

The Kingdom of Cambodia

- Nation – Religion – King -

The Project on

Promotion of Medical Equipment Management System

Project Document

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Ministry of Health

and

Japan International Cooperation Agency (JICA)



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ANNEX

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Abbreviation list

(alphabetical order)

CPA	Complementary Package of Activities
HSD	Hospital Services Department
HSP	Health Strategic Plan
HSSP	Health Sector Support Project
MOH	Ministry of Health
MPA	Minimum Package of Activities
NH	National Hospital
NMCHC	National Maternal and Child Health Center
NW	National Workshop
OD	Operational District
PCM	Project Cycle Management
PDM	Project Design Matrix
PHD	Provincial Health Department
RH	Referral Hospital
TOT	Training of Trainers

1. Introduction

1.1. Background on the request for technical cooperation

In Cambodia, the main problem of medical equipment management is the incorrect interpretation of the basic idea of maintenance and the roles of medical equipment managers and medical equipment technicians. Generally, the medical equipment technicians are only the hospital's assistants who do not have sufficient knowledge and skills of medical equipment maintenance. Furthermore, the hospital itself often lacks the basic maintenance tools. As a result, medical equipment technicians cannot carry out properly all the activities which they are authorized to do. Many of hospitals have not assigned officially any staff to be chiefly in the position of medical equipment technician.

Through the JICA Maternal and Child Health Project, medical equipment maintenance and management services at the National Maternal and Child Health Center (NMCHC) has been established and further strengthened. The medical engineering section of the NMCHC has performed several workshops' works with the full and active participation of JICA experts and medical equipment operators such as doctors and nurses in the NMCHC.

The Ministry of Health (MOH) is planning to take further steps to improve the medical equipment management system in Cambodia. Two steps which are considered as the MOH's strategies are foreseen as follows:

- (1) To strengthen the management capacity of the Hospital Services Department (HSD) in the MOH.
- (2) To set up the training courses for two target groups, medical equipment technicians of National Hospitals (NHs) and Complementary Package of Activities referral hospitals (CPA3RHs) and medical equipment managers of Provincial Health Departments (PHDs), NHs and CPA3RHs.

The Government of Cambodia has made a request for the technical assistance from the Government of Japan for implementing of these plans and the Project.

The JICA Preparatory Study Team for the Project on Promotion of Medical Equipment Management was dispatched to Cambodia from October 6 to October 21, 2005 with the main purpose of drawing up the design of the Project on Promotion of Medical Equipment Management System. As a result, the JICA Preparatory Study Team and the Cambodian sides had discussed the outline of the project plans and had agreed on the matters as signed in the Minutes of Meeting.

1.2. Objectives of the Project Document

This project document is the outcomes of a collaborative work between MOH and the Study Team during the process of designing the new project. It contains a lot of useful information concerning the project formulation, and it could be utilized for the following objectives:

- Information Sharing The process of designing the new project is summarized in this document for anyone concerned. The document, therefore, could be used as a reference for other donors and relevant organizations.
- Project Strategy This document describes the project strategies, the background information as well as the reasons why these strategies are involved in the project.
- Project Justification The project justification is described based upon the analysis of the viewpoints of relevance, effectiveness, efficiency, impact and sustainability of the project in the context of nursing educational reformation in Cambodia.

This project document, which includes the Project Design Matrix (PDM) and Plan of Operation (PO), is subject to revision and modification through mutual consultation between the Cambodian side and the Japanese side when changes in the environment and/or the progress of the project would necessitate such revision.

2. Country strategy on medical equipment maintenance /management system

2.1. Health Strategic Plan (HSP) 2003-2007 and its 5-year implementation plan

In Cambodia, MOH implemented the Cambodia Disease Control and Health Development Project from 1997 to 2002. After all, since 2003, it has carried out the HSP, the main policy and strategy to promote the health sector's development. The HSP has the following 6 key areas:

- (1) Health service delivery
- (2) Behavioral change
- (3) Quality improvement
- (4) Human resource development
- (5) Health financing
- (6) Institutional development

For upgrading the Health service delivery, MOH has sets 5 strategies:

- (1) Increase coverage and access to health services, especially for the poor, and other vulnerable groups with better planning of health facilities' location and strengthening outreach services.
- (2) Improve delivery of quality basic health services by health centers and outreach service, based on the Minimum Package of Activities (MPA) scheme.
- (3) Improve delivery of quality care, especially obstetric and pediatric care, at all hospitals with a CPA scheme and others.
- (4) Enhance management of cost-effective interventions to control communicable diseases.
- (5) Enhance management and coverage of support services, such as laboratory, blood safety, referral, pharmaceuticals, equipment and other medical supplies and maintenance of facilities and transport.

The HSD, PHDs, NHs, and CPA3RHs are assigned as executing agencies with other related departments of MOH. After implementing those activities, the following five outcomes will be realized: (1) improved coverage of health services; (2) increased utilization of preventive and curative services especially by the poor; (3) reduction of prevalence rates of communicable diseases; (4) increased availability of supplies and functioning equipment; and (5) an effective referral system.

2.2 HSD's perspective on the future of the medical equipment maintenance and management

If agents of medical equipment can provide a good service with a reasonable cost, and hospitals can allocate sufficient budget to be used for such services, it is obviously possible that the maintenance services can be performed by those agents. However, in Cambodia, such conditions have not been applicable yet, as there are a few reliable agents who can provide good and effective maintenance services. In addition there are only a few hospitals which can allocate a small amount of budget for such a service. To remedy such situation, HSD plans to raise at least one medical equipment technician at each NH and CPA3 RH. Accordingly, all NHs and CPA 3 RHs are assigned at least one technician with sufficient knowledge and skills to work for the medical equipment maintenance and management. It is anticipated that if this plan is effectively worked out, HSD will extend its activities to the CPA 1 and 2 RHs. Ergo, all the medical equipment technicians can handle the basic maintenance of medical equipment at their hospitals. Through this expected achievements, HSD plans to establish a Central Workshop, apart from the existing National Workshop (NW) that, currently, belongs to the NMCHC, and plans to develop regional workshops at major CPA3 RHs.

However, these plans have neither a budget and nor a specific timetable for implementation.

3. Challenges, problem analysis and future perspectives on medical equipment maintenance and management system

3.1 Challenges and problem analysis

3.1.1 Central level

According to the job description of MOH's departments, bureaus and units¹, the bio-medical engineering bureau of HSD is responsible for the maintenance and management of medical equipment at public health institutions as follows:

- Registration:
 - Organize a repair-maintenance network on medical equipment.
 - Organize a standard equipment for health centers and hospitals.
 - Develop a standard list and system of electricity for RHs.
 - Develop the inventory list and register the medical equipment's information into the computer database.
- Facilitation of Repair:
 - Prepare plans for Central and Regional Workshops.
 - Liaise and work well with donors.
 - Work with hospitals in implementing the repair and maintenance of medical equipment.
 - Routinely monitor and evaluate the implementation of guidelines and the action plan on maintenance and repair of medical equipment.
- Training:
 - Work with the Department of Human Resource Development in formulating Terms of Reference (TOR) of every level of training for medical equipment maintenance/repair staff.
 - Develop basic and continuing training curriculum for medical equipment maintenance/repair staff.

However, the afore-mentioned roles and responsibilities have not been executed yet. Although the bio-medical engineering bureau has already developed the policy and guidelines for medical equipment management (i.e. policy documents, implementation plans and guidelines, and basic maintenance documents), and the Medical Equipment Standard List for RHs with

¹ The job description was set by the Secretary of State, MOH, on November 30, 1998.

the support from donors namely JICA and UNICEF, they have not been fully implemented at the RHs. Due to the limited communication on medical equipment maintenance and management system among HSD, PHDs and RHs, RHs do not accurately and promptly report the updated inventory data of medical equipment to the bureau in MOH. As a result, it has caused the bureau to be unable to supervise the real situation of medical equipment maintenance and management at RHs. Similarly, medical equipment managers and technicians are not provided with adequate training courses and seminars.

Such situation could partially occur due to the shortage of human resources and budget. Although the bureau has four (4) staff, two (2) of them are on leaves, long-term leave and maternity leave. Taking the limited number of staff into account, HSD has made a request to MOH for 2 additional engineering staff to work at the bureau, but the request has not been replied yet. The existing two (2) staffs do not work only for the bio-medical equipment bureau, but also other additional assignments and responsibilities. Despite the fact that MOH's budget is being increased every year, the budget for medical equipment maintenance and management was still limited at 855,000,000 Riels (US\$ 213,750) for the year 2004, which was 0.69% of MOH's total budget. Thus, HSD, like other departments, has difficulty in purchasing the new medical equipment and even office supplies, as those departments cannot receive their own operational budget. It is true that HSD and other departments depend largely on the budget of donor- supported programs such as HSP for the operation of their major activities.

The medical engineering section of NMCHC serves as NW, which provides the medical equipment maintenance and repair services. Once requests are made from the public health institutions, especially CPA 3 RHs, the NW provides a basic repair service of medical equipment, user training and preventive maintenance. Currently, there are four (4) medical equipment technicians and seven (7) facility technicians working at the NW. It is important to note that with the support from the JICA Maternal and Child Health Project, the technical capability of NW's technicians have been improved dramatically, for they are able to maintain and repair most of the medical equipment at the NMCHC and other hospitals where the medical equipment are sent to be repaired at the NW.

3.1.2 Provincial level: PHDs, NHs and CPA 3 RHs

There are eight (8) NHs² and sixty-nine (69) CPA RHs in Cambodia. Even though the hospitals vary in scale³ from one to another, NHs and CPA 3 RHs are considered as the top referral hospitals of this country since they have been well equipped with modern medical equipment and facilities and with skilled and specialized medical staff who can perform operations for most of the serious diseases referred from the health centers, CPA 1, 2 and 3 hospitals. Thus, NHs and RHs have relatively large numbers of medical equipment items. However, many of them are unsuitable for hospital services, as they are out of order and obsolete.

The Medical Equipment Standard List for CPA 3 RHs describes the specification and quantity of medical equipment to be installed at CPA 3RHs. During the preliminary evaluation study, the Team has observed the conditions of medical equipment in Chey Chumneas RH of Kandal province and Kampong Siem RH of Kampong Cham province and interviewed the counterparts of HSD and NW. Furthermore, as the result of PCM workshop, participants have recognized the current problems of medical equipment management.

In view of the above evaluation activities, following are addressed as major causes of inappropriate maintenance:

- (1) Technicians do not provide adequate maintenance service.
- (2) Medical equipment managers do not manage the equipment properly.
- (3) Operators do not have the right skills for using the equipment.
- (4) Infrastructure is poor.
- (5) Spare parts are unavailable.

1. Technicians do not provide adequate maintenance service.

According to the CPA guideline for the referral hospitals, every CPA RH is supposed to assign at least one appropriate personnel to be in charge of medical equipment maintenance. However, some hospitals do not have one. According to the survey of the preliminary study team, two (2) NHs and two (2) RHs out of six (6) NHs and eighteen (18) RHs have not had such personnel.

Even if there are sizable differences in knowledge and skills among the technicians, it can be

² Khmer Soviet Friendship Hospital, Preah Kossamak Hospital, Preah Ang Duong Hospital, Kantha Bopha Hospital, National Pediatric Hospital, Calmette Hospital, National Center for Tuberculosis and Leprosy Control, and National Maternal and Child Health Center.

³ Here are ranges in numbers. Number of RH's staff members: 45-455; number of doctors: 8-36; and number of beds: 0-267.

recognized that most of them do not have sufficient knowledge and skills to deal with medical equipment problems. Many of them have low level of educational background. Additionally, they have not received enough training courses on medical equipment maintenance/management, and they have not actually dealt with medical equipment problems at all while they are mainly the hospital facilities' workers who fix merely the minor problems such as electricity and water supply. By and large, hospitals often keep using the medical equipment with minor problems until they are no longer functioning.

(2) Medical equipment managers do not manage the equipment properly.

At most NHs and RHs, the medical equipment manager is responsible for administration office, accounting office and/or serves as the (vice) director. PHD has allocated one staff to be in charge of medical equipment management for public health institutions under its jurisdiction. Although MOH sets a guideline for maintenance and management of medical equipment for RHs, most RHs do not necessarily follow it due to the limited instructions from MOH. There seems to have no clear organization structure of medical equipment management at many NHs and RHs, as some of the RH and PHD directors undertake the seminars, meetings or workshops on medical equipment management. Thus, many RHs do not know the roles and responsibilities of medical equipment managers and small amount of budget or zero budget is allocated for this field

Inventory of medical equipment is usually made once a year, and the format differs in each hospital. For instance, criteria for categorizing the medical equipment's condition are not common for RHs. As a result, HSD cannot accurately grasp the real condition of medical equipment at NHs and RHs.

The financial sources and the total amount of budget for medical equipment maintenance differ from one RH to another. In many cases, however, RHs do not have sufficient budget to maintain and purchase expensive spare parts. For most of the NHs and RHs, the main financial sources come from the user fee and the governmental budget. For instance, Kampong Siem RH uses 2-3 % of the user fee budget for the medical equipment maintenance. The total amount of the annual user fee budget is US \$75,000 and the budget for medical equipment maintenance is \$1,500 - \$2,250. Similarly, Chey Chumneas RH also uses a portion of the user fee for the medical equipment maintenance such as purchasing the small spare parts

(3) Operators do not have the right skills for using the equipment.

It is important for medical equipment to be used safely and properly, and to be kept in the right condition. In some cases, there is no operational manual for medical equipment, for hospitals

are unable to keep manuals, second-hand equipment have been donated without manuals, and Khmer manuals are not available. Also, some equipment have been kept at dusty and humid places without a dust cover and have not been cleaned after using. To cope with these problems, training for operators is strongly required, but, presently, such training opportunities are very limited.

(4) Infrastructure is poor.

RHs do not have well-maintained facilities/infrastructures for medical equipment operation. For sensitive medical equipment, an appropriate environment control in such factors as temperature, humidity, cleanness, electricity supply, and water quality is essential. In Cambodia, however, many RHs buildings are old and limited to manage such environment. Major hospitals have the electricity and generators, but, sometimes, there is no resource for the fuel supply. In case of a workshop station for maintenance and repair of medical equipment, many hospitals' workshops are not regarded as the appropriate workshops, and located in a dusty and dark storage, often without basic tools for maintenance services, where are unsuitable for the work.

(5) Spare parts are unavailable.

Spare parts are indispensable for repairing and maintenance of medical equipment. Yet it is very difficult for many hospitals to obtain the spare parts. In the case of second-hand equipment provided by donors without accessories, consumables, and reliable information on an agent, it is hard for medical equipment managers to find the suitable spare parts for their equipment. Also there is a few reliable agents selling the spare parts for medical equipment. Furthermore, even if managers can find the appropriate spare parts, they are usually too expensive to afford. For HSD, they usually find it difficult to allocate sufficient budget to supply spare parts to hospitals.

3.2 Prospects on a system for medical equipment maintenance and management

It is essential for the project stakeholders to (1) have a clear vision on the future of a medical equipment maintenance and management system, (2) know the current problems they are facing, and (3) share ideas on what outcomes they expect to see after completion of the 3-year JICA project.

In order to reach the super goals, at least the following conditions should be achieved after completion of the project.

1. Securing a budget for medical equipment maintenance and management (e.g., creating an

expenditure item on medical equipment maintenance in government budget, and providing PAP for hospitals in all provinces).

2. Ensuring appropriate usage of medical equipment (e.g., training for medical equipment operators).
3. Improving the infrastructures and facilities of hospitals and medical equipment workshops.
4. Promoting availability of spare parts (e.g., educating donors for appropriate provision of (second-hand) medical equipment, attracting investment of medical equipment suppliers and agents, and educating them on good service at a reasonable cost and timing).
5. Regularly conducting a program on medical equipment maintenance and management (e.g., improvement of training for CPA 3 RHs and activity expansion to CPA 1 and 2 RHs).

4. Project design

To achieve prescribed objectives within a given budget and specified period of time, a participatory planning workshop was held to design the Project in Cambodia from 13 to 14 October 2005. A draft of the project design matrix (PDM) which was refined on by the Japanese side, and was finally agreed by the Minute of the Meetings between the MOH and the Preparatory Study Team on 19 October 2005.

4.1 Outline of project design

The Project aims to introduce basic maintenance activities of medical equipment at the target NHs and CPA 3 RHs, which are the top referral hospitals of Cambodian public health institutions. In order to meet the objectives, the project takes three approaches: (1) improvement of administrative instruction of HSD for medical equipment management, (2) skill development of medical equipment technicians at target NHs and CPA 3 RHs, and (3) development of management capacity of medical equipment managers at PHDs, NHs and CPA 3 RHs. The technicians of NMCHC's medical engineering section (i.e., NW) become trainers for medical equipment technicians at the above-mentioned hospitals. The staff of HSD will be the instructors for medical equipment managers at PHDs, NHs and CPA 3 RHs. In order to ensure that trainees will apply the acquired skills and knowledge at work, follow-up supervision and brush-up meetings will be done. In the follow-up supervision, instructors will visit the ex-trainees at their workplaces and give technical advice on their daily challenges. All ex-participants will join brush-up meetings to exchange ideas on how to solve the problems they face.

4.2 Project operation structure

The initial institutional framework for Project implementation will be as follows:

<Cambodian side>

Project Director: The Secretary of State for Health, MOH, will bear the overall responsibility for the administration and implementation of the Project.

Project Supervisor: The Deputy Director General for Health, MOH will function as an advisor to the project management in order to implement the Project successfully.

Technical Advisor: The Director, the NMCHC will function to advise technical activities of NW at NMCHC.

Project Manager: The Director, the HSD, MOH and the Director, the NMCHC will be responsible for the managerial and technical matters of the Project.

Other Concerned Project Staff

- Staff of the HSD, MOH
- Staff of the Medical Engineering Section, NMCHC
- Trainees (e.g., personnel in charge of medical equipment management at PHDs, NHs and CPA 3 RHs, as well as medical equipment technicians at NHs and CPA 3 RHs).

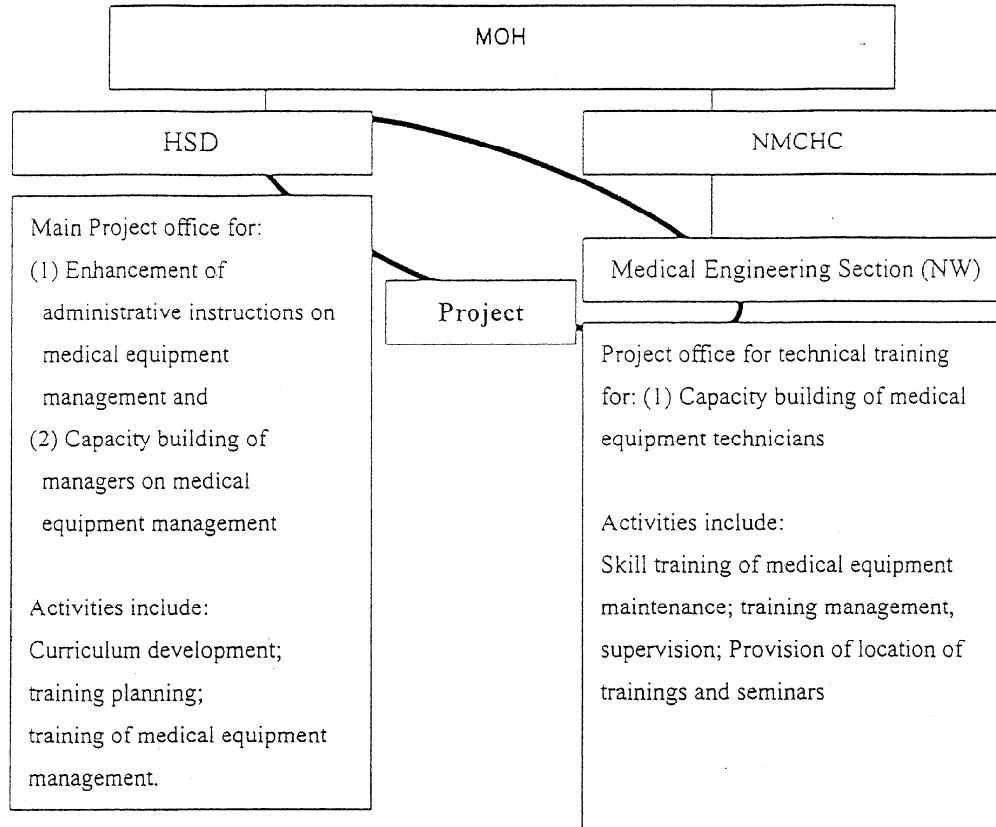
Training facilities at NMCHC

<Japanese side>

Chief Advisor

Short-term experts will give necessary technical guidance and advice to the Cambodian counterpart personnel.

Chart of project implementation



4.3 Super Goal

The Super Goal, the goal at a higher level than the Overall Goal, is defined as: "Basic maintenance of medical equipment is conducted at all RHs."

4.4 Overall Goal

The Overall Goal is the prospective impact seen 3-7 years after project completion, which will be produced as a result of a project purpose. "Basic maintenance of medical equipment is conducted at NH and CPA 3 RH" was determined as the overall goal of the Project.

4.5 Project Purpose, Output and Activities

4.5.1 Project Purpose

A project purpose is a purpose, which is expected to achieve by the end of the project period

through the realization of outputs. The project purpose was determined that "Basic maintenance and management activities for medical equipment are introduced at the target NHs and CPA 3 RHs, by following the instructions of MOH and PHDs, and by receiving technical guidance of NW."

The Project plans to promote the basic medical equipment maintenance management and skills for PHDs, the target NHs and CPA3 RHs. Means of verification of the medical equipment management and maintenance are verified through the annual activity reports and plans from PHDs, the target NHs and CPA3 RHs which are intended to implement with the guidance of the HSP. Achievement degree of the project purpose will be verified by the result of medical equipment management and maintenance activities at the target NHs and CPA3 RHs.

4.5.2 Outputs

Project outputs are intermediate goals that should be realized in order to achieve a project purpose, and indicate the strategies by which the project is attempting to achieve the project purpose.

In order to promote medical equipment maintenance and management, following outputs are expected to realize through the project activities.

- (1) Administrative instruction of HSD of MOH on medical equipment management for the target NHs and CPA 3 RHs is strengthened, with technical guidance of NW.
- (2) Technical skills of medical equipment technicians in the target NHs and CPA 3 RHs are improved.

Management skills of medical equipment managers in the target NHs, CPA 3 RHs, and PHDs are improved.

As previously mentioned, the Project aims to promote medical equipment maintenance and management in the target NHs, CPA 3 RHs, and PHDs. Technical skills and management skills attained from the project is expected to expand into four (4) NHs and eighteen (18) CPA 3 RHs by Cambodian side.

4.5.3 Activities

Project activities are specific action intended to produce the outputs through effective use of the inputs. The following activities were agreed upon in the discussion time between MOH and Japanese side during the Preliminary Study.

(1) Activities to realize the output 1

- 1) Design and introduce the medical equipment inventory.

- 2) Enhance knowledge of HSD staff on medical equipment management administration.
- 3) Verify and give advice on existing policy guidelines (i.e., policy document, implementation plan and guidelines, and basic maintenance) on medical equipment management, based on the experience from project activities, as needs arise.
- 4) Provide on-site guidance to medical equipment managers and technicians at the target NHs and CPA 3 RHs.
- 5) Conduct regular monitoring and evaluation on all the above activities.
- 6) Give advice to MOH and donors for appropriate supply of new medical equipment to hospitals.

(2) Activities to realize the output 2

- 1) Develop the medical equipment maintenance manuals and checklist for target NHs and CPA 3 RHs (i.e., medical equipment inventory, activity record, inspection standard and reporting).
- 2) Conduct needs assessment on medical equipment technicians at target NHs and CPA 3 RHs.
- 3) Provide technical training of trainers (TOT) for NW staff.
- 4) Develop training curriculum (i.e., preventive maintenance, maintenance planning, inventory management, minor repair, and reporting) for medical equipment technicians of NHs and CPA 3 RHs.
- 5) Prepare a training handout for medical equipment technicians of target NHs and CPA 3 RHs.
- 6) Provide technical training for medical equipment technicians at HSD, target NHs and CPA 3 RHs.
- 7) Evaluate the above (2-6.) technical training.
- 8) Conduct follow-up supervision for the ex-trainees at their workplace.
- 9) Hold brush-up meetings with medical equipment technicians of target NHs and CPA 3 RHs at NW to promote usage of maintenance manuals and checklist.

(3) Activities to realize the output 3

- 1) Provide TOT for HSD staff for medical equipment management training program.

- 2) Develop the medical equipment management manual to PHDs, target NHs and CPA 3 RHs. (i.e., inventory management, management of technicians, maintenance planning, and reporting protocol).
- 3) Conduct training needs assessment of medical equipment managers at PHDs, target NHs and CPA 3 RHs.
- 4) Develop a training curriculum for medical equipment managers of PHDs, target NHs and CPA 3 RHs.
- 5) Provide training for medical equipment managers of PHDs, target NHs and CPA 3 RHs.
- 6) Evaluate the above (3-5.) trainings.
- 7) Provide follow-up supervision for the ex-trainees at their workplace.
- 8) Hold brush-up meetings with medical equipment managers and directors of PHDs, target NHs, and CPA 3 RHs at HSD to promote usage of management manual.

4.6 Input

4.6.1 Japanese side inputs

- Dispatch of Japanese experts
 - Long-term experts: Chief adviser
 - Short-term experts: Maintenance of medical equipment
 - Training planning
 - Medical equipment management system
 - Evaluation and monitoring
- Training of Cambodian counterpart personnel in Japan
 - Necessary equipment for project offices and basic maintenance tools for trainees at their workplaces.
- Provision of equipment
 - Necessary equipment and materials for the implementation of the Project.

4.6.2 Cambodian side inputs

- Counterpart and administrative personnel
 - Counterpart members from HSD and NW
 - Trainees from PHDs, target NHs and CPA 3 RHs
- Provision of offices, building and facilities
 - Land

Building and facilities: Training facilities (at NMCHC)

Project offices (both at MOH and NMCHC)

Services, such as the supply of electricity, gas and water, sewerage system and furniture necessary for the Project activities

Other facilities mutually agreed upon as necessary

- **Counterpart budget for the implementation of the Project**

Local costs for government staff including salary and facilities. Water, electricity and gas supply for project offices.

- **Establishment of the Joint Coordinating Committee**

For the effective and successful implementation of technical cooperation for the Project, a Joint Coordinating Committee will be established.

4.7 Important assumptions and risk analysis

4.7.1 Important assumptions

- In order to fulfill the above-mentioned activities, main counterpart members should keep working with the Project for harmonizing the project activities with the policy and strategies of MOH. Also trained medical equipment managers and technicians should follow the instructions provided by MOH.
- A majority of trained medical equipment managers and technicians should be continued working for the position.
- Refresher training to the ex-participants, who are managers and technicians, is expected to be provided by MOH. In addition, MOH is also expected to promote “medical equipment maintenance” to medical personnel at NHs and CPA 3 RHs and to improve the knowledge on its usage. This assumption is very important to realize the overall goal. Therefore, it is desirable that the Project confirms the implementation strategies of MOH during the project period.
- Extension of project activities to medical equipment maintenance managers and technicians at Operational District (OD), CPA 1 and 2 RHs is expected to be implemented by the MOH to attain the super goal.

4.7.2 Risk analysis

Any serious and negative impact is not expected to occur in social and environmental aspects because the project aims to promote medical equipment maintenance and management and technical skills to the target NHs and CPA 3 RHs. However, following factors are addressed

as potential risks of the Project at the present moment:

- Lack of human resources for medical equipment technicians will fail to provide appropriate medical equipment management skills to the projects targets. Therefore, medical equipment maintenance managers and technicians should be assigned officially by the MOH at the target NHs and CPA 3 RHs before launching the Project.
- Many of the medical equipment technicians do not complete high school or receive equivalent education. Therefore, the Project should pay attention that curriculum and teaching materials fulfill the knowledge and skills from the viewpoint of basic management and maintenance activities.

Report on PCM workshop

During the preparatory study, a PCM workshop was held at NMCHC on 13 and 14th October 2005. Thirty-eight Cambodians took part in the workshop. They were project stakeholders from MOH, NMCHC, PHDs, NHs, and RHs. The Japanese study team members and personnel from related projects and organizations also joined the workshop. The workshop's objectives were to:

1. Identify situations of NHs and RHs and existing problems in repair, maintenance and management systems of medical equipment.
2. Discuss approaches to take in the new project.
3. Clarify perspective and range of activities of the new project.

The workshop consisted of two steps of analysis and formulation of PDM, a standard method in project planning.

<Analysis>

- Problem Analysis: Clarify the problems facing a target group which is a major beneficiary of the project.
- Project Selection: Identify the scope of the project by comparing alternative approaches of project proposals.

<Planning>

- Formulation of PDM: Based on the discussion and the output in the above-mentioned analysis stages, formulate the framework of a project by using Project Design Matrix (PDM), a standardized format.

In the Project analysis, participants identified 6 major causes of the core problem, "Medical equipment at NH and CPA 3 RH are not well maintained". They are: (1) Technicians do not provide adequate maintenance service; (2) Medical equipment managers do not manage the equipment properly; (3) The system for medical equipment management is not well established; (4) Operators do not have the right skills for using medical equipment, (5) Infrastructure is poor; and (6) Spare parts are unavailable. The identified causes led to the following six project approaches: (1) Capacity building of medical equipment technicians; (2) Capacity building of medical equipment managers; (3) Improvement of the medical equipment management system, (4) Skill development of medical equipment users; (5) Improvement of infrastructure; and (6) Improvement of spare parts availability.

In the Project selection process, participants voted on the priority of project intervention among the six approaches. Criteria for the project selection were: Urgency, Feasibility, Cost effectiveness (Efficiency), Positive Impact, and Sustainability. Here is the rating system: 3 points for high priority, 2 points for medium and 1 point for low. As the following table shows, the first and second approaches received the highest scores. The third and fourth approaches recorded about the same level of priority. Since the third approach "Improvement of the medical equipment management system" is closely related to the first and second approaches, participants decided to include those three approaches in the project framework. Participants made the PDM based on the selected approaches. Details are in Chapter 4 of the report.

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Approaches /Selection Criteria	A: Capacity building of medical equipment technicians	B: Capacity building of medical equipment managers	C: Improvement of the medical equipment management system	D: Skill development of medical equipment users	E: Improvement of infrastructure	F: Improvement of spare parts availability
Urgency	95	92	88	89	79	83
Feasibility	76	81	75	74	61	51
Efficiency	77	72	75	77	63	62
Positive Impact	74	74	75	72	71	70
Sustainability	82	81	79	78	73	62
Total	404	400	392	390	347	328

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ANNEX II: Project Design Matrix (PDM)

Title: Promotion of Medical Equipment Management System

Target Area: Whole Cambodia

Target Group: Medical equipment managers and technicians at target NHs, PHDs and CPA3 RHs

Indirect Beneficiary: Patients of NHs and CPA3 RHs

Super Goal: Basic maintenance of medical equipment is conducted at all RHs

Duration: January, 2006–December, 2008

Version: PDM0

Narrative Summary	Objectively Verifiable Indicator	Means of Verification	Important Assumption
<p>[Overall Goal] Basic maintenance of medical equipment is conducted at NHs and CPA3 RHs.</p>	<ul style="list-style-type: none"> * Operable rate of medical equipment is improved for all medical equipment at NHs and CPA3RHs. * Estimated equipment life is fulfilled for all medical equipment at NH and CPA3 RHs. * Number of preventive maintenance are increased while repair cost is decreased, during the estimated equipment life. * Number of minor repair service by maintenance workshops at CPA3RH makes constant increase, while the one of NW decreases. 	<ul style="list-style-type: none"> * Annual activity report of NHs and CPA3RHs * Inventory data at HSD * Accounting book of NH and CPA3RHs * Annual activity report of PHDs, HSD and NW 	<ul style="list-style-type: none"> * Medical equipment maintenance managers and technicians are assigned at OD, CPA1 and CPA2 RHs, and Project activities are extended to them.
<p>[Project Purpose] Basic maintenance and management activities for medical equipment are introduced at target NHs and CPA3 RHs, by following the instruction of MOH and PHDs, and by receiving technical guidance of NW.</p>	<ul style="list-style-type: none"> * Target NHs and CPA3 RHs submit annual activity report on medical equipment management to PHDs and HSD. * Based on the instruction manuals and checklist of medical equipment, periodical check and maintenance are conducted at target NHs and CPA3 RHs. * Maintenance and management plans are prepared and followed at target NH and CPA 3 RH. 	<ul style="list-style-type: none"> * Maintenance activity plan of NHs, CPA 3 RHs and PHDs * Reports from NHs, CPA 3 RHs and PHDs 	<ul style="list-style-type: none"> * Refresher training is provided to ex-participants * Training is provided to managers and technicians of other PHDs and CPA3 RHs. * Medical personnel at NHs and CPA3 RHs improve the knowledge on medical equipment usage.

<p>[Outputs]</p> <ol style="list-style-type: none"> 1. Administrative instruction of HSD of MoH on medical equipment management for target NHs and CPA3 RHs is strengthened, with technical guidance of NW. 2. Technical skill of medical equipment technicians in target NHs and CPA3 RHs is improved. 3. Management skill of medical equipment managers in target NHs, CPA3 RHs, and PHDs is improved. 	<p>For Output 1</p> <ol style="list-style-type: none"> 1. Inventory is completed and regularly updated. 2. Monitoring trip by HSD and maintenance service by NW are regularly conducted, and findings are fed back to their activity plans. 3. HSD prepares annual work plan by considering available human resources, financial resources, and materials. 4. HSD prepares quarterly report of their activities, and analyzes the progress. <p>For Output 2 and 3</p> <ol style="list-style-type: none"> 1. Number of trainees and instructors trained. 2. Number and types of training courses. 3. Number and types of developed manuals, checklist, curriculum and training handouts. 4. Difference in scores of pre-test and post-test conducted in the training course makes constant progress. 5. Project team's monitoring results for ex-participants make constant progress. 	<ul style="list-style-type: none"> * Project report of HSD and NW * Inventory data * Annual report of HSD and NW * Training report (i.e., test results, supervision results, and questionnaire survey results) 	
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<p>【Activity】</p> <p>1-1. Design and introduce the medical equipment inventory.</p> <p>1-2. Enhance knowledge of HSD staff on medical equipment management administration.</p> <p>1-3. Verify and give advices on existing policy guidelines (i.e. policy document, implementation plan & guideline, and basic maintenance) on medical equipment management, based on the experience from project activities, as needs arise.</p> <p>1-4. Provide on-site guidance to medical equipment managers and technicians at target NHs and CPA3 RHs.</p> <p>1-5. Conduct regular monitoring and evaluation on all above activities.</p> <p>1-6. Give advice to MOH and donors for appropriate supply of new medical equipment to hospitals.</p> <p>2-1. Develop the medical equipment maintenance manuals and checklist to target NHs and CPA3 RHs (i.e. medical equipment inventory, activity record, inspection standard, and reporting).</p> <p>2-2. Conduct needs assessment on medical equipment technicians at target NHs and CPA3 RHs.</p> <p>2-3. Provide technical training of trainers (TOT) for NW staff.</p> <p>2-4. Develop training curriculum (i.e. preventive maintenance, maintenance planning, inventory management, minor repair, and reporting) for medical equipment technicians of target NHs and CPA3 RHs.</p> <p>2-5. Prepare training handout for medical equipment technicians of target NHs and CPA3 RHs.</p> <p>2-6. Provide the technical training for medical equipment technicians at HSD, target NHs and CPA3 RHs.</p> <p>2-7. Evaluate the above (2-6) technical training.</p> <p>2-8. Conduct follow-up supervision for the ex-trainees at their workplace.</p> <p>2-9. Hold bluish-up meetings with medical equipment technicians of target NHs and CPA3 RHs at NW to promote usage of maintenance manuals and checklist</p>	<p>【Input】</p> <p>Japanese Side <Personnel> Long-term experts (HSD and NW)</p> <p>Short-term experts 2. PHD, NH and CPA 3 RH</p> <p><Equipment and Materials> Basic maintenance Materials tool</p> <p>Necessary equipment for Project Office</p> <p><Training in Japan> <Budget> Local cost for government staff including salary and facilities. Water, electricity and gas supply for project offices.</p>	<p>* Majority of trained medical equipment maintenance managers and technicians continue working for the position.</p> <p>* Main counterpart members remain working for the Project</p> <p>【Pre-Condition】</p> <p>* Appropriate medical equipment managers and technicians are assigned at target NH and CPA 3 RH</p>
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<p>3-1. Provide TOT for HSD staff for medical equipment management training program.</p> <p>3-2. Develop the medical equipment management manual to PHDs, target NHs and CPA3 RHs (i.e. inventory management, management of technicians, maintenance planning, and reporting protocol).</p> <p>3-3. Conduct training needs assessment of medical equipment managers at PHDs, target NHs and CPA 3 RHs.</p> <p>3-4. Develop training curriculum for medical equipment managers of PHDs, target NHs and CPA 3 RHs.</p> <p>3-5. Provide training for medical equipment managers of PHDs, target NHs and CPA 3 RHs.</p> <p>3-6. Evaluate the above (3-5) training.</p> <p>3-7. Provide follow-up supervision for the ex-trainees at their workplace.</p> <p>3-8. Hold bluish-up meetings with medical equipment managers and directors of PHDs, target NHs, and CPA3RHs at HSD to promote usage of management manual.</p>		
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Abbreviation: National workshop: NW; Hospital service department: HSD; Provincial Health Department: PHD; Referral Hospital: RH; Training of Trainers: TOT; Ministry of Health: MOH; Operational District: OD; Complementary Package of Activities: CPA

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ANNEX III: Plan of Operation (PO)

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Activities	2006												2007												Implementer	Experts in charge	Note
	2006												2007														
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12			
1-Administrative functions of HSD for MOH (for medical equipment management) for target NHs and CPA3 RHs																											
1-1 Design and introduce the medical equipment inventory.																										HSD	C&S1
1-2 Enhance knowledge of HSD staff on medical equipment management administration																										HSD	C
1-3 Verify and give advices on existing policy guidelines on medical equipment management, based on the experience from project activities, as needs arise.																										HSD	C
1-4 Provide on-site guidance to medical equipment managers and technicians at target NHs and CPA3 RHs.																										HSD	C&S2, 4
1-5 Conduct regular monitoring and evaluation on all above activities																										HSD	C
1-6 Give advice to MOH and donors for appropriate supply of new medical equipment to hospitals.																										HSD	C
1-7 Hold Joint Coordination Committee (JCC)																										MOH	C
2-Technical skill for medical equipment maintenance staff in target NHs and CPA3 RHs is improved																											
2-1 Develop the medical equipment maintenance manuals and checklist to target NHs and CPA3 RHs (i.e. medical equipment inventory, activity record, inspection standard, and reporting).																											
2-2 Conduct needs assessment on medical equipment technicians at target NHs and CPA3 RHs.																											
2-3 Provide technical training of trainers (TOT) for NW staff																											

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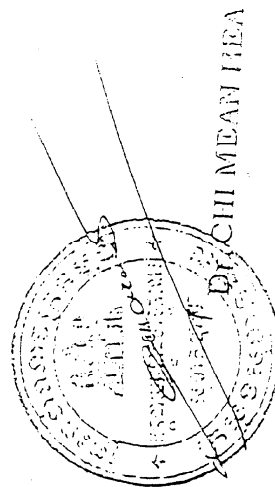
List of Medical Equipment Managers and Technicians

No	Name of Province/NH/MoH	Name of ME Manager at PHD	Name of ME manager at CPA3 RH/NH	Name of Technician at CPA3 RH/NH/MoH
1	Prey Veng	Dr. Nhoek Dim Nora (DD) Ph. Ork Odom	Dr. Tim Kosal (D) Mr. Ghern Sophak	Mr. Mak Van Mr. Him Sear
3	Slem Reap	Dr. Ly Tung (DD) Dr. Eab Bun Loeun	MA. Mol Neng Ph. Sam Sela Vichelh	Mr. Muth Samay Mr. Son Bunna
3	Kampong Chhnang	Mr. Phan Chandara Mr. Penh Savuth (Inventory)	Dr. Nhoung Kho Sok (DD) Mr. Vong Vichet (Chief nurse)	Mr. Kong Hoeun Mr. Nhem Choeun
4	Battambang	Dr. Nhek Bun Chhup (D) Mr. Kim Heng (Accounting)	Mr. Chhim Narin (Inventory) Dr. Ngo Sithy (D)	Mr. Thuy Samith Mr. Chea Chhaya
5	Siung Treng	Dr. Nuon Phoeur (DD) Mr. Kim Vathak (Nurse)	Mr. Yun Tay An (In Charge Inventory) Mr. Do Sothy (DD)	Mr. Sim Siratha Mr. Sam Meal
6	Kampong Cham	Ph. Chheng Sena (DD) Mr. Prak Moeun	Mr. Mam Sivuth (Accounting) Mr. Song Meng (Vice Chief Ad. Office)	Mr. San Sophan Mr. Mean Sophak
7	Pursat	Dr. Ky Kleng Hong (DD) Dr. OuK Phearith	Mr. Kim Eang (Inventory) Dr. Tann Lao Hy (DD)	Mr. Tii Sim Mr. Song Samy
8	Koh Kong	Dr. Toev Moeng (DD) Ph. Ou Kimsan	Mr. Men Sameth Dr. MATH Ly Zay Nob	Mr. Chum Sophan Mr. Suon Samith
9	Kandal	Dr. Keam Piseth (Technical group) Ph. Sok Sam Ang (Pharmacy store)	Dr. Kong Chhun Ly (D) Ph. Ren Sokha	Mr. Chum Panha Mr. Men Ya

ANNEX IV

20	Preah Bat Ang Duong Hospital (NH)	Dr. Sea Huong (D)	Mr. Ung Leak Tola
21	National Pediatric Hospital (NH)	Dr. Chhuo Dady	Mr. Klok Sola
22	Khmer-Soviet Friendship Hospital (NH)	Dr. Kdan Yuvalha	Mr. Nel Vichea
23	HSD, MoH	Dr. Kel Vansih	Mr. Noun Eng
		Dr. Kheang Yana (DD)	Mr. Chiv Chinbanaul
		Dr. Tan Phally	Mr. Long Borin
			Mr. Pen Sophy
<p>Note: Managers of ME: 18 at PHD; 18 at RH and 4 at NH. Total = 40 Managers of ME</p> <p>Technicians of ME: 18 at RH; 4 at NH and 2 at MoH. Total = 24 Technicians of ME</p> <p>Abbreviation: D=Director; DD=Deputy Director; Ad=administration; NH= National Hospital; PHD=Provincial Health Department; RH=Referral Hospital; CPA= Complementary Package of Activity.</p>			

Seen and Approved
 Director General for Health
 Deputy Director General for Health



Phnom Penh, October 27, 2005

Director Hospital Services Department

(Signature)

Dr. SANN SARY

(Handwritten initials)