

National Surgical, Obstetric, and Anesthesia Planning Intervention Toolkit

A Resource from the Program in Global Surgery and Social Change, Harvard Medical School

Domain: Hospital equipment maintenance

Authors: Desmond Jumbam¹, Isabelle Citron¹

¹Program in Global Surgery and Social Change, Boston, MA

Brief Synopsis

There is a small body of evidence around interventions to improve hospital equipment maintenance. The World Health Organization has developed a series of policy recommendations as part of their Medical Device Technical Series. These guidelines provide guidance on hospital equipment maintenance including procuring new equipment, managing equipment inventory, conducting medical device needs assessments, and managing equipment donations. Some of these WHO recommendations are summarized below. Other major interventions to improve hospital equipment maintenance can be divided into skills training and policy interventions. There is more outcome information available for skills training interventions than there are for policy interventions.

Guidelines

1. Policy Recommendations from the WHO Medical Device Technical Series; 2011
 - a. [Needs assessment for medical devices](#)

This document provides guidance for a methodological approach to conduct a thorough needs assessment of the current situation and future medical device needs taking into account the country's disease burden. It also provides useful tools and references for conducting medical device needs assessments
http://apps.who.int/iris/bitstream/10665/44562/1/9789241501385_eng.pdf
 - b. [Introduction to medical inventory management](#)

This document provides an overview of health-care technology inventory for people working within the healthcare field who wish to understand the topic in greater detail. It also introduces different types of inventories and illustrates the role of an accurate, detailed inventory in health technology management to support informed decision-making.
http://apps.who.int/iris/bitstream/10665/44561/1/9789241501392_eng.pdf
 - c. [Medical equipment maintenance program overview](#)

This document provides information regarding the components of an effective medical equipment maintenance program. It provides guidelines for planning, managing, and implementing the maintenance of medical equipment. It is intended to be concise and flexible to ensure it is adaptable to various settings and levels of technical resources.
http://apps.who.int/iris/bitstream/10665/44587/1/9789241501538_eng.pdf
 - d. [Procurement process and resource guide](#)

A summary of published health technology procurement guidelines is provided along with references to those publications. The resources will be relevant to Ministries of Health developing a new procurement system or reviewing an existing system. A set of indicators for procurement performance assessment are provided.

http://apps.who.int/iris/bitstream/10665/44563/1/9789241501378_eng.pdf

e. [Computerized maintenance management system](#)

A guide to biomedical and clinical engineers on adopting and implementing a computerized method of managing their maintenance system. It is specifically aimed at those with the technical and financial resources to support such a system.

http://apps.who.int/iris/bitstream/10665/44567/1/9789241501415_eng.pdf

f. [Medical donations: Considerations for solicitation and provision](#)

The best practices and considerations covered in this document are intended to improve the quality of equipment donations and provide maximum benefit to stakeholders. These considerations can be used to develop institutional or national policies and regulations for medical equipment donations.

http://apps.who.int/iris/bitstream/10665/44568/1/9789241501408_eng.pdf

2. [List of organizations involved in donation of medical devices and roles](#)

http://www.who.int/medical_devices/management_use/donation_org_roles.pdf?ua=1

3. [WHO Technical Specification for Medical Devices](#)

The WHO technical specification for 61 medical devices can provide guidelines prior to purchasing equipment to ensure optimal specifications are met.

http://www.who.int/medical_devices/management_use/mde_tech_spec/en/

Interventions

SKILLS TRAINING INTERVENTIONS

1. Long-term academic partnerships with foreign academic institutions to train biomedical engineers and equipment technicians

Reference: <http://www.aiha.com/technical-areas/biomedical-technology/>

Type: Partnership between local training institutions and foreign training institutions

Intervention description:

The lack of skilled biomedical equipment technicians (BMET) and engineers often limits the usefulness of equipment. To address this challenge, a number of countries and NGOs have developed biomedical equipment training programs to increase the number of adequately skilled BMETs.

Example: Jimma University, Addis Ababa Institute of Technology and Tegbare-id Polytechnic College, both major BMET training programs in Ethiopia, partnered with Rice University, Texas Children's Hospital and the University of Wisconsin in the USA, with support from of The American International Health Alliance (AIHA), to build the capacity of biomedical engineers. Together they strengthened preservice biomedical engineering and equipment technician training programs at the bachelor and diploma levels, updated curricula, trained faculty and provided

evidence-based learning resources and develop maintenance protocols. Expansion of practical in-service training for non BMETs was also provided to expand the capacity of cadres to manage and maintain crucial medical equipment. Based on the success of this partnership, similar programs have been launched in Kenya, Uganda, Tanzania, and Zambia.

Outcome: Existing BMET curriculum revised and adapted to the local context. Free online course developed and offered to students and as CPE for practicing BMETs. Mentorship program for BMETs. 30 BMETs trained with 7 who will participate in training-of-trainer courses.

Organization: AIHA, Jimma University, Tegbare-id Polytechnic College, Rice University, Texas Children's Hospital, Ministries of Health
Cost: Financed through PEPFAR
Considerations: Program scale-up may be limited due to a shortage in instructors. Strong and long-term commitment from supporting institutions is necessary.

2. Short-term biomedical equipment training courses

Reference: <https://projectcure.org/programs/biomedical-technology-train-trainer-program>

Type: Facility-based

Intervention description:

These interventions often involves partnerships with NGOs or academic institutions who deliver short-term (one to two week) training courses to local biomedical equipment technicians.

Example: In 2015, Project C.U.R.E. developed a 5-day train-the-trainer program to equip local biomedical technicians and engineers on skills to repair and troubleshoot issues with biomedical equipment with a strong focus on preventative maintenance. The program also aims to empower trainees to become leaders and trainers of other BMETs within their health systems.

Outcome: Knowledge and skill levels of practicing BMETs increased after completion of 5-day course. Reported 16% increase in knowledge of participants of Project C.U.R.E.'s program.

Organization: Project C.U.R.E

Cost: Often funded by NGOs

Considerations: Instructors for short term-courses are often volunteers and this can lead to sustainability challenges in the long-term. Knowledge imparted in short-term courses need to be applicable in the local context and equipment availability.

POLICY INTERVENTIONS

1. Medical equipment donation guidelines

References:

1. [http://www.tzdpd.or.tz/fileadmin/documents/dpg_internal/dpg_working_groups_clusters/cluster_2/health/Key_Sector_Documents/Medicines and Medical Supplies Documents/Donation Gdlns Book Final 2015.pdf](http://www.tzdpd.or.tz/fileadmin/documents/dpg_internal/dpg_working_groups_clusters/cluster_2/health/Key_Sector_Documents/Medicines_and_Medical_Supplies_Documents/Donation_Gdlns_Book_Final_2015.pdf)
2. [http://www.moh.gov.rw/fileadmin/templates/Guidelines Protocols/GUIDELINES HEALTH CARE EQUIPMENT DONATIONS.pdf](http://www.moh.gov.rw/fileadmin/templates/Guidelines_Protocols/GUIDELINES_HEALTH_CARE_EQUIPMENT_DONATIONS.pdf)
3. Howie, S. R., Hill, S. E., Peel, D., Sanneh, M., Njie, M., Hill, P. C., ... Adegbola, R. A. (2008). Beyond good intentions: lessons on equipment donation from an African hospital. *Bulletin of the World Health Organization*, 86(1), 52–56. <http://doi.org/10.2471/BLT.07.042994>

Type: National policy/guidelines

Intervention description:

Many countries have instituted national policies to guide all medical equipment donations to their countries. These guidelines often ensure that there is a sustainable plan for the distribution, use, and maintenance of all medical equipment that is donated to facilities in the country.

Example: National equipment donation guidelines have been developed in a number of countries including Tanzania¹ and Rwanda.²

Outcome: There is little available data on the impact of national medical equipment donation guidelines.

Organization: National Ministries of Health

Cost: Time for national policy writing, may require a team or committee to be formed within the MOH

Considerations: After writing policy there should be a clear plan for enforcing the guidelines in order to guarantee impact. Establishing of a donations committee at each facility could aid in the proper distribution of equipment and implementation of national medical equipment donation guidelines.³

2. Medical equipment management guidelines

Reference:

1. <http://www.moh.gov.zm/docs/reports/Medical%20Equipment%20Management%20Guidelines.pdf>
2. [http://www.moh.gov.rw/fileadmin/templates/Guidelines Protocols/GUIDELINES FOR DECOMMISSIONING AND DISPOSING HEALTHCARE EQUIPMENT IN RWANDA.pdf](http://www.moh.gov.rw/fileadmin/templates/Guidelines_Protocols/GUIDELINES_FOR_DECOMMISSIONING_AND_DISPOSING_HEALTHCARE_EQUIPMENT_IN_RWANDA.pdf)
3. http://www.who.int/medical_devices/survey_resources/health_technology_national_policy_botswana.pdf

Type: National policy/guidelines

Intervention description:

National medical equipment management guidelines are national policies often developed by the Ministry of Health to guide medical equipment maintenance from initial purchase to decommissioning and replacement.

Example: National medical equipment management guidelines have been developed in a number of countries including Zambia¹, Rwanda², and Botswana.³

Outcome: Few outcomes are reported for medical equipment guidelines as most of these are relatively new policies.

Organization: National Ministries of Health

Cost:

Considerations: National equipment management guidelines like many other health guidelines should be context relevant and enforceable.

Additional Resources:

Howie, S. R., Hill, S. E., Peel, D., Sanneh, M., Njie, M., Hill, P. C., ... Adegbola, R. A. (2008). Beyond good intentions: lessons on equipment donation from an African hospital. *Bulletin of the World Health Organization*, 86(1), 52–56. <http://doi.org/10.2471/BLT.07.042994>