTRUCTIONS

(ANESTHESIA APPARATUS)

Daily and before use:
1. Cleaning checking:
Check the equipment is clean.
2. General inspection:
Verify there are no damages or abnormalities on main unit, ventilator, and vaporizer.
3. Accessory checking:
Verify all accessories (patient circuit ventilator, and vaporizer) are read to us. If color of CO2 absorbent changed, it should be replaced.
4. Functional checking:
Verify smooth control of flow meters, a dial of vaporizer, a pop-off valve, all switches, and a knob of ventilator.
5. Operational checking :
Verify there is no abnormal sound, vibration , and gas leak sound when operated with test bag. Verify flow-meter when oxygen flows closed, N2Oflows is closed simultaneously. And also, verify when oxygen line is disconnected. alarm sound is activated.
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning or when the equipment is not being used. When you disconnect power cable, switches should be off and plug should be held.

DAILY MAINTENANCE INSTRUCTIONS

(ELECTRO SURGICAL UNIT)

Daily and before use:
1. Cleaning checking:
Check the equipment is clean. Especially, all connectors and surface of equipment should be clean.
2. General inspection:
Verify there are no damages or abnormalities on main unit, control devices (including foot switch), and power cables.
3. Accessory checking:
Verify all accessories (patient electrode, hand piece, tip, and foot switch) are hygiene and ready to use.
4. Functional checking:
Verify all switches, dials, and screws are fixed tightly and verify connection to had piece is not loosen.
5. Operational checking :
Verify there is no abnormal sound or vibration when operated on all modes (bi-polar, mono-polar, cut coagulation, and mix) of the equipment.
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning or when the equipment is not being used. When you disconnect power cable, switches should be off and plug should be held.

DAILY MAINTENANCE INSTRUCTIONS

(AUTOMATIC X-RAY FILM DEVELOPER)

Daily and before use:
1. Cleaning checking:
Check the equipment is clean. Especially tunings and drain is clean without any leak. Remove each rack and wash by water every week (once per week). Dryer rack can be washed anytime when it become dirty.
2. General inspection:
Verify there are no damages or abnormalities on main unit, each tank (developing, fixing, washing) and gear for film feeding.
3. Accessory checking:
Not required.
4. Functional checking:
Verify all switches, maps and dials work normally. Power on and confirm there is no abnormal sound, vibration, smell or leak of liquid. Confirm there is no alarm sound and no liquid leak from piping. Operate and confirm temperature reach to desired setting.
5. Operational checking :
Verify there is no abnormal sound, movement , and vibration when you feed test films.
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning or when the equipment is not being used. When you disconnect power cable, switches should be off and plug should be held.

DAILY MAINTENANCE INSTRUCTIONS

(MOBILE X-RAY)

Daily and Before Use:
1. Cleaning Check:
Check if the equipment is clean
2. General Inspection:
Verify there are no damages or abnormalities on main unit, casters, arm, X-ray tube, and power cable.
3. Accessory Checking:
Verify X-ray protection apron is prepared.
4. Functional checking:
Verify all switches, presetting and dials if work normally. Power ON and confirm self test pass.
5. Operational checking :
Verify if adjustable to desired setting. X-ray exposure is available on the desired setting and there is no abnormal sound, vibration, or smell.
Daily and After Use:
6. Cleaning Check :
Check if equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning or when the equipment is not being used. When you disconnect power cable, switches should be off and plug should be held.

DAILY MAINTENANCE INSTRUCTIONS

(FIXED X-RAY)

Daily and before use:
1. Cleaning checking:
Check the equipment is clean. Especially, bucky table, bucky stand, and X-ray tube unit are clean.
2. General inspection:
Verify there are no damages or abnormalities on all cables and unit. Verify movement of X-ray tube holder, bucky table, and bucky stand. All movement should be smooth and locking mechanism works well. Verify smooth movement of collimator on X-ray tube unit.
3. Accessory checking:
Not required.
4. Functional checking:
Verify all switches, presetting and dials are fixed tightly and work smoothly. After power on, all unit energized without any abnormality. Verify value for kVA and mA change correctly by dial or switch setting. Target lamp on when switch on and turn off automatically.
5. Operational checking :
Verify adjustable to desired setting. X-ray exposure is available on the desired setting and there is no abnormal sound, vibration, or smell.
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning or when the equipment is not being used. When you disconnect power cable, switches should be off and plug should be held.

DAILY MAINTENANCE INSTRUCTIONS

(SOLAR SYSTEM)

Daily and before use:
1. Cleaning checking:
Check the control panel is clean.
2. General inspection:
Verify battery indicator is high level.
3. Accessory checking:
Not required.
4. Functional checking:
Not required.
5. Operational checking :
Not required.
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning or when the equipment is not being used. When you disconnect power cable, switches should be off and plug should be held.

DAILY MAINTENANCE INSTRUCTIONS

(FETAL DOPPLER)

Daily and before use:
1. Cleaning checking:
Check the equipment and detector are clean.
2. General inspection:
Verify there are no damages or abnormalities on main unit, detector, and detector cable.
3. Accessory checking:
Verify all accessories (echo jell, battery or battery charger, earphone etc.) are hygiene and ready to use.
4. Functional checking:
Verify all switch work normally. There is no abnormality after power on.
5. Operational checking :
Verify FHR can be detect.
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning. When you disconnect power cable, switches should be off and plug should be held. However, always connect equipment to power supply and make it on, if chargeable battery is equipped on the fetal doppler.

DAILY MAINTENANCE INSTRUCTIONS

(PULSE OXIMETER)

Daily and before use:
1. Cleaning checking:
Check the equipment and probe are clean.
2. General inspection:
Verify there are no damages or abnormalities on main unit, probe, and probe cable.
3. Accessory checking:
Verify probe is hygiene and ready to use.
4. Functional checking:
Verify all switch work normally. There is no abnormality after power on and indicator energized.
5. Operational checking :
Connect your finger to probe and verify SpO2 measuring start and SpO2 is indicated.
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning. When you disconnect power cable, switches should be off and plug should be held. However, always connect equipment to power supply and make it on, if chargeable battery is equipped on the pulse oximeter.

DAILY MAINTENANCE INSTRUCTIONS

(ULTRASOUND DIASNOSTIC EQUIPMENT)

Daily and before use:
1. Cleaning checking:
Check the equipment is clean
2. General inspection:
Verify there are no damages or abnormalities on main unit, casters, probes, and printer.
3. Accessory checking:
Verify ultrasound jell is ready to use.
4. Functional checking:
Verify all switches, dials, and keyboard work normally. Power on and confirm self test pass.
5. Operational checking :
Verify operation of the equipment is normal.
Daily and after use:
6. Cleaning checking :
Check that equipment and accessories are clean and no damage after every operation.

Disconnect the equipment from the mains power supply before cleaning or when the equipment is not being used. When you disconnect power cable, switches should be off and plug should be held.

Form 16. Planned Preventive Maintenance Check Lists

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Water Bath	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully by technician's eye.		
2	Cleaning and lubrication		
	(1) Clean overall of the equipment. Especially confirm the cleanness of heater, sensor, and circulation propeller.		
3	General check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect overall physical damage.		
4	Electrical check		
	(1) Inspect all cables, cords, plugs and connectors are not broken or damaged. Measure ground continuity.		
	(2) Inspect power supply voltage.		
	(3) Measure line voltage regulation.		
	(4) If you have electrical leak tester, measure the leak current and confirm it is within the regulation.		
	- grounding wire (normal/single failure)		
	- exterior (normal/single failure)		
5	Function check		
	(1) Power on and confirm lamp on and there is no abnormal sound or vibration.		
	(2) Inspect all switch and key work normally.		
	(3) Confirm heater on and circulation propeller work.		
6	Operation check		
	(1) Confirm temperature goes up to adjusted temperature and the temperature is controlled automatically.		
	(2) After temperature controlled, measure water temperature by another thermometer and confirm the temperature accuracy is within the specification.		
7	Trouble shooting		
	(1) All abnormal part which are found on the periodical check should be replaced by consumables and spare parts of new or good condition.		

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Water distiller	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully by technician's eye.		
2	Cleaning and lubrication		
	(1) Clean overall of the equipment. Especially confirm the cleanness of heater and tube.		
	(2) If necessary, remove scale on heater and boiler.		
3	General Check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect overall physical damage.		
4	Electrical Check		
	(1) Inspect all cables, cords, plugs and connectors are not broken or damaged. Measure ground continuity.		
	(2) Inspect power supply voltage.		
	(3) Measure line voltage regulation.		
5	Function Check		
	(1) Power on and confirm lamp ON and if there is no abnormal sound or vibration.		
	(2) Supply water and confirm smooth water flow.		
	(3) Inspect boiling rate, it starts normally.		
6	Operation Check		
	(1) Confirm distilled water produced smoothly.		
7	Trouble Shooting		
	(1) All abnormal part which are found on the periodical check should be replaced by consumables and spare parts of new or good condition.		

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Hematocrit Centrifuge	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully by technician's eye.		
2	Cleaning and Lubrication (1) Clean overall of the equipment. Especially confirm the cleanness of inside of rotor, under rotor, and under the main body.		
3	General Check (1) Inspect bumpy and missing screws. (2) Inspect overall physical damage. (3) Carefully inspect if there is no crack or damage to rotor part. (4) Inspect condition of motor brush.		
4	Electrical Check (1) Inspect all cables, cords, plugs and connectors are not broken or damaged. Measure ground continuity. (2) Inspect power supply voltage. (3) Measure line voltage regulation.		
5	Function Check (1) Power ON and confirm lamp on and there is no abnormal sound or vibration. (2) Inspect all switches, keys, and timer if working normally. (3) Rotate the rotor and confirm the smooth rotation / stopping.		
6	Operation Check (1) Operate and confirm the revolving speed reach to 12,000rpm. (depends on rotor type), keep the speed by timer setting (5 min. or more), and no abnormal vibration or sound. (2) Inspect micropipette or sample tube are not damaged by the centrifugation.		
7	Trouble Shooting (1) All abnormal part which are found on the periodical check should be replaced by consumables and spare parts of new or good condition.		

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Centrifuge	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully by technician's eye.		
2	Cleaning and Lubrication		
	(1) Clean overall equipment. Especially confirm the cleanness of inside of rotor, under rotor, and under the main body.		
3	General Check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect overall physical damage.		
	(3) Carefully inspect if there is no crack or damage to rotor part.		
	(4) Inspect condition of motor brush.		
4	Electrical Check		
	(1) Inspect all cables, cords, plugs and connectors are not broken or damaged. Measure ground continuity.		
	(2) Inspect power supply voltage.		
	(3) Measure line voltage regulation.		
5	Function Check		
	(1) Power ON and confirm lamp on and if there is no abnormal sound or vibration.		
	(2) Inspect all switches, keys, and timer working normally.		
	(3) Rotate the rotor and confirm the smooth rotation / stopping.		
	(4) Confirm the door lock mechanism functiong properly.		
	(5) Confirm the rotor stop automatically while door open.		
6	Operation Check		
	(1) Operate and confirm the revolving speed reach to 3,500rpm. (depends on rotor type) , keep the speed by timer setting (5 min. or more), and no abnormal vibration or sound.		
	(2) Inspect micropipette or sample tube are not damaged by the centrifugation.		
7	Trouble Shooting		
	(1) All abnormal part which are found on the periodical check should be replaced by consumables and spare parts of new or good condition.		

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Incubator / Drying Oven	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully by technician's eye.		
2	Cleaning and lubrication		
	(1) Clean overall of the equipment. Especially confirm the cleanness of chamber inside.		
3	General check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect overall physical damage.		
4	Electrical check		
	(1) Inspect all cables, cords, plugs and connectors are not broken or damaged. Measure ground continuity.		
	(2) Inspect power supply voltage.		
	(3) Measure line voltage regulation.		
5	Function check		
	(1) Power on and confirm lamp on and there is no abnormal sound or vibration.		
	(2) Inspect the equipment pass self check, if the mechanism equipped.		
	(3) Inspect all switch and key work normally.		
	(4) Manually confim overheating function work properly.		
6	Operation check		
	(1) Operate and confirm the temperature reach to set temperature and keep the time by the timer setting.		
7	Trouble shooting		
	(1) All abnormal part which are found on the periodical check should be replaced by consumables and spare parts of new or good condition.		

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Autoclave	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully by technician's eye.		
2	Cleaning and lubrication		
	(1) Clean overall of the equipment.		
	(2) Make cleaning of water, steam, and drain strainer.		
	(3) Inspect the condition of air and steam filter. If necessary, replace them.		
	(4) Inspect movement of door and lubricate handle axis and hinge if necessary.		
	(5) Inspect rust of all outside and inside of chamber. If there is rust, it should be removed them.		
3	General check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect overall physical damage. Especially check sign of damage on door gasket.		
	(3) Inspect there is no remain of water or steam leak.		
	(4) Inspect loose of all piping and bolt. If necessary, tighten them.		
4	Electrical check		
	(1) Inspect all cables, cords, plugs and connectors are not broken or damaged. Measure ground continuity.		
	(2) Inspect power supply voltage.		
	(3) Measure line voltage regulation.		
5	Function check		
	(1) Power on and confirm lamp and controller on and there is no abnormal sound or vibration.		
	(2) Inspect all switches and controller panel switch work properly.		
	(3) Inspect steam and water pressure and sign of leak.		
	(4) Inspect door open/close lamp on/off by door condition.		
6	Operation check		
	(1) Inspect one complete sterilization process and confirm all process work properly.		
	(2) Inspect door handle do not move while the operation.		
	(3) Inspect there are no steam and water leak while the operation.		
7	Trouble shooting		
	(1) All abnormal part which are found on the periodical check should be replaced by consumables and spare parts of new or good condition.		

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Autoclave, Vertical	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully by technician's eye.		
2	Cleaning and lubrication		
	(1) Clean overall of the equipment.		
	(2) Make cleaning of drain strainer.		
	(3) Inspect the condition of filters. If necessary, replace them.		
	(4) Inspect movement of door and lubricate hinge if necessary.		
	(5) Inspect rust of all outside and inside of chamber. If there is rust, it should be removed them.		
3	General check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect overall physical damage. Especially check sign of damage on door gasket.		
	(3) Inspect there is no remain of water or steam leak.		
	(4) Inspect loose of all piping and bolt. If necessary, tighten them.		
4	Electrical check		
	(1) Inspect all cables, cords, plugs and connectors are not broken or damaged. Measure ground continuity.		
	(2) Inspect power supply voltage.		
	(3) Measure line voltage regulation.		
5	Function check		
	(1) Power on and confirm lamp and controller on and there is no abnormal sound or vibration.		
	(2) Inspect all switches and controller panel switch work properly.		
	(3) Inspect steam and water pressure and sign of leak.		
6	Operation check		
	(1) Inspect one complete sterilization process and confirm all process work properly.		
	(2) Inspect door firmly closed and no steam and water leak while the operation.		
7	Trouble shooting		
	(1) All abnormal part which are found on the periodical check should be replaced by consumables and spare parts of new or good condition.		

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Refrigerator	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully by technician's eye.		
2	Cleaning and Lubrication		
	(1) Clean overall equipment. Especially confirm the chamber inside.		
	(2) If necessary, reorganize material of chamber inside.		
3	General Check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect overall physical damage.		
	(3) Inspect smooth door open/close and closing condition. There should be no space on door side.		
4	Electrical Check		
	(1) Inspect all cables, cords, plugs and connectors are not broken or damaged. Measure ground continuity.		
	(2) Inspect power supply voltage.		
	(3) Measure line voltage regulation.		
5	Function Check		
	(1) Power on and confirm compressor on and there is no abnormal sound or vibration.		
	(2) Inspect lamp turn on when you power on the lamp switch or when door opend.		
	(3) Manually inspect high / low temperature alarm work properly, if equipped.		
6	Operation Check		
	(1) Operate the refrigerator or freezer and confirm the temperature go down as adjusted.		
	(2) Confirm the temperature controlled at the desired temperature properly.		
7	Trouble Shooting		
	(1) All abnormal part which are found on the periodical check should be replaced by consumables and spare parts of new or good condition.		

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Infant Incubator	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully by technician's eye.		
2	Cleaning and Lubrication		
	(1) Clean overall of the equipment. Especially clean temperature and humidity control part (under the plate of incubator inside).		
3	General Check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect overall physical damage.		
	(3) Inspect port cover and port door is not damaged and properly attached.		
	(4) Inspect humidity indicator has no damage and good condition.		
4	Electrical Check		
	(1) Inspect all cables, cords, plugs and connectors are not broken or damaged. Measure ground continuity.		
	(2) Inspect power supply voltage.		
	(3) Measure line voltage regulation.		
	(4) If you have electrical leak tester, measure the leak current and confirm it is within the regulation.		
5	Function Check		
	(1) Power ON and confirm lamp on and if there is no abnormal sound or vibration.		
	(2) Inspect the equipment pass self check.		
	(3) Inspect all switch and key if working normally.		
	(4) If equipped, connect skin sensor and confirm it measures skin temp. and servo control function.		
	(5) Decrease temperature alarm setting and confirm temperature alarm activated.		
	(6) If fan alarm is equipped, stop the fan manually and confirm fan alarm activated.		
6	Operation Check		
	(1) Set temperature 34 degree C by manual control mode and confirm temperature is controlled at 34 degree C. and humidity go up.		
7	Trouble Shooting		
	(1) All abnormal part which are found on the periodical check should be replaced by consumables and spare parts of new or good condition.		

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Dental Unit	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully by technician's eye.		
2	Cleaning and lubrication		
	(1) Clean overall of the equipment.		
	(2) Clean one-way drain filter.		
3	General check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect signs of air and water leak.		
	(3) Inspect signs of damage to switches and tubes.		
	(4) Inspect condensed water of compressor air tank.		
4	Electrical check		
	(1) Inspect all cables, cords, plugs and connectors are not broken or damaged. Measure ground continuity.		
	(2) Inspect power supply voltage.		
	(3) Measure line voltage regulation.		
5	Function check		
	(1) Power on and confirm lamp on and there is no abnormal sound or vibration.		
	(2) Inspect all switch and key work normally.		
	(3) Inspect all air turbine, air motor, three way syringe, suction, and salva work properly. Inspect function of foot switch together.		
	(4) Inspect lamp of treatment and x-ray film (if equipped).		
6	Operation check		
	(1) Inspect all air turbine, air motor, suction, and salva work properly.		
	(2) Confirm patient chair movement to all direction properly.		
7	Trouble shooting		
	(1) All abnormal part which are found on the periodical check should be replaced by consumables and spare parts of new or good condition.		

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Microscope	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully by technician's eye.		
2	Cleaning and lubrication		
	(1) Clean overall of the equipment.		
	(2) Clean eye piece, objective lens, table, condenser lens, filters, and lamp part by alchole.		
3	General check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect overall physical damage.		
	(3) Inspect smooth movement of knob and table.		
4	Electrical check		
	(1) Inspect all cables, cords, plugs and connectors are not broken or damaged. Measure ground continuity.		
	(2) Inspect power supply voltage.		
	(3) Measure line voltage regulation.		
5	Function check		
	(1) Power on and confirm lamp on and there is no abnormal sound or vibration.		
6	Operation check		
	(1) Check view by all oabjective lens and confirm the goodness.		
7	Trouble shooting		
	(1) All abnormal part which are found on the periodical check should be replaced by consumables and spare parts of new or good condition.		

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Suction unit	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully by technician's eye.		
2	Cleaning and lubrication		
	(1) Clean overall of the equipment.		
	(2) Clean tube and bottles.		
	(3) Confirm level of vacuum oil and bearing grease. If necessary add vacuum pump oil and grease.		
3	General check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect overall physical damage.		
	(3) Inspect filters and cleanness of them.		
	(4) Inspect all accessories (tube, connector, rubber cup of bottle) and signs of damage.		
4	Electrical check		
	(1) Inspect all cables, cords, plugs and connectors are not broken or damaged. Measure ground continuity.		
	(2) Inspect power supply voltage.		
	(3) Measure line voltage regulation.		
5	Function check		
	(1) Power on and confirm lamp on and there is no abnormal sound or vibration.		
	(2) Inspect all switches work normally.		
	(3) Confirm vacuum pump work by operation of foot or operation switch. and vacuum level becomes up.		
6	Operation check		
	(1) Confirm when the suction circuit the vacuum reach to -500mmHg or more.		
	(2) Suck water and confirm the flow is smooth and there is no reverse flow.		
7	Trouble shooting		
	(1) All abnormal part which are found on the periodical check should be replaced by consumables and spare parts of new or good condition.		

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Blood pressure machine	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully by technician's eye.		
2	Cleaning and lubrication		
	(1) Clean overall of the equipment.		
	(2) Make cleaning of mercury, if necessary.		
3	General check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect overall physical damage. Especially check sign of damage on rubber tubing and glass tube.		
4	Electrical check - Electric type blood pressure machine only		
	(1) Inspect all cables, cords, plugs and connectors are not broken or damaged. Measure ground continuity.		
	(2) Inspect power supply voltage.		
	(3) Measure line voltage regulation.		
5	Function check		
	(in the case of electric type)		
	(1) Power on and confirm lamp and controller on and there is no abnormal sound or vibration.		
	(2) Inspect all switches and controller pedal/switch work properly.		
6	Operation check		
	Measure blood pressure and verify normal operation.		
7	Trouble shooting		
	(1) All abnormal parts which are found on the periodical check should be replacedby consumables and spare parts of new or good condition.		

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Operation table	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully by technician's eye.		
2	Cleaning and lubrication		
	(1) Clean overall of the equipment.		
	(2) Make cleaning of base and back side of operation table.		
	(3) Inspect hydraulic oil and add if necessary.		
3	General check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect overall physical damage. Especially check sign of damage on frame connection.		
4	Electrical check - Electric type operation table only		
	(1) Inspect all cables, cords, plugs and connectors are not broken or damaged. Measure ground continuity.		
	(2) Inspect power supply voltage.		
	(3) Measure line voltage regulation.		
5	Function check		
	(1) Inspect movement of operation table, up/down, tilting, and trendenberg.		
	(in the case of electric type)		
	(2) Power on and confirm lamp and controller on and there is no abnormal sound or vibration.		
	(3) Inspect all switches and controller pedal/switch work properly.		
6	Operation check		
	Not required		
7	Trouble shooting		
	(1) All abnormal parts which are found on the periodical check should be replacedby consumables and spare parts of new or good condition.		

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Operation light mobile	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully by technician's eye.		
2	Cleaning and lubrication		
	(1) Clean overall of the equipment. Especially confirm the cleanness of lighting part.		
3	General check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect overall physical damage.		
	(3) Inspect smooth movement of caster.		
4	Electrical check		
	(1) Inspect all cables, cords, plugs and connectors are not broken or damaged. Measure ground continuity.		
	(2) Inspect power supply voltage.		
	(3) Measure line voltage regulation.		
5	Function check		
	(1) Power on and confirm lamp on.		
6	Operation check		
	Not required.		
7	Trouble shooting		
	(1) All abnormal part which are found on the periodical check should be replaced by consumables and spare parts of new or good condition.		

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Oxygen concentrator	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully by technician's eye.		
2	Cleaning and lubrication		
	(1) Clean overall of the equipment.		
	(2) Make cleaning inside of equipment. Especially make cleaning of motor, tubing, and piping.		
3	General check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect overall physical damage. Especially check sign of damage on frame connection.		
4	Electrical check		
	(1) Inspect all cables, cords, plugs and connectors are not broken or damaged. Measure ground continuity.		
	(2) Inspect power supply voltage.		
	(3) Measure line voltage regulation.		
5	Function check		
	(1) Inspect all switches and knobs work properly.		
	(2) Power on and confirm operation start and there is no abnormal sound or vibration.		
6	Operation check		
	(1) Adjust oxygen flow and confirm flow volume change.		
	(2) Measure concentration of oxygen.		
7	Trouble shooting		
	(1) All abnormal parts which are found on the periodical check should be replacedby consumables and spare parts of new or good condition.		

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Patient Monitor	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully by technician's eye.		
2	Cleaning and Lubrication		
	(1) Clean overall of the equipment. Especially confirm the cleanness of paddle and display.		
	(2) Clean ECG cable and electrode connection part.		
3	General Check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect overall physical damage.		
	(3) Inspect patient cable and electrodes do not damaged or rusted.		
	(4) Inspect all accessories (ECG cable, patient cable, NIBP cuff with tube, SpO2 sensor, temperature sensor etc.) and signs of damage		
4	Electrical Check		
	(1) Inspect all cables, cords, plugs and connectors are not broken or damaged. Measure ground continuity.		
	(2) Inspect power supply voltage.		
	(3) Measure line voltage regulation.		
	(4) If you have electrical leak tester, measure the leak current and confirm it is within the regulation.		
	- grounding wire (normal/single failure)		
	- exterior (normal/single failure)		
	- patient leakage (normal/single failure)		
5	Function Check		
	(1) Power ON and confirm lamp on and if there is no abnormal sound or vibration.		
	(2) Inspect the equipment pass self check.		
	(3) Inspect all switch and key work normally.		
	(4) Record operational time/frequency from test menu (if this function equipped).		
	- Operating time		
	- Temperature adjusted operation time		
	- Battery operation time		
	- NIBP measurement frequency		
	- Maximum internal temperature		
	- Recording time		
6	Operation Check		
	(1) If you have ECG simulator, connect it to the patient monitor and confirm ECG signal is displayed by I to III lead. If you do not have the ECG simulator, perform the test without input signal.		
	(2) Inspect function of NIBP, SpO2, and temperature sensor manually.		
7	Trouble Shooting		
	(1) All abnormal parts which are found on the periodical check should be replacedby consumables and spare parts of new or good condition.		

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Anesthesia apparatus	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully		
2	Cleaning and lubrication		
	(1) Clean overall of the equipment.		
	(2) Make clean inside of equipment. Especially remove dust from electronics part.		
3	General check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect overall physical damage.		
4	Electrical check		
	(1) Inspect all cables, cords, plugs and connectors are not broken or damaged. Measure ground continuity.		
	(2) Inspect power supply voltage.		
	(3) Measure line voltage regulation.		
5	Function check		
	(1) Inspect all switches and knobs work properly.		
	(2) Power on and confirm operation start and there is no abnormal sound or vibration.		
	(3) Perform leak test and calibration based on manufacturer's procedure.		
6	Operation check		
	(1) Connect test bug and operate it. Confirm normal operation. Use standard setting of your facility.		
7	Trouble shooting		
	(1) All abnormal parts which are found on the periodical check should be replacedby consumables and spare parts of new or good condition.		

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Electrosurgical unit	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully by technician's eye.		
2	Cleaning		
	(1) Clean overall of the equipment.		
	(2) Make clean inside of unit. Remove all dust from electronics part.		
3	General check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect overall physical damage.		
4	Electrical check		
	(1) Inspect all cables, cords, plugs and connectors are not broken or damaged. Measure ground continuity.		
	(2) Inspect power supply voltage.		
	(3) Measure line voltage regulation.		
5	Function check		
	(1) Inspect all switches and knobs work properly.		
	(2) Power on and confirm there is no abnormal sound or vibration.		
	(3) Adjust setting and confirm indicating value change.		
6	Operation check		
	(1) Make trial operaion by soap.		
	(2) Perfom all alarm function and confirm they work properly. Disconnect rounding and disconnect patient plate.		
	(3) Measure leak current and high frequency leak current by electrosurgical unit analyzer.		
7	Trouble shooting		
	(1) All abnormal parts which are found on the periodical check should be replacedby consumables and spare parts of new or good condition.		

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Automatic X-ray film developer	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully by technician's eye.		
2	Cleaning		
	(1) Clean overall of the equipment.		
	(2) Make clean inside of main unit and inside of tubing. Remove all dust from electronics		
3	General check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect overall physical damage. Especially check sign of damage on film transfer mechanism.		
	(3) Check all filters (water supply, air etc.) and replace them if necessary.		
4	Electrical check		
	(1) Inspect all cables, cords, plugs and connectors are not broken or damaged. Measure ground continuity.		
	(2) Inspect power supply voltage.		
	(3) Measure line voltage regulation.		
5	Function check		
	(1) Inspect all switches and knobs work properly.		
	(2) Power on and confirm there is no abnormal sound or vibration.		
	(3) Check film transfer mechanism work normally and smoothly.		
6	Operation check		
	(1) Make trial feeding and confirm the feeding is smooth and normal.		
	(2) While test feeding, verify replenish pump work and liquid are introduced to developing and fixing tank.		
	(3) Verify water supply is normal.		
7	Trouble shooting		
	(1) All abnormal parts which are found on the periodical check should be replacedby consumables and spare parts of new or good condition.		

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Mobile X-ray	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully by technician's eye.		
2	Cleaning and Lubrication		
	(1) Clean overall of the equipment.		
	(2) Make clean inside of equipment. Remove all dust from electric parts.		
	(3) Clean and lubricate casters, if necessary.		
3	General Check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect overall physical damage.		
4	Electrical Check		
	(1) Inspect all cables, cords, plugs and connectors are not broken or damaged. Measure ground continuity.		
	(2) Inspect power supply voltage.		
	(3) Measure line voltage regulation.		
5	Function Check		
	(1) Power ON and confirm lamp on and there is no abnormal sound or vibration.		
	(2) Inspect movement of X-ray tube extension arm.		
	(3) Inspect movement of collimator and collimator lamp.		
	(4) Inspect moving and stopping condition.		
	(5) Inspect all switches and dials if working properly.		
6	Operation Check		
	(1) Expose X-ray and confirm there is no abnormality or malfunction.		
7	Trouble Shooting		
	(1) All abnormal parts which are found on the periodical check should be replacedby consumables and spare parts of new or good condition.		

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Fixed X-ray	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully by technician's eye.		
2	Cleaning and Lubrication		
	(1) Clean overall of the equipment.		
	(2) Clean and lubricate moving part and wire on bucky stand, bucky table and tube		
3	General Check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect overall physical damage.		
4	Electrical Check		
	(1) Inspect all cables, cords, plugs and connectors are not broken, damaged, and/or tightly connected. Measure ground continuity.		
	(2) Inspect power supply voltage.		
	(3) Measure line voltage regulation.		
5	Function check		
	(1) Power ON and confirm lamp on and there is no abnormal sound or vibration.		
	(2) Inspect all switches and dials work properly.		
	(3) Inspect cassette holder movement and locking of bucky stand.		
	(4) Inspect movement and locking of bucky table.		
	(5) Inspect movement, rotation, and locking of X-ray tube support.		
	(6) Inspect function of collimator and collimator lamp.		
	(7) Inspect alignment of X-ray tube to bucky table and stand.		
6	Operation Check		
	(1) Expose X-ray and confirm there is no abnormality or malfunction.		
7	Trouble Shooting		
	(1) All abnormal parts which are found on the periodical check should be replacedby consumables and spare parts of new or good condition.		

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Solar system	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully		
2	Cleaning		
	(1) Clean solar panel if necessary.		
	(2) Clean battery charger, batteries, and DC-AC converter. Remove all dust from		
3	General Check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect overall physical damage. Especially check sign of damage on solar cell and		
	(3) Check connection of all wiring.		
4	Electrical Check		
	(1) Measure output voltage of solar panel, battery charger, batteries, and DC-AC converter.		
	(2) Measure output current of solar panel by short condition.		
5	Function Check		
	Not required.		
6	Operation Check		
	Not required.		
7	Trouble Shooting		
	(1) All abnormal parts which are found on the periodical check should be replacedby consumables and spare parts of new or good condition.		

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Fetal doppler	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully by technician's eye.		
2	Cleaning		
	(1) Clean main unit and detector.		
3	General Check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect overall physical damage. Especially check sign of damage on probe.		
	(3) Check connection cable and connector of detector.		
4	Electrical Check		
	(1) Check battery condition.		
5	Function check		
	(1) Power ON and confirm there is no abnormality and FHR detection start.		
6	Operation Check		
	(1) Check detector sense FHR if working properly.		
7	Trouble Shooting		
	(1) All abnormal parts which are found on the periodical check should be replacedby consumables and spare parts of new or good condition.		

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Pulse oximeter	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully by technician's eye.		
2	Cleaning		
	(1) Clean main unit and probe.		
3	General Check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect overall physical damage. Especially check sign of damage on probe.		
	(3) Check connection cable and connector of probe.		
4	Electrical Check		
	(1) Inspect all cables, cords, plugs and connectors are not broken or damaged. Measure ground continuity.		
	(2) Inspect power supply voltage.		
	(3) Measure line voltage regulation.		
	(4) If rechargeable battery is equipped, check battery condition.		
5	Function Check		
	(1) Power on and confirm there is no abnormality and SpO2 measuring start.		
6	Operation Check		
	(1) Check SpO2 measuring is normal and correct. In the case of healthy people, the value will be 98% or more.		
	(2) If you have SpO2 tester, check measuring value is correct or not.		
7	Trouble Shooting		
	(1) All abnormal parts which are found on the periodical check should be replacedby consumables and spare parts of new or good condition.		

PLANNED PREVENTIVEL MAINTENANCE CHECK LIST

Equipment : Ultrasound diagnostic equipment	Inventory Number:
Maker:	Model:
Technician	Periodical maintenance date:

No.	Activities	Check result	Note
1	Perform daily maintenance process for signs of damage or abnormalities. Check carefully by technician's eye.		
2	Cleaning and Lubrication		
	(1) Clean overall of the equipment. Especially, clean probe and probe box.		
	(2) Clean and lubricate casters, if necessary.		
	(3) Clean inside and remove all dust from electrical parts.		
	(4) Clean air filter.		
3	General Check		
	(1) Inspect bumpy and missing screws.		
	(2) Inspect overall physical damage.		
4	Electrical Check		
	(1) Inspect all cables, cords, plugs and connectors are not broken, damaged, and/or tightly connected. Measure ground continuity.		
	(2) Inspect power supply voltage.		
	(3) Measure line voltage regulation.		
5	Function Check		
	(1) Power ON and confirm lamp on and there is no abnormal sound or vibration.		
	(2) Inspect the equipment pass self check.		
	(2) Inspect all switches and dials if working properly.		
6	Operation Check		
	(1) Operate equipment and confirm to obtain normal picture.		
	(2) If you have a test phantom, measure it and confirm resolution is within the error range.		
7	Trouble Shooting		
	(1) All abnormal parts which are found on the periodical check should be replacedby consumables and spare parts of new or good condition.		

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