


No. 001

Ministry of Health
Syrian Arab Republic

**BASIC DESIGN STUDY REPORT
ON
THE PROJECT
FOR
IMPROVEMENT OF
THE MEDICAL EQUIPMENT
IN
DAMASCUS HOSPITAL
IN
THE SYRIAN ARAB REPUBLIC**

MARCH, 1997

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PREFACE

In response to a request from the Government of the Syrian Arab Republic the Government of Japan decided to conduct a basic design study on the Project for Improvement of the Medical Equipment in Damascus Hospital and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Syria a study team from September 19 to October 19, 1996.

The team held discussions with the officials concerned of the Government of Syria, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Syria in order to discuss a draft basic design, and as this result, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Syrian Arab Republic for their close cooperation extended to the teams.

March, 1997



Kimio Fujita

President

Japan International Cooperation Agency

March, 1997

Letter of Transmittal

We are pleased to submit to you the basic design study report on the Project for Improvement of the Medical Equipment in Damascus Hospital in the Syrian Arab Republic.

This study was conducted by International Techno Center Co., Ltd., under a contract to JICA, during the period from September 5, 1996 to March 24, 1997. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Syria and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,

Shigetaka Tojo
Project manager,
Basic design study team on
the Project for Improvement of the
Medical Equipment in Damascus Hospital
International Techno Center Co., Ltd.

**BASIC DESIGN STUDY REPORT
ON
THE PROJECT
FOR
IMPROVEMENT OF MEDICAL EQUIPMENT
IN DAMASCUS HOSPITAL
IN THE SYRIAN ARAB REPUBLIC**

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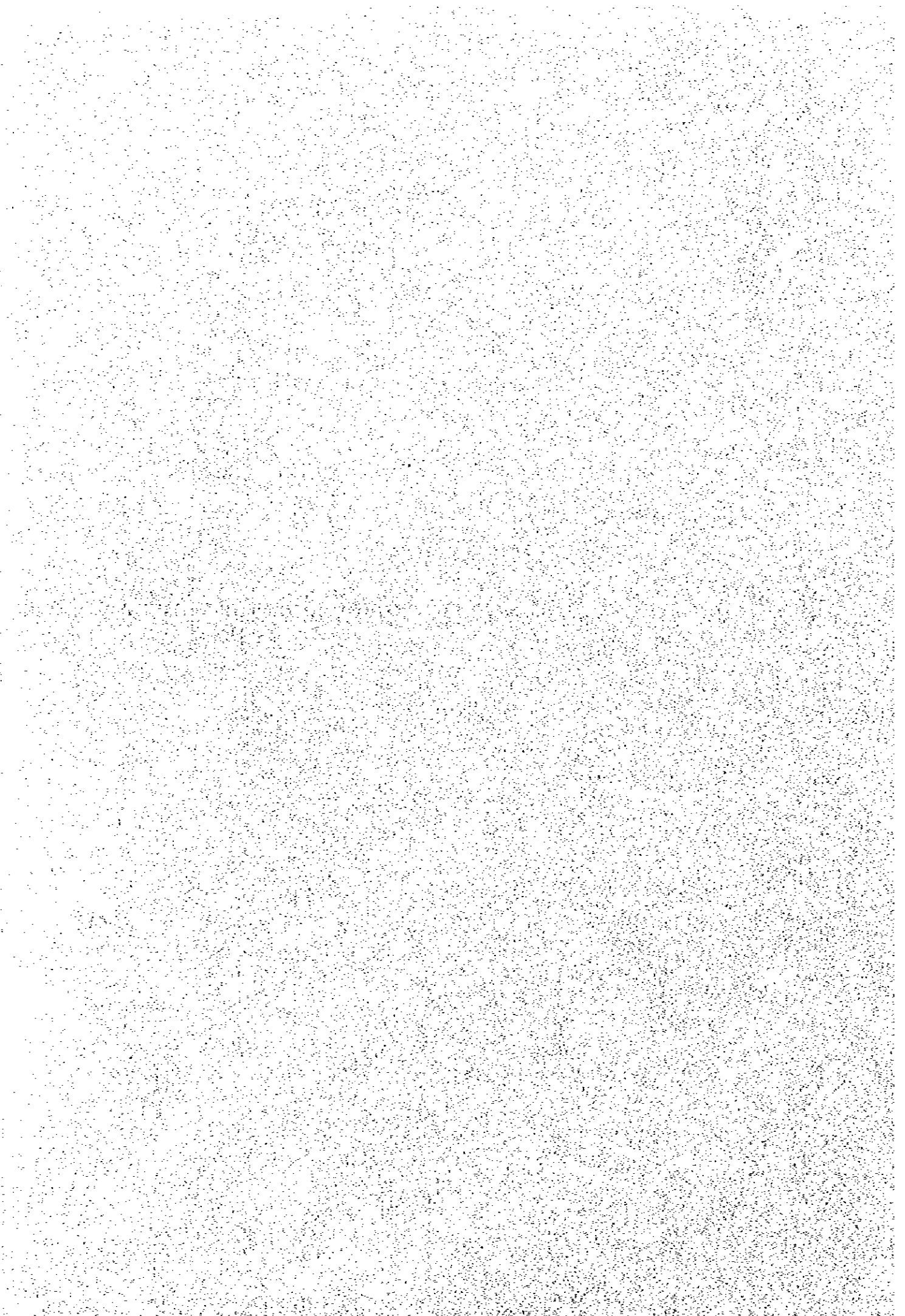
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Chapter 1 BACKGROUND OF THE PROJECT



Chapter 1 Background of the Project

Syrian Arab Republic (hereinafter referred to as Syria), which has a population of about 15 million, is located in the east of the Mediterranean Sea. Syria has a land area of approximately 190,000 sq km, which is about half the size of Japan. It is bordered by Turkey in the north, Iraq in the east, Jordan in the south, and Lebanon and the Mediterranean Sea in the west. A wide range of land forms are found in Syria: a Mediterranean coastal plain, which is the center of agriculture, industry and marine transportation; a mountainous region which extends from the coastal plain with a series of hills and mountains; a flat inland with natural vegetation which expands in the east of the mountainous region; and a desert region which occupies the central area and the eastern and southeastern area of the country. About 30% of the land is under cultivation; 50% is in steppe; and the remaining 20% is in woodlands, rocky mountains, and deserts.

Syrian economy experienced a rapid growth in the 1970s, but it stagnated throughout the 1980s because of poor agricultural productions from bad weathers and of increased defense spendings. Since 1990, in correspondence with changes of the international environment which surrounds Syria, the government has adopted a new foreign policy and a policy of economic liberalization. Firstly, the establishment of new relations with other countries has increased economic cooperations with other Arab nations as well as with western countries. This has resulted in creation of new overseas markets for Syrian agricultural products and industrial goods, and it has also brought a renewed flow of financial assistance from international financial agencies. Secondly, crude oil productions have increased rapidly while the domestic consumptions of crude oil are being held low. This is a result of increased use of natural gas, which is made available by a maturing energy industry. As a result, a substantial portion of the crude oil which Syria produces is now directed for import. Thirdly, the private sector has been encouraged to play an active role in the economy, and exports are increasing. In these favorable conditions, the economy is now growing smoothly.

Geographical and historical factors have contributed to the concentrations of people to urban cities. In 1991, the populations of the Governorate of Damascus, the Province of Damascus, and Syria as a whole were 1,434 thousands, 1,302 thousands, and 12,529 thousands, respectively. In 1995, the population of Syria reached 14,186 thousands. If the populations in the above respective areas in 1995 are compared to those in 1991 in percentage, then the populations grew to 101% (1,489 thousands) in the Governorate of Damascus, to 131% (1,730 thousands) in the Province of Damascus, and to 112% in Syria as a whole. Population increase is particularly serious in the Province

of Damascus, which surrounds the Governorate of Damascus. In average, the Governorate of Damascus and the Province of Damascus experienced a population increase of 15% and grew to 115% (3,218 thousands) of that in 1991. Such concentrations of population are also seen in Aleppo and Homs, which are provincial cities important as transportation links. On the other hand, the concentration of population is rare in Derezor province in the desert and Idlib province in the mountains.

Health care needs in Syria are characterized by cardiovascular diseases and injuries, which are major causes of death among adults, and by antenatal anomaly and congenital anomaly, which are major causes of death among infants. Infections, which are prevalent in other developing countries, are not a serious problem in Syria.

Medical facilities in Syria are categorized into those which are administered by the Ministry of Health; other public facilities which are administered by the Ministry of Higher Education, the Ministry of Social Welfare, and the Ministry of Defense; and private hospitals and clinics. The Ministry of Health administers 53 facilities throughout the country. Most people receive medical examinations and treatments at these medical facilities. Changes in the number of hospitals and in health service activities are shown in Tables 1-1 and 1-2, respectively. As seen from these tables, efforts of the Ministry of Health are directed to establishing medical facilities in the provinces for the purpose of rectifying regional differences in provision of medical services as the services tend to concentrate in urban cities because of geographical and economical reasons which are favorable to large cities. Some projects for improving the existing medical facilities are carried out in cooperation with other countries. For example, six provincial hospitals which had been constructed with funds from the coffer of the national government were provided with medical equipment in cooperation with Kuwait Fund a few years ago, and it was a substantial contribution to the improvement of the health care system. At present, major medical facilities are distributed throughout the country as shown in Fig. 1-1.

Table 1-1: Hospitals in Syria

| | National Hospitals | | | | Private Hospitals | |
|------|--------------------|-------|------------------|-------|-------------------|-------|
| | MOH | | Other Ministries | | Private | |
| | hospital | beds | hospital | beds | hospital | beds |
| 1970 | 28 | 3,099 | 7 | 2,312 | 49 | 1,196 |
| 1995 | 53 | 9,670 | 24 | 8,395 | 218 | 4,050 |

Table 1-2: Number of Patients of MOH and MOE

| | Beds | Number of Patients | | |
|------------------------------|-------|--------------------|--------------|-------------|
| | | Emergency Dept | Out-patients | In-patients |
| Ministry of Health | 9,670 | 1,214,054 | 199,127 | 474,768 |
| Ministry of Higher Education | 3,992 | 281,845 | 380,974 | 184,027 |

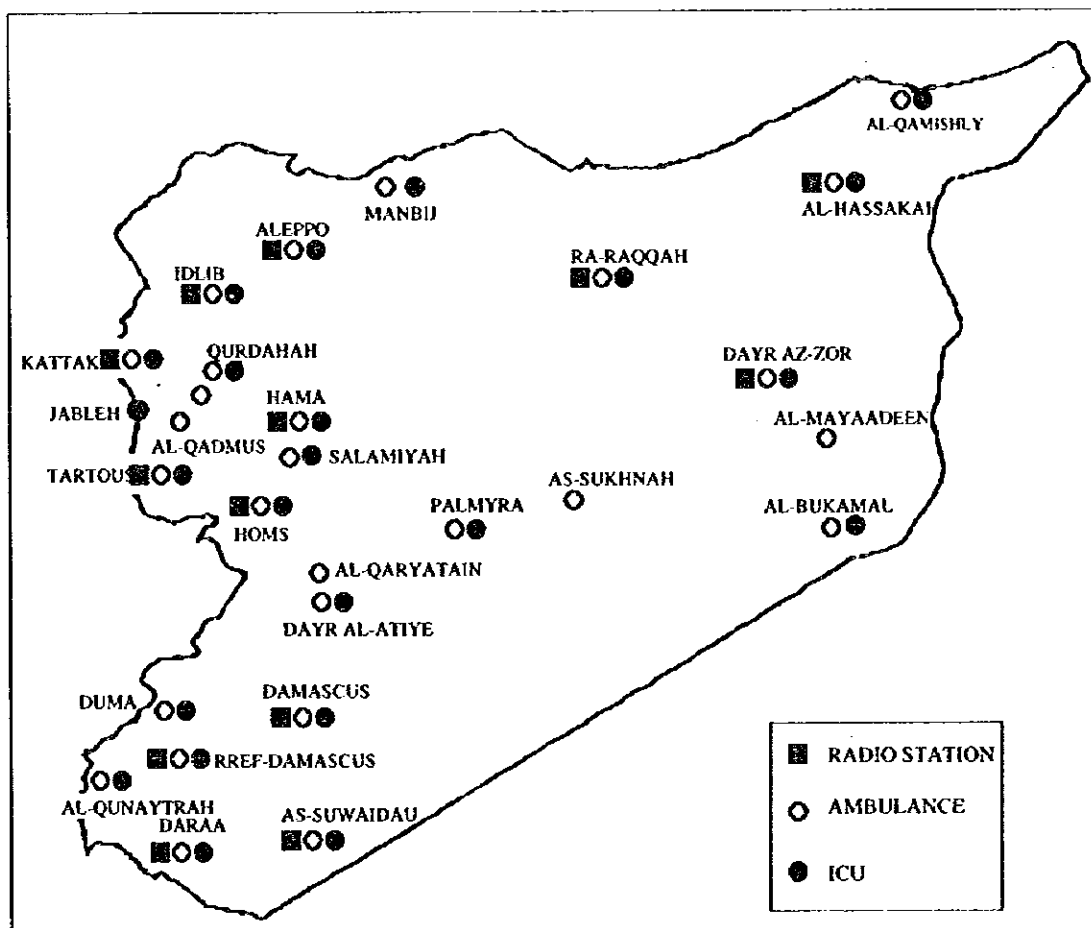


Figure 1-1: Nationwide Emergency Care System

In addition, the Ministry of Health has placed priorities to provision of primary health care (PHC) and to improvement of patient transportation in the emergency care system. Results of the promotion of PHC are seen in the infant mortality rate, which has substantially decreased since the 1970s, and in the vaccination rate, which now covers most of the children. As for the provision of emergency care, personnel have been developed and trained, medical facilities have been equipped with essential medical equipment, and the system for maintaining the medical equipment has been

improved. In connection to this effort, ambulances with radio equipment and emergency-care medical equipment have been provided as a grant by the Government of Japan.

Table 1-3 compares the numbers of hospital beds and medical personnel to the population. The condition of the national hospitals are much better with increased numbers of beds and nurses in 1995 than in 1970. These achievements are results of the efforts spent by the Ministry of Health in improving medical facilities and promoting efficiency in accordance with a policy of health care development, which will be mentioned later in this report.

Table 1-3: Population per Medical Personnels

| | 1970 | 1995 |
|------------------------------|--------|--------|
| beds per 100 thousand | 5 | 7 |
| population per bed, MOH | 1,165 | 771 |
| population per bed, others | 954 | 632 |
| population per health center | 21,651 | 16,159 |
| population per doctor | 3,855 | 916 |
| population per pharmacist | 7,301 | 2,677 |
| population per dentist | 16,641 | 1,765 |
| population per midwife | 11,055 | 2,344 |
| population per nurse | 4,466 | 613 |

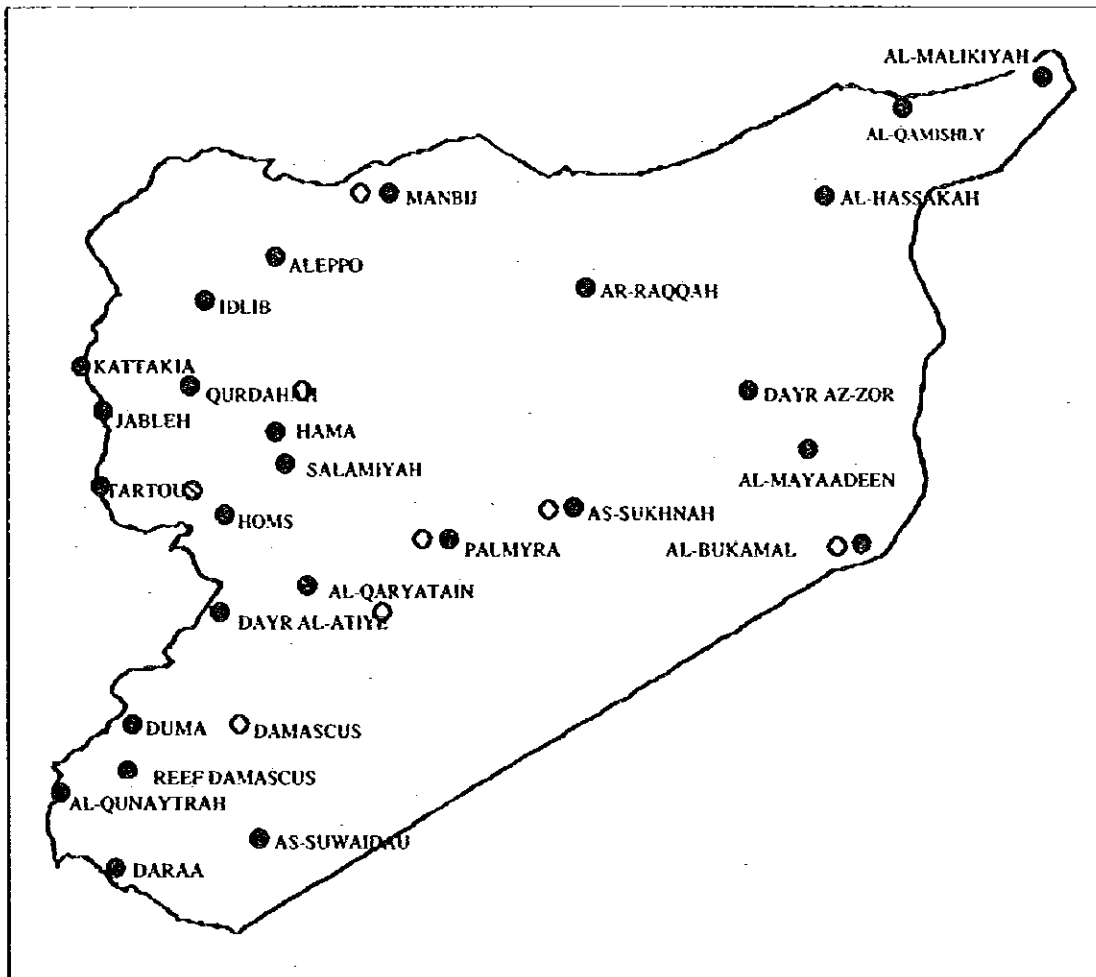


Figure 1-2: Major Hospitals (including those constructed by Project for Six Hospitals)

However, as the population increases while the economy develops, the need for medical services is rapidly increasing. The health care system, which has still wide regional differences in availability of medical services, is yet faced with many problems to be solved. In this condition, the government is actively promoting improvement of medical facilities and of administrations of these facilities on the present five-year health care program.

Medical facilities have been quantitatively improved on this program, and the number of patients treated in these facilities is increasing. Now, it is high time that the system were improved qualitatively as well. Qualitative improvement of the system can be realized by developing and training new medical personnel and positioning them appropriately throughout the country, by improving medical techniques, by enforcing rules of the existing referral system, and by alleviating congestions of patients at tertiary

medical care facilities and at the emergency departments of general hospitals.

These kinds of qualitative improvement are especially necessary for National Damascus Hospital because it plays a role of top referral hospital and teaching hospital in the system. Damascus Hospital treated about 160 thousand emergency patients and about 80 thousand outpatients in 1995. With such a large number of patients, the hospital is very crowded, and citizens' complaint of this problem has reached the Ministry of Health. Also, the personnel working in the hospital are strongly demanding improvement of the hospital. Moreover, the Ministry of Health is responsible for providing educational training to interns, and Damascus Hospital plays an important role on this matter by offering interns a series of specialized courses. The hospital trains about five hundred interns annually. In consideration of a special and important position of the hospital in the health care system, the ministry has recognized and has undertaken to solve the problems as an urgency so that the hospital will be revitalized to function as a top referral hospital in the referral system and to meet the need of medical services in the province of Damascus.

When the Ministry of Health first considered of building a new hospital as a top referral facility, the ministry was not able to secure a site which is as convenient as the location of National Damascus Hospital. Therefore, a decision has been made that the buildings and equipment of National Damascus Hospital be improved for the purpose of betterment of the system in view of ease of access by the people who live in the province of Damascus, which has a high concentration of population. Specific improvements to be made include: renovation of the buildings of the hospital; renewal and improvement of the functions of the hospital through reorganization; strengthening of educational and training activities; and renewal of the equipment including procurement of new items of equipment to suffice those items which are in shortage. These qualitative improvements are not only to strengthen the functions of National Damascus Hospital as the highest referral and teaching hospital in the system but also to improve the medical services qualitatively throughout the country through the referral system. Thus, this is one of the most important projects on the current program of the ministry.

At present, the Ministry of Health is renovating and expanding the existing buildings of National Damascus Hospital with funds coming from the government. Objectives of this renovation are: integration of intensive care units, which are located at several sections of the hospital at present; improvement in the control of outpatients and visitors; renovation of the sterilization system including partition of clean area from dirty area; and strengthening specific other functions of the hospital. The allocation of the funds including those requested for the construction work which is planned for the

administrative year 1998 has been already determined and approved by the government, and the budget for the construction work which starts in January 1998 is waiting to be approved by the parliament. This renovation work is now under way with the schedule and contents which are described on the following page. However, because the purchase of new equipment in such a large scale as planned for Damascus Hospital requires a substantial amount of foreign currency, it is difficult for the Government of Syria to carry out the project by itself. On this background, the Government of Syria has asked the Government of Japan for a grant in assistance to procure items of medical equipment which are needed for National Damascus Hospital on this project.

Chapter 2 CONTENTS OF THE PROJECT

Chapter 2 Contents of the Project

2-1 Objectives of the Plan

The Ministry of Health is actively working to improve the existing medical facilities, especially to strengthen activities which are carried out there. This includes improvement in the administrative systems of these facilities. This effort is directed to satisfy the ever increasing need of medical services and at the same time to rectify regional differences in the provision of medical services. As a measure to improve the health care system qualitatively for the purpose of raising the efficiency of the system, the Ministry of Health has given a top priority to improvement of National Damascus Hospital, which is the top referral hospital in the health care system and is a teaching hospital.

National Damascus Hospital has been in operation since the establishment 40 years ago, so the facilities and equipment used there are quite old and dilapidating. In this condition, the hospital cannot perform fully the roles of being a highest referral facility and a teaching hospital, and it cannot meet the increasing need for medical services in the province of Damascus. This project is to revitalize the hospital to the expected status.

Specific improvements to be made on the hospital include: renovation of the buildings of the hospital; renewal and improvement of the functions of the hospital; strengthening of educational and training activities; and renewal of the equipment including procurement of new items of equipment to suffice those items which are in shortage. At present, the Ministry of Health is renovating and expanding the existing buildings of the hospital with funds coming from the government, but it lacks funds in foreign currency for the purchase of new equipment. Therefore, the Government of Syria has asked the Government of Japan for a grant in assistance to procure medical equipment for the hospital.

Therefore, the object of this project is to procure medical equipment and educational and training equipment which can be effectively utilized in the improvement of the hospital. Specific items of the equipment to be procured on the project are determined in compliance with the system of grant assistance of the Government of Japan in analysis of the contents of the request presented by the Government of Syria and the present state of the hospital, which is described in the previous chapter.

2-2 Basic Concept of the Project

In this study, this project is considered not only as a project to improve the medical equipment of the Damascus Hospital but also as a project to improve the

functions of the hospital, and the study team advises the Syrian party to implement this project as such (refer to material 6, Minutes of the Meeting, and material 7, Chart of Project Concept). The study team has given advice specifically on organization and administration of the staff, reviewing of medical service from the patient side, monitoring of effects of the project after implementation, etc. in addition to renewal of the buildings and the equipment.

Here, only the basic concept of the project which is to improve the equipment with a grant from the Government of Japan is described, and the project which is seen as to improve the functions of the hospital will be described briefly later in the section of "Recommendations" of this report.

(1) Scope of Assistance

Damascus Hospital plays an important role in the health care system as a top referral hospital as well as a teaching hospital and is responsible for providing medical services to the people who live in the city and province of Damascus, which has a rapidly increasing population. Therefore, the field study was focused on understanding the disease patterns of Syria as a whole and of Damascus and the present state of Damascus Hospital, and the following data were collected in the study: the number of patients who are admitted at each department, the numbers of examinations and operations performed, the organization of the personnel, and the degree of dilapidation and the frequency of use of the existing medical equipment of the hospital.

The hospital treats about 160 thousand emergency patients and outpatients annually, and the existing items of medical equipment are more than ten years old with 7% of them being more than 20 years old. Thus, it is ascertained that improvement is necessary for all the existing departments of the hospital, and it is determined that this project include all these departments for improvement.

Renewal should be carried out for the items of the equipment which is determined too old to be operative for use in examinations and treatments performed at the departments. Items which are necessary for the operation of the hospital after the renovation of the buildings should be also procured. For this procurement, the items to be purchased should be planned in analysis of the new layout of the hospital. As for the departments of education and training, basic items of equipment should be procured to the lecture rooms and the emergency-care training center so that the hospital will be able to perform fully a role of educating and training interns and paramedics.

(2) Independency from the Renovation Work

This project involves the departments which provide examinations and

treatments, the lecture rooms, and the training center of Damascus Hospital. Because some items of the medical equipment which are planned for procurement on the project require some installation work, smooth progress in the construction work of the buildings especially for the sections which are planned for operation rooms, ICUs, sterilization rooms, mortuary rooms, physiotherapy rooms, and emergency care rooms is important for the successful implementation of this project. Therefore, the study team confirmed and ascertained the followings during the field study: the schedule of the renovation work has already been specifically decided, the funds necessary for the renovation work has already been allocated, and the agency which executes the work has been organized. As such, the implementation of this project can be planned in relation with the progress of the renovation work without any difficulty.

However, it is important for the implementation of this project to avoid any delay which might occur in relation with the progress of the renovation work of the buildings. Therefore, the items of equipment to be procured for the departments which are being renovated should be selected so as not to involve a lot of installation work. For this reason, simple or movable items of equipment, which only require plug-in of a power line, should be chosen. Figure 2-1 shows the schedule of the renovation work, which is carried out by the Ministry of Health.

| Work | Location | 1997 | | | | | | | | | | 1998 | | | | |
|---------------|----------------------|------|---|---|---|---|----|----|----|---|---|------|---|---|---|--|
| | | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 | 5 | | |
| Removal | 4F | | ■ | | | | | | | | | | | | | |
| | 3F | | | ■ | | | | | | | | | | | | |
| | 2F | | | | ■ | | | | | | | | | | | |
| | 1F | | | | | ■ | | | | | | | | | | |
| Renovation | Main Bldg A/4F ICU | | | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | |
| | Main Bldg A/3F | | | | | | | | ■ | ■ | ■ | ■ | | | | |
| | Main Bldg A/2F | | | | | | | | | | ■ | ■ | ■ | ■ | | |
| | Main Bldg A/1F | | | | | | | | | | | ■ | ■ | ■ | ■ | |
| | Main Bldg Exterior | | | | | | | | | ■ | ■ | ■ | | | | |
| Building Work | Main Bldg | | | ■ | ■ | ■ | ■ | | | | | | | | | |
| | Main Bldg Lift | | | | | | | ■ | | | | | | | | |
| Renovation | Outpatient Clinic/3F | | | ■ | ■ | ■ | ■ | | | | | | | | | |
| | Outpatient Clinic/2F | | | | | | ■ | ■ | ■ | | | | | | | |
| | Outpatient Clinic/1F | | | | | | | ■ | ■ | ■ | | | | | | |

Figure 2-1: Schedule of Renovation Work

(3) Securing Independent Development

The maintenance of the medical equipment of the hospitals which are administered by the Ministry of Health is covered by agreements which are signed between the ministry and providers of maintenance work. The maintenance of the medical equipment which is procured on this project will be carried out in the same manner, and the cost for signing such agreements will be secured in the budget of the ministry. As the budgets of the Ministry of Health and the Department of Health of Damascus Governorate have steadily increased in the past especially since 1992, it is judged that the future budgets can easily afford a little increase in the expenditure for the maintenance of the equipment including the items which are procured for Damascus Hospital on this project. However, in this basic design of the project, a top priority is to renew the items of equipment which are too old to be operative, without increasing the current maintenance cost. As for the items which are newly introduced, determination is made in consideration of their maintenance cost. Therefore, there will not be much increase in the expenditure for the maintenance of the equipment.

The purpose of the Government of Japan to grant assistance is to help self-effort of the recipient government, so the followings are agreed on after a discussion with the Government of Syria:

1. Basic medical equipment necessary for conducting examinations and treatments at Damascus Hospital shall be procured;
2. Basic equipment necessary for conducting educational and training activities at Damascus Hospital shall be procured;
3. The items of equipment which are to be procured shall be selected appropriately with respect to the maintenance capacity of the Ministry of Health; and
4. The project shall be planned in compliance with the policies of the system of grant assistance of Government of Japan.

2-3 Basic Design

2-3-1 Design Concept

(1) Protection against Natural Condition

Equipment which complies with JIS, BS, DIN, etc. has sufficient durability against the natural conditions such as temperature and moisture which prevail in the province of Damascus. Therefore, the equipment to be procured on the project shall be produced in compliance with one of these standards.

(2) Concerning Social Practice

The installation work of the equipment and the completion of the project can fall in January or February. Because these months are a period of Ramadan (fasting), special care should be paid in scheduling the implementation of this project, and cooperation should be encouraged by both the Syrian party and the Japanese party who carries out the project. From the experience of the implementation of the last project which was assisted by the Government of Japan, i.e., "Project for Improving Emergency Care System", it is presumed that the installation work even during Ramadan is possible through good communication and cooperation with the Syrian party though a little slowing may be expected. To secure smooth execution of the project, it is important that the local representatives of the manufacturers who will supply the equipment shall be also informed of and convinced on this matter before the implementation.

(3) Concerning Local Procurement and Local Representatives

There is no manufacturer in Syria who produces any item of the equipment which are planned for procurement on this project. Therefore, no item of the equipment shall be produced in Syria. However, if some items which are planned for procurement require periodical or special maintenance services, or consumables or reagents, then such specific items will be selected from manufacturers who have local representatives in Syria. In this case, such manufacturers can be any nationality including Japanese.

There are many local representatives of medical equipment manufacturers of various countries in Syria including Japan, European countries, the United States, etc. However, substantial differences exist in the form and technical level of services they offer. Therefore, the products which require services from the local representatives of the manufacturers shall be selected in consideration of the technical ability and experiences of the local representatives.

(4) For Ease of Maintenance

For the purpose of carrying out maintenance work on the equipment after the implementation of the project, personnel who will be in charge of operating the equipment shall be given instructions regarding how to carry out maintenance work and daily inspections on the equipment. In this respect, manuals and technical data necessary for maintenance work shall be provided together with lists of the manufacturers and their local representatives as reference.

(5) Selecting Equipment and its Grade

After analyzing the information collected in the field study, the items of equipment to be procured and their grades are decided in accordance with the policies of the basic design study. The quantities of the items are also determined appropriately after the analysis. These quantities are confirmed by the Syrian party after discussion in a meeting with the Japanese party, who presented the basic design of the project.

Items of Equipment

1. The items of equipment to be procured are those which are considered necessary for examinations and treatments performed at the departments which are included for improvement on this project, and

are considered appropriate as replacements of the existing items which have dilapidated with wear and tear, or

are considered appropriate as additions to the existing items so that the hospital can meet the current demand for medical services.

2. The equipment to be procured further includes those items which are to be used in lecturing interns in the lecture rooms of the hospital.

3. Also included are those items which are to be used in emergency care training at the emergency-care training center of the nursing school which belongs to Damascus Hospital.

Grades of the Items

1. The items of medical equipment to be procured are basic items which are necessary for examinations and treatments.

2. These items must be easily operable and maintainable by the staff of Damascus Hospital without requiring additional, special technique or knowhow.

3. These items should possess performance capacities which can meet the current numbers of examinations and treatments which are carried out by the hospital.

4. These items must be cost-effectively maintainable by the Ministry of Health.

Basis of Determination of Quantities

1. The quantities of the items to be procured are determined on the basis of the quantities of the existing items which are more than ten years old and are in need of replacement.

2. They are determined also in estimation of the quantities of the items which are considered short with regard to satisfying the current needs of the hospital.

3. The quantity of each item to be procured is determined appropriately in consideration of the quantities of other items which are related to it.

4. The quantities of the items to be procured are determined also in consideration of the space available for installation in the hospital after the renovation.

5. They are determined also in consideration of the examinations, treatments, and training activities which will be carried out at the hospital after the renovation.

(6) Concerning Work Schedule

It is important to pay attention to a period of Ramadan in scheduling the implementation of this project.

The implementation should disturb the other activities of the hospital as little as possible. As the installation work of the equipment overlaps the renovation work of the buildings in the schedule, the delivery and installation of the equipment should be well planned in discernment of the progress of the renovation work.

(7) Independency from Renovation Work

It is confirmed during the field study that the portion of the renovation work planned for 1997 has already started. However, even if the renovation work should delay by any reason, this project will be still implemented as scheduled without any delay. Therefore, the items of equipment to be procured are determined in consideration of the following points:

*These items must be installed easily without much installation work;

*If electricity or water supply is required, the items should be installed with a supply line which is extended from the currently existing facilities of the hospital; and

*Installation, adjustment, and training work, if required of the items, should be carried out by the local representatives of the manufacturers.

2-3-2 Basic Design

(1) Overall Plan

It is ascertained that many items of the existing equipment are dilapidated from an extensive use over a long period. The dilapidation and use of the existing equipment are exactly in such condition as described in the equipment list which was submitted with the request for assistance. Moreover, some items of the existing equipment, even they are operating, have a problem of unreliability in measurement.

As for the department of education and training, the procurement should include basic items which are used in education and training so that the hospital can play an

important role as a teaching hospital in developing and training interns and paramedics. Therefore, this project procures equipment necessary for the following departments:

| | |
|-----------------------------|----------------------------------|
| Gastrointestinal Department | ICU Department |
| Surgery Department | Ophthalmology Clinic |
| Emergency Department | Chest Disease Department |
| Laboratories | Sterilization Department |
| Dental Clinic | ENT Clinic |
| Pediatric Department | Cardiology Department |
| Neurosurgery Ward | Burns Plastic Surgery Department |
| Urology Clinic | Artificial Kidney Unit |
| Physical Therapy Department | X-ray Department |
| Morgue Unit | Operation Word |
| Lecture Hall | Emergency Training Center |

The items of equipment to be procured on the project must be operative and maintainable by the current staff of the hospital with the methods and techniques available for the staff at present. As such, items of medical equipment which require high or latest technologies are not procured on the project. Furthermore, the grade of each item is determined individually in comparison with that of the existing equipment so that the equipment selected can be operated by the existing staff of the hospital without any special training. Determining the grades of the items in this way also secures effective maintenance of the equipment, making maintenance service available in the current system, which involves the maintenance sections of the hospital and the Ministry of Health and manufacturers or their local representatives who are bound by agreements with the ministry.

The central supply and sterilization department and the mortuary are planned to be opened in the space on the ground floor of the main building, which is currently occupied by operation rooms. The Syrian party is requested that the renovation work for this section be carried out first with a top priority. Because the equipment to be used in the central supply and sterilization department and the mortuary requires some installation work, the renovation work for these sections must be completed before the installation work of the equipment. Also, the ICU department is planned to be opened on the top floor of the main building by moving the kitchen, which currently occupies the place, to another building. Therefore, the items to be procured for the ICU department are selected so as not to involve a lot of installation work. Nevertheless, the Syrian

party is requested to complete the renovation work of this section promptly.

(2) Equipment Planning

The items of the equipment to be procured for each department of the hospital are as follows. The items and their quantities are determined after studying the request and the condition of the existing equipment with a priority to replace the existing equipment in dilapidation. In addition, the items which are newly added or introduced on this project are determined in consideration of the needs of the departments which are seen from their activities. They are determined also in consideration of the conditions and performance of the existing items or items planned for procurement which are related to them in functions or use. For details, refer to a list which is provided at the end of this chapter. In the list, the condition of the existing equipment, the items originally requested by the Ministry of Health, and the items planned for procurement on the project are contrasted to one another for ease of comprehension.

Gastrointestinal Department

Among the 23 items which are originally requested, the items overlapping the equipment which the hospital has already purchased are rejected. Moreover, the items which are listed in the request but are only consumables or are just repetitions are also rejected. As a result, the following six items are selected for procurement. The quantities of these items are determined in analysis of the conditions and quantities of respective existing items in need of renewal. The five items except the endoscope cleaning cart are all in need of renewal after more than ten years of use. The endoscope cleaning cart should be introduced because the hospital does not have any cleaner specialized for washing endoscopes, colonoscopes, and gastroscopes at present.

| | |
|--|---|
| No. 28 Colonoscope | 2 |
| No. 49 Endoscopy Cleaning Cart | 1 |
| No. 56 Gasteroscope | 3 |
| No. 102 Scanner Ultrasonic General Purpose | 1 |
| No. 109 Sterilizing Unit Dry Heat | 2 |
| No. 111 Suction Unit | 1 |

ICU Department

The current intensive care units, which are located in three different places as ICU, CCU, and NICU with a total of 35 beds in the hospital, are planned to be integrated

into one ICU department with 14 beds on the top floor of the main building in the renovation work. The design and layout of the new ICU department have been all prepared including the transfer of the kitchen, which currently occupies the top floor. In the basic design study, the layout of the department was analyzed by positioning the existing equipment and the items requested for procurement on the drawing for pursuing practicality and effectiveness of the department in relation with other departments. As a result this analysis, two ICU systems each with seven beds are planned, requiring two central monitors, one for each system; 14 bed-side monitors, one for each bed; 14 syringe pumps and 14 infusion pumps, both, one for each bed; and two defibrillators, one for one system. The other items and their quantities are determined in consideration of the conditions of the existing items and the activities of the department.

| | | |
|---------|----------------------|----|
| No. 13 | Bed Side Monitor | 14 |
| No. 16 | Blood Gas Analyze | 1 |
| No. 22 | Central Monitor | 2 |
| No. 34 | Defibrillator | 2 |
| No. 42 | Electrocardiograph | 4 |
| No. 43 | Electrolyte Analyzer | 1 |
| No. 57 | Glucose Analyzer | 4 |
| No. 66 | Infusion Pump | 14 |
| No. 94 | ICU Bed | 14 |
| No. 115 | Syringe Pum | 14 |
| No. 123 | Ventilator | 6 |

Surgery Department

Among the 14 items which are originally requested for use in general surgery, the items which are considered not necessary for this department are rejected. Subsequently, four items are selected for procurement in consideration of operations performed at present. These items are to supplement the existing equipment. Procurement of a cell saver, which was strongly and repeatedly requested by the Syrian party, is rejected because it is judged inappropriate from a technical point. This rejection has been explained to the Syrian party.

Among these four items, the one item listed below, i.e., two glucose analyzers, will be used in the surgery department. However, the other three items will be used in the operation rooms. Therefore, these three items are categorized as equipment for operation rooms and are listed in an appropriate section of this chapter.

Ophthalmology Clinic

Damascus Hospital transfers patients who need highly complicated ophthalmological operations to Ibn Naphis Hospital, which specializes in ophthalmology in Damascus. Therefore, the items to be procured for the ophthalmology clinic are limited to those required for the hospital to function only as a kind of ophthalmic dispensary which can provide easy operations. From the 20 items originally requested, the items considered not necessary are rejected. As a result, the procurement includes only the items which are to replace the existing items that are more than ten years old. Operating tables and operation lights which are included in the request for this clinic are procured as equipment for operation rooms and are listed in an appropriate section. It is necessary to include an ophthalmic unit with a diagnostic table, which will be used in examinations and treatments at the clinic. The followings are the items which are to be procured for the ophthalmology clinic.

| | | |
|---------|----------------------------------|---|
| No. 54 | Eye Chart | 1 |
| No. 68 | Keratonometer | 1 |
| No. 71 | Lensometer | 1 |
| No. 84 | Ophthalmic Diagnostic Table Unit | 1 |
| No. 85 | Ophthalmic Magnet | 1 |
| No. 86 | Ophthalmoscope Direct | 2 |
| No. 87 | Ophthalmoscope Indirect | 1 |
| No. 91 | Perimeter | 1 |
| No. 100 | Retinoscope | 1 |
| No. 106 | Slit Lamp | 1 |
| No. 119 | Trial Lens Set Ophthalmic | 1 |

Emergency Department

From the 11 items originally requested, only examination lights, a dry-heat sterilizing unit, and a radiographic unit for general purpose are selected for procurement after a study and analysis is made of the condition of the existing equipment and the activities of the department. The examination lights and the sterilizing unit are needed as supplements for carrying out the current load of examinations and treatments, and the radiographic unit is to replace a broken-down X-ray apparatus of the department. In the field study, a plan to expand the ICU section of the emergency department was revealed

in detail as a part of the renovation of the buildings. After studying drawings of the renovation of the department and planned activities, four items including bedside monitors and their quantities are decided as listed below.

| | |
|--|---|
| No. 13 Bed Side Monitor | 4 |
| No. 52 Examination Light | 3 |
| No. 66 Infusion Pump | 4 |
| No. 96 Radiographic Unit General Purpose | 1 |
| No. 109 Sterilizing Unit Dry Heat | 1 |
| No. 115 Syringe Pump | 4 |
| No. 123 Ventilator | 1 |

Chest Disease Department

From the 16 items originally requested for use in treating chest diseases, nine items are selected for procurement as necessary for renewing the existing items which are more than ten years old, and the others are rejected as not necessary for renewal. Among the nine items selected, all the items except a lung-function diagnostic unit are used in operations for treating chest diseases. Therefore, these items are categorized as equipment for operation rooms and are listed in an appropriate section. Among the endoscopes which are originally requested, a mediastinal scope is rejected as inappropriate from a technical point. Instead, a thoracic endoscope and a bronchoscope are chosen for procurement. The thoracic endoscope will be used in operations, so it is categorized as equipment for operation rooms and are listed in an appropriate section. Thus, the items to be procured for the chest disease department are as follows.

| | |
|--|---|
| No. 73 Lung Function Testing Equipment | 1 |
| No. 131 Bronchoscope | 1 |

Laboratories

When the field study was conducted, there was disagreement between the Ministry of Health and the laboratory department of the hospital with regard to the items listed in the request. After the study team asked the Syrian party to compile a new list, a new list with 72 items was presented. As described in the equipment list which was submitted with the request, many items of the existing laboratory equipment are more than 15 years old. In addition, there is a problem of unreliability or inaccuracy with some instruments, and the quantities of the items of the existing equipment are not adequate in

view of the number of examinations which are performed there with the current number of staff. These 72 items of laboratory equipment which are requested are studied in necessity with a priority to renew the existing old equipment in analysis of the existing equipment and the examinations that are performed there.

Laboratory work of the hospital is carried out separately at the sections of biochemistry, microbiology, pathology, immunology, hematology, blood bank, etc. Therefore, the items which are determined for procurement are listed separately in accordance with these sections, with a quantity for each item.

Lab (Biochemistry)

| | | |
|---------|---------------------------------------|---|
| No. 8 | Automatic Diluter | 1 |
| No. 29 | Constant Temperature Circulating Bath | 1 |
| No. 44 | Electrolyte Analyzer Na,K,Cl | 1 |
| No. 61 | High Precision Analytical Balance | 2 |
| No. 69 | Laboratory Autoclave | 1 |
| No. 92 | Pipette Set | 1 |
| No. 107 | Spectrophotometer /Visible | 1 |
| No. 128 | Water Demineralizer | 1 |

Lab (Bacteriology)

| | | |
|--------|---------------------------------------|---|
| No. 25 | Centrifuge Tabletop | 2 |
| No. 29 | Constant Temperature Circulating Bath | 1 |
| No. 38 | Distilling Unit | 1 |
| No. 69 | Laboratory Autoclave | 1 |

Lab (Pathology)

| | | |
|--------|---------------------------------------|---|
| No. 10 | Balance Electronic | 2 |
| No. 11 | Bath Paraffin | 1 |
| No. 14 | Binocular Microscope | 1 |
| No. 29 | Constant Temperature Circulating Bath | 1 |
| No. 33 | Deep Freezer | 1 |
| No. 61 | High Precision Analytical Balance | 2 |
| No. 63 | Histology Staining Station | 1 |
| No. 69 | Laboratory Autoclave | 1 |
| No. 76 | Microtome (Rotary) | 1 |
| No. 77 | Microtome (Sledge) | 1 |

| | | |
|---------|----------------------------|---|
| No. 78 | Microtome Cryostat | 1 |
| No. 90 | Paraffin Oven | 1 |
| No. 92 | Pipette Set | 1 |
| No. 93 | Pipette Washer | 1 |
| No. 103 | Shaker for Tissue Fixation | 1 |
| No. 105 | Slide Warmer | 1 |
| No. 118 | Tissue Processor | 1 |
| No. 129 | Wax Dispenser | 1 |

Lab (Immunology)

| | | |
|---------|---------------------------------------|---|
| No. 14 | Binocular Microscope | 1 |
| No. 29 | Constant Temperature Circulating Bath | 2 |
| No. 61 | High Precision Analytical Balance | 2 |
| No. 69 | Laboratory Autoclave | 1 |
| No. 92 | Pipette Set | 1 |
| No. 109 | Sterilizing Unit Dry Heat | 1 |

Lab (Hematology)

| | | |
|--------|---------------------------------------|---|
| No. 14 | Binocular Microscope | 7 |
| No. 15 | Blood Cell Counter | 1 |
| No. 23 | Centrifuge hematocrit | 1 |
| No. 27 | Coagulometer | 1 |
| No. 29 | Constant Temperature Circulating Bath | 2 |
| No. 38 | Distilling Unit | 1 |
| No. 61 | High Precision Analytical Balance | 2 |
| No. 69 | Laboratory Autoclave | 1 |
| No. 92 | Pipette Set | 1 |

Lab (Blood bank)

| | | |
|--------|---------------------------------------|---|
| No. 23 | Centrifuge hematocrit | 1 |
| No. 25 | Centrifuge Tabletop | 1 |
| No. 29 | Constant Temperature Circulating Bath | 2 |
| No. 61 | High Precision Analytical Balance | 1 |
| No. 69 | Laboratory Autoclave | 1 |
| No. 92 | Pipette Set | 1 |
| No. 98 | Refrigerator Blood Bank | 2 |

Lab (Hormone)

| | | |
|--------|---------------------------------------|---|
| No. 8 | Automatic Diluter | 1 |
| No. 9 | Automatic Titration Device | 1 |
| No. 24 | Centrifuge Refrigerated | 1 |
| No. 25 | Centrifuge Tabletop | 1 |
| No. 29 | Constant Temperature Circulating Bath | 2 |
| No. 61 | High Precision Analytical Balance | 2 |
| No. 64 | Incubator Laboratory Thermocycling | 1 |
| No. 69 | Laboratory Autoclave | 1 |
| No. 79 | Mixer Clinical Laboratory | 1 |
| No. 92 | Pipette Set | 1 |

Lab (Electrophoresis)

| | | |
|--------|---------------------------|---|
| No. 45 | Electrophoresis Equipment | 1 |
|--------|---------------------------|---|

Sterilization Department

The existing sterilization equipment is severely worn out, and other equipment including supply lines, etc. in this department are also very old. Moreover, the area in use is not partitioned into a clean or sterilized section and a dirty or unsterilized section at present. However, this condition will be drastically improved by the creation of a new section for central supply and sterilization in the renovation work. Therefore, the items listed below are selected in analysis of the plan and layout drawings of the new section. In the selection process, items which are not appropriate for the sterilization department or those which are difficult to maintain are rejected, but items which are necessary for replacing the existing equipment are included. A disinfecter for medical waste, which was not originally listed in the request but requested at the time of the field study, is included for procurement in consideration of the policy of the Ministry of Health to control disposal of medical waste. This item is considered to help the hospital build a system for safe disposal of medical waste.

| | | |
|---------|--------------------------------|---|
| No. 55 | Gas Sterilizer | 1 |
| No. 62 | High Pressure Steam Sterilizer | 3 |
| No. 121 | Ultrasonic Cleaner | 1 |
| No. 127 | Washing Machine for Instrument | 1 |
| No. 136 | Disinfecter for Medical Waste | 1 |

Dental Clinic

From the six items requested for the dental clinic, a dental chair unit is judged as necessary to replace the existing unit, which has been in use since procurement 15 years ago. In integration with this dental chair unit, included for procurement are an electrosurgical unit for dentistry and a dental X-ray unit as a replacement of the existing unit, which is seven years old and not in good condition.

| | |
|------------------------------------|---|
| No. 36 Dental Chair Unit | 1 |
| No. 46 Electrosurgical Unit Dental | 1 |
| No. 132 Dental X-ray Unit | 1 |

ENT Clinic

From the eight items requested, two items are selected for procurement to renew the existing items which are more than 20 years old. In addition, a basic set of instruments for treatments is included as necessary. The other items are excluded as not necessary. The item, ENT treatment unit, will be procured in only one unit because of the limited space available in the clinic and the small size of examinations and treatments which are carried out there.

| | |
|---------------------------|---|
| No. 6 Audiometer | 1 |
| No. 50 ENT Treatment Unit | 1 |
| No. 74 Magnifier | 1 |

Pediatric Department

There is another hospital which specializes in obstetrics and gynecology in Damascus, so Damascus Hospital does not have a department for these specialties but has only a pediatric department. After studying the activities of this department, only basic items for general pediatric care are selected from the twelve items originally requested, omitting the items which are determined as unnecessary. In addition, sterilizers for nursing bottles, which are requested for the sterilization department, are included here for this department in consideration of convenience of use.

| | |
|--------------------------|---|
| No. 17 Blood Warmer | 1 |
| No. 52 Examination Light | 1 |
| No. 57 Glucose Analyzer | 1 |

| | | |
|---------|-------------------------------|----|
| No. 58 | Head Box | 10 |
| No. 82 | Nebulizer | 4 |
| No. 95 | Pulse Oximeter | 4 |
| No. 108 | Sterilizer for Nursing Bottle | 2 |
| No. 124 | Ventilator Neonatal | 4 |

Cardiology Department

Originally, eleven items were requested as items for Coronary Care Unit (CCU), and eight items were requested as those which are to be used in operations and in wards. After leaving out the items which overlap those requested for other departments or the items determined as not necessary, the items of CCU equipment judged necessary are listed for procurement with those for the ICU department because they will be used in the ICU department, which is expanded in the renovation. Furthermore, the items determined necessary for use in operations are categorized as equipment for operation rooms and are listed in an appropriate section. As a result, the following items will be procured for the cardiology department.

| | | |
|---------|----------------------------|---|
| No. 35 | Defibrillator | 1 |
| No. 42 | Electrocardiograph | 1 |
| No. 101 | Scanner Ultrasonic Cardiac | 1 |

Neurosurgery Ward

From the items originally requested for the neurosurgery ward, an electroencephalograph (EEG) and an examination light, which will be used in the ward, are selected for procurement. The items which are judged not necessary are excluded, and those which are judged inappropriate from a technical point are also excluded. The procurement of an examination light is necessary because the existing examination light is severely damaged. The items of ICU equipment requested for the neurosurgery ward are grouped with those items which will be procured for the ICU department.

| | | |
|--------|-------------------|---|
| No. 41 | EEG | 1 |
| No. 52 | Examination Light | 1 |

Orthopedic Surgery Department

From the 19 items originally requested for the orthopedic surgery department, the items necessary to replace the existing gyps cutter and other basic items are selected

for procurement. These items are mainly used for surgical operations, so they are categorized as equipment for operation rooms and are listed in an appropriate section. The other items are rejected because how they are used is not clear or technically questionable, or because they overlap items which are procured for other departments.

Burns Plastic Surgery Department

Burns of children are caused by accidents with hot water, tea, milk, or cooking oil, and those of adults are caused by accidents with gas cylinders used for cooking, which ignite the clothing, or by electrical accidents in factories. Treatment of burns has been given at the surgery department. However, along with the renovation of the buildings of the hospital, this new department is going to be established specifically for the treatment of burns. Among the items which were originally requested, those requested for use in operations are rejected because they overlap other items which are procured for other departments. After a study of the remaining items including the four items which are strongly requested by the Syrian party, five items are selected for procurement. Two items of these five items are planned to be used in operation rooms, so these two items are categorized as equipment for operation rooms and are listed in an appropriate section. Therefore, the following three items are procured for the burns plastic surgery department.

| | |
|-----------------------------------|---|
| No. 18 Burns Bath | 1 |
| No. 72 Lower Air Loss Bed | 3 |
| No. 51 Refregirater for skin bank | 1 |

Urology Department

The six items requested for this department are to renew the existing equipment, so they are determined appropriate for procurement in view of the dilapidated conditions of the respective items. These items are categorized as equipment for the artificial dialysis room of the urology clinic. The water treatment apparatus which are requested as an independent item in the list are grouped with the hemodialysis units as components because they are used together. A cystoscope, which this department lacks at present, is included for procurement because this item is determined necessary in view of the current demand for operations requiring a cystoscope. This cystoscope and the other items which will be used in operation rooms are categorized as equipment for operation rooms and are listed in an appropriate section.

Urology Clinic

| | |
|--|---|
| No. 102 Scanner Ultrasonic General Purpose | 1 |
| No. 109 Sterilizing Unit Dry Heat | 1 |

Artificial Kidney Unit

| | |
|-----------------------------------|---|
| No. 60 Hemodialysis Unit | 3 |
| No. 109 Sterilizing Unit Dry Heat | 1 |

Physiotherapy Department

From the 13 items requested, the items overlapping one another are excluded. The following seven items are selected for procurement, and their quantities are determined in analysis of the existing equipment and the activities of the department.

| | |
|-------------------------------------|---|
| No. 12 Bath Praffin Clinical | 1 |
| No. 53 Exerciser Neck | 2 |
| No. 59 Heating Unit Hot Pack | 2 |
| No. 65 Infrared Light | 8 |
| No. 81 Muscle Stimulator | 3 |
| No. 104 Short Wave Physical Therapy | 1 |
| No. 122 Ultrasound Physical Therapy | 3 |

X-ray Department

From the ten items requested, the items overlapping one another are excluded, and those requiring leading technology are rejected. Thus, an apparatus for fluoroscopy and radiography and a surgical microscope are selected for procurement. The existing general radiographic apparatus is very old and somewhat damaged, and the current demand for radiographic examinations is so large as to make the X-ray equipment in full operation. On this background, a general radiographic apparatus and an X-ray fluoroscopic apparatus are requested as separate items. To satisfy this request, the above X-ray apparatus for fluoroscopy and radiography is chosen for procurement to replace the existing general radiographic apparatus as well as to provide fluoroscopic function.

One of the two film processors of the department is damaged and not repairable. In this condition, one film processor, which was requested but was mistakenly not listed in the minutes of the basic design study, is included here as an item to be procured for this

department.

The surgical microscope, which was requested for this department but will be used in operation rooms, is categorized as equipment for operation rooms.

| | |
|---|---|
| No. 130 Radiographic & Floroscopic Unit General Purpose | 2 |
| No. 133 Film Processor | 1 |

Morgue Unit

There is a plan to build a mortuary in the renovation project. Therefore, a morgue refrigerator with a capacity of eight or nine bodies is selected for procurement in consideration of the size of the hospital.

| | |
|----------------------------|---|
| No. 80 Morgue Refrigerator | 1 |
|----------------------------|---|

Operation Ward

At present, each of the operation rooms is managed separately by a department which performs surgical operations in a respective specialty, and each operation room and the department which use it are not located on the same floor. This condition of the management of the operation rooms lacks efficiency without integrated use of not only the operation rooms but also equipment or instruments, and it also hinders smooth transportation of patients before and after operations. To solve this problem, the hospital is relocating the operation rooms and plans to place them under the management of a group of anesthetists so that the operation rooms will be easily accessible from each respective department and be managed effectively. These operation rooms are being rebuilt in a new layout in the renovation work, which is being carried out by the Syrian party at present. In this renovation, four operation rooms will be built on every floor from the first floor to the third floor.

Basic items of medical equipment are planned for procurement for these operation rooms, including operating tables, operating lights, anesthetizers, electrosurgical apparatus, monitors, suction apparatus, and items specialized for operations which are performed by each respective department. The items which are originally requested by each respective department for use in operations are categorized as equipment for operation rooms and are procured for the operation ward because these items will be installed and used in the operation rooms.

Renovation of Operation Ward

| | |
|-------|--|
| Floor | Present |
| GF | Surgery, Urology |
| 1F | Chest disease, Urology, ENT |
| 2F | Surgery, Orthopedics, Cardiology |
| 3F | Oral surgery, Orthopedics, Ophthalmology, Neurosurgery |

| Floor | After Renovation | Number of rooms |
|-------|--|-----------------|
| GF | (Sterilization, Physiotherapy, etc.) | ... |
| 1F | Chest disease, Urology, Cardiology, ENT | 4 |
| 2F | Surgery (2), Orthopedics (2) | 4 |
| 3F | Oral surgery, Burns, Ophthalmology, Neurosurgery | 4 |
| | | Total: 12 rooms |

Equipment for operation rooms

| | |
|---|----|
| No. 116 Table Operating | 12 |
| No. 83 Operating Light | 12 |
| No. 4 Anaesthesia Unit | 12 |
| No. 47 Electrosurgical Unit General Purpose | 12 |
| No. 40 ECG Monitor | 12 |
| No. 110 Suction Unit | 12 |
| No. 109 Sterilizing Unit Dry Heat | 3 |

For orthopedic surgery:

| | |
|------------------------------------|---|
| No. 1 Air Pressure Drill | 1 |
| No. 2 Air Pressure Oscillating Saw | 1 |

For neurosurgery:

| | |
|---------------------------------|---|
| No. 26 Coagulator | 1 |
| No. 97 Radiographic Unit Mobile | 1 |
| No. 112 Surgical Microscope | 1 |

For burns plastic surgery:

| | |
|---------------------------|---|
| No. 37 Dermatome Electric | 1 |
|---------------------------|---|

For chest surgery:

No. 117 Thoracendoscope 1

For urosurgery:

No. 32 Cystoscope 1

For ophthalmologic and ENT surgery:

No. 114 Surgical Microscope 1

Lecture Halls

There are two large lecture halls, which are used for holding seminars or symposiums, and four relatively small lecture rooms, which are used for giving lectures to interns. From the items originally requested, basic items which are determined necessary for use in giving lectures in these lecture halls and lecture rooms are selected for procurement. Pointers which were requested as independent items in the list are grouped with overhead projectors as accessories. Also, the item which was originally requested as mixers is confirmed as video projectors after a discussion. Slide projectors and overhead projectors are placed in the lecture rooms, one for each room, respectively. Video cassette recorders and TV sets are placed in the lecture rooms and in an editorial room, one for each room, and two video cameras are placed in the editorial room.

| | |
|-------------------------------------|---|
| No. 5 Video Projector | 2 |
| No. 19 Carousel Slide Projector | 4 |
| No. 89 Overhead projector | 4 |
| No. 120 TV Set | 5 |
| No. 125 VHS Movie Camera | 2 |
| No. 126 VHS Video Cassette Recorder | 5 |

Emergency Training Center

For the purpose of effectively using the facilities of the hospital, it is planned that training programs for paramedics, nurses, and doctors be carried out in four training rooms of the nursing school which is located in the hospital, after the renovation of the buildings. Therefore, basic items which are to be used especially in programs to develop paramedics are selected for procurement.

| | |
|--|---|
| No. 134 Air Way Management Trainer (adult) | 5 |
|--|---|

| | | |
|---------|------------------------------------|---|
| No. 3 | Air Way Management Trainer (child) | 2 |
| No. 7 | Auto Ventilator | 4 |
| No. 135 | CPR Mannequin (adult) | 5 |
| No. 30 | CPR Mannequin (child) | 2 |
| No. 31 | CPR Mannequin with Monitor | 1 |
| No. 39 | Dressing Emergency Bag | 4 |
| No. 48 | Emergency Injuries Model | 4 |
| No. 67 | IV Trainer Arm | 4 |
| No. 99 | Resuscitation Emergency Bag | 4 |

Chapter 3 IMPLEMENTATION PLAN

Chapter 3 Implementation Plan

3-1 Implementation Plan

3-1-1 Implementation Concept

This project is formally implemented in accordance with the system of the Japanese Government's Grant Aid Assistance after the grant is approved by the Government of Japan, and an Exchange of Notes (EN) is signed by the Government of Syria and the Government of Japan.

After the signing of an EN, an agreement for consultant service shall be signed between the Ministry of Health of the Government of Syria and a Japanese consultant firm who is recommended by the Japan International Cooperation Agency (JICA) in compliance with the system of the Japanese Government's Grant Aid Assistance. This agreement becomes effective after it is verified by the Government of Japan. Then the consultant firm designs this project in detail, prepares tender documents and a bidding, and monitors the implementation of the project.

The procurement of the equipment planned for the project is carried out by a Japanese supplier who has won the bidding and has signed an agreement with the Ministry of Health of the Government of Syria. This agreement also needs verification by the Government of Japan to become effective. The supplier carries out the procurement including delivery and installation of the equipment. He provides technical instructions for operation and maintenance of the equipment, and he also prepares manuals including technical documents and a list of manufactures and representatives, which are useful for maintenance of the equipment.

The minister of the Ministry of Health is the signer of the above mentioned agreements, and the actual implementation of the project is executed by the following organization.

General management: Ministry of Health

Execution: Hospital Coordinate Office of the Ministry of Health, Department of Health of Damascus Province, and Damascus Hospital

Equipment maintenance: Maintenance Office of Ministry of Health and Maintenance Section of Damascus Hospital

Consumable management: Medical Supply Office of Ministry of Health and Procurement Section of Damascus Hospital

3-1-2 Implementation Conditions

The work of installing and handing the equipment is expected to fall in a period of Ramadan. Therefore, smooth communication should be carefully maintained so as to make adjustments which may become necessary for completing the project within a scheduled time period. The progress of the renovation work must be monitored and confirmed, and if it should delay from any reason, a place be secured for storing the equipment temporarily.

3-1-3 Scope of Works

The cost for implementation of the project is shared by the parties of both the Government of Syria and the Government of Japan as follows.

The Government of Japan:

1. Bears the cost for procuring the equipment on the project;
2. Bears the cost for transporting the equipment to Damascus Hospital including for marine and land transportation;
3. Bears the cost for installing and setting up the equipment; and
4. Bears the cost for providing technical instructions on the test runs, inspections, operation, and maintenance of the equipment.

The Government of Syria:

1. Provides information and data necessary for the installation of the equipment;
2. Secures peripheral and auxiliary infrastructure which may be necessary for installing the equipment, such as laying out lines of electricity, water supply, and drainage;
3. Removes the existing old equipment to evacuate the places where the items of the equipment procured on the project are installed;
4. Constructs foundations including, e.g., power supply lines which may be necessary for the installation of the equipment;
5. Provides temporary storage facilities for the equipment upon arrival until the installation; and
6. Provides an office space in the hospital for the Japanese party.

3-1-4 Consultant Supervision

After carrying out the bidding, which selects the Japanese supplier, the Japanese consultant provides supervisory work on the project to ensure smooth

execution of the procurement and installation of the equipment.

This supervisory work includes, first of all, verification of the items which are supplied by the supplier. The consultant checks the items whether they are in compliance with the design documents of the agreement. Secondly, the consultant carries out pre-shipment inspections on the equipment, if necessary. As for the transportation of the equipment, it is important to confirm the days which are spent for packing and transporting the equipment and clearing the customs. On this matter, the consultant provides guidance, advice, and supervision to the supplier. While the equipment is being installed, the consultant monitors the condition of the site and provides advice and guidance to the executing agency of the Syrian party and to the supplier, and he reports the progress of the project to the authorities of both the governments who are concerned on the project.

While the equipment is being installed, a training session is held for staff members who are going to operate and maintain the equipment. In this training, special instructions are given on the items whose operation and maintenance require such training. The consultant arranges this training session in consultation with the Syrian party and the supplier so that sufficient and effective training will be provided for effective use of the equipment.

The consultant shall consist of three engineers including a project manager, an equipment planner, and a facility planner.

3-1-5 Procurement Plan

The procurement of the equipment shall be carried out in the following manner.

(1) Local Procurement

Some items which are made in Japan or other foreign countries are available locally in Syria through local representatives. However, local representatives who exclusively represent particular medical equipment manufacturers are very rare. In such condition, prices and other information necessary for the procurement are not immediately available to local representatives. Such information may be obtainable only after they take necessary actions. In addition, it is not easy to familiarize them with the system of the Japanese grant assistance. Moreover, it is not certain whether they can deliver the equipment on schedule because their systems for keeping stocks and ordering new supplies are not clearly established. Because of these concerns, it

is a policy of the project that no item of the equipment be procured locally.

(2) Procurement from Other Countries

In consideration of the condition of the medical equipment market in Syria, the items listed below are allowed procurement from other countries rather than Japan because of the unavailability of Japanese products for these specific items.

Artificial dialysis apparatus, electrolyte analyzer, blood gas analyzer, glucose analyzer, model for endotracheal intubation, mannequin for emergency care training, model for describing injuries, arm model for phlebotomy training, air bed, and washer for instruments

In consideration of the condition of the medical equipment market in Syria, the following items are procured either from Japan or from other countries.

Gas sterilization apparatus, high-pressure sterilization apparatus, respirator, water-distilling apparatus, spectrometer, coagulator, infusion pump, blood warmer, vibrating saw, plaster cutter, air drill, and syringe pump

(3) Transportation Period

It takes about four weeks for the equipment to be transported from Japan to Syria, and it takes about two or three weeks from Europe. After being unloaded, it takes one week for the equipment to pass the customs and to move inland. The shipment and delivery take place during a period from the end of the year to the beginning of the following year, and the installation work is expected during Ramadan. Therefore, some extra days should be included in the period which is required for implementation of the project so as to allow adjustment if necessary, and the schedule should be followed carefully while good communication is kept with the Syrian party.

3-1-6 Implementation Schedule

(1) Detailed Design Work

The consultant starts designing the project in detail immediately after the agreement of consultant service which is signed by the Ministry of Health of

Syria is verified by the Government of Japan. The consultant compiles a set of tender documents including detailed design drawings, technical specifications, and tender instructions in consultation with the Syrian party and in view of the progress of the renovation work, which is carried out by the Syrian party. This set of tender documents needs to be approved by the Syrian party. This detailed design work takes about two and a half months.

(2) Tender-related Work

The preparation for a bidding to select the supplier and the actual bidding are carried out in the following order: publicizing the bidding, distributing the tender documents, receiving tenders, evaluating the tenders, nominating the supplier, and signing an agreement with the supplier for the procurement. This work takes about one month.

(3) Equipment Procurement and Installation Work

After the agreement signed between the Ministry of Health of Syria and the supplier is verified by the Government of Japan, the supplier starts procuring the equipment. It will take about six and a half months from the order of procurement to the handing of the equipment to the Syrian party.

Fig. 3-1 shows the implementation schedule of the project. The implementation of the project starts at the signing of an Exchange of Notes and ends at the handing of the equipment.

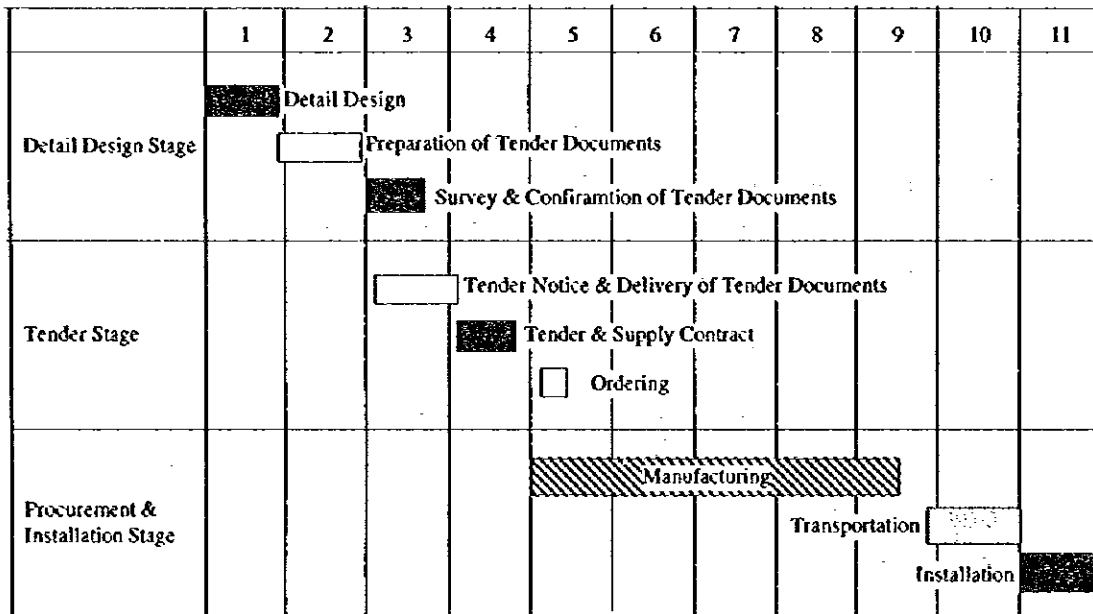


Figure 3-1: Implementation Schedule

3-1-7 Obligation of Recipient Country

The matters to be implemented for this project by the Syrian party are as follows.

1. Completing the renovation of the buildings as scheduled;
2. Presenting information and data which are necessary for the implementation of the project;
3. Arranging smooth unloading, customs clearance and inland transportation of the equipment in Syria;
4. Exempting persons who are involved in the procurement of the equipment or those who are providing services in relation with the implementation of the project from customs duties and various taxes;
5. Giving assistance or support to Japanese nationals by facilitating their bringing-in of some equipment which is needed for carrying out work and services on the project and by taking security measures for their protection;
6. Bearing the costs and expenses for processing a Banking Arrangement (B/A) and Authorizations to Pay (A/P);
7. Assigning personnel and appropriating funds for effective implementation of the project (including the operation and maintenance cost of the equipment);
8. Providing technical training to the staff so that they can handle the equipment effectively;

9. Preparing and submitting an operation plan of the equipment;
10. Maintaining the equipment properly and effectively after the procurement with proper allocation of funds necessary for the maintenance;
11. Granting permits, licenses, and other certificates which are required for implementing the project;
12. Bearing the costs and expenses involved in granting the permits, licenses, etc.;
13. Collecting data to report how the equipment is being used after the completion of the project; and
14. Bearing costs and expenses not specified in this report which may arise while the project is being implemented.

3-2 Project Cost Estimation

(1) Cost Borne by Each Party

The cost for implementing this project is shared by the Government of Syria and the Government of Japan as follows.

Japanese party: Cost for designing and procuring the equipment.

Syrian party: Cost for Renovation of Damascus Hospital.

(2) Conditions applied for the Cost Estimation

Estimated in: November 1996

Exchange rate: US\$ 1.00 = 110 yen

Period for implementation: eleven months

Ordering method: bundled in a lot

Others: this project shall be implemented in compliance with the system of grant assistance of the Government of Japan.

3-3 Operation and Maintenance Costs

(1) Maintenance System of the Ministry of Health

The medical equipment of the hospitals which are administered by the Ministry of Health is maintained mainly by the maintenance department of the ministry. The headquarters of this department are located in the premises of Ibn Naphis Hospital in Damascus. The department has a three-story steel-reinforced concrete building, which houses office rooms, workshops, and a storage room. About 30 engineers and technicians, who are specialized in electrical engineering, electronics and mechanical engineering, are working for the department. The department carries out inspections and repairs in

cooperation with engineers of the local representatives of the manufacturers who are under agreement to provide maintenance service. The equipment procured on this project is maintained also by this department. Therefore, the procurement of such items as requiring periodical checkups and continual supplies of consumables or reagents should involve local representatives who have much technical knowhow and experience, which can be helpful in the implementation of the project as well as in the provision of proper maintenance after the procurement. Figure 3-2 shows the organization of the ministry for maintenance of the equipment.

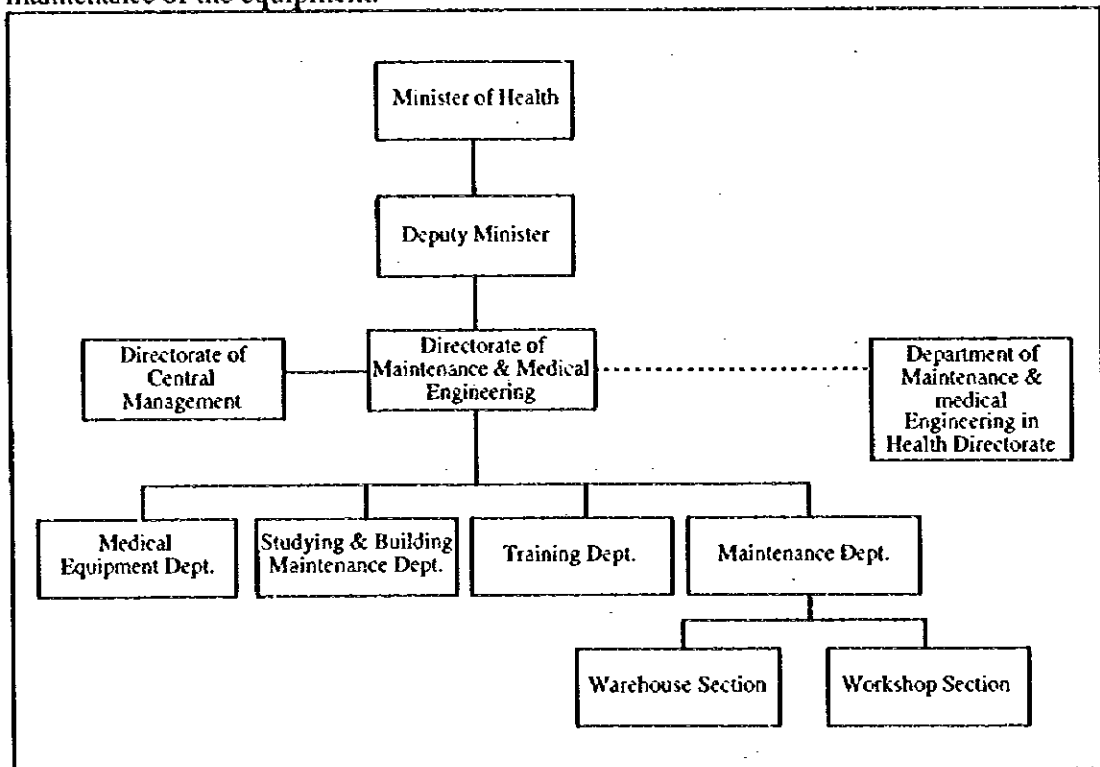


Figure 3-2: MOH Organization of Maintenance

(2) Provision of Technical Data

For the purpose of smooth execution of maintenance work by the Syrian party after the procurement, the supplier shall provide operation manuals, maintenance manuals, a list of parts, drawings, a list of manufacturers, a list of local representatives, etc. in the following manner.

1. Operation manuals

An operation manual shall be provided for each respective item of the

equipment. In addition, a set of all the manuals shall be provided to the hospital, and another set shall be provided to the Hospital Coordination Office (HCO).

2. Maintenance manuals

A set of maintenance manuals shall be provided to the hospital, and another set to the HCO.

3. Part list

A list of parts shall be provided to the hospital and also to the HCO.

4. Drawings

A set of drawings shall be provided to the hospital, and another set to the HCO.

5. Manufacturer list

A list of manufacturers shall be provided to the hospital and also to the HCO.

6. List of local representatives

A list of local representatives shall be provided to the hospital and also to the HCO.

(3) Cost Estimation for Operation and Maintenance

Table 3-1 shows the annual cost estimated for the operation and maintenance of main items of the equipment which is procured on this project. Based on this estimation, successive future annual costs are estimated as follows.

O/M cost estimation

For the first fiscal year (1998) after the procurement, six months are included in the calculation of the annual cost for purchasing consumables, and an annual inflation rate of 7% is applied in the calculation. With these conditions, the cost for the fiscal year 1998 is estimated at about 10 million yen (about 5 million SP). For the following year, the estimation is about 33 million yen (about 14 million SP).

First year: (maintenance agreement + replacement parts + consumables x 6/12) x (1.07)³

$$= (0 \text{ yen} + 0 \text{ yen} + 19,897 \text{ thousand yen} \times 6/12) \times (1.07)^3$$

$$= 12,187 \text{ thousand yen} = \text{about } 5,078,058 \text{ SP.}$$

Second year and thereafter: (maintenance agreement + replacement parts +

consumables) x (1.07)⁴

= (1,520 thousand yen + 5,860 thousand yen + 19,897 thousand yen) x (1.07)⁴

= 33,415 thousand yen = about 13,923,000 SP.

As mentioned in the previous chapter, the Ministry of Health spends 1,073,215,000 SP (about 33% of the total budget) for the operation of the ministry. The above estimated cost for maintaining the equipment in the second year (13,923,000 SP) or thereafter accounts for about 1.3% of the operation cost and about 0.4% of the total budget of the ministry in 1996. As such, it is expected in consideration of the budgetary accounts and past budgetary allocations to health care of the Government of Syria that this newly added cost will be managed in the budget of the Ministry of Health without much difficulty. However, as the equipment includes such items as artificial dialysis apparatus which require continual supplies of consumables for operation, it is desirable that the Ministry of Health take appropriate measures to secure the budget necessary for the maintenance of the equipment while it promotes improvement in the maintenance system further.

F3-1 : Annual running cost for main equipment

| Name | Cost per unit (Yen) | Q'ty | Total (Yen) | Total (Sp) |
|-----------------------------------|---------------------|------|-------------|------------|
| ECG | 252,800 | 5 | 1,264,000 | 482,618 |
| Bedside monitor | 275,000 | 18 | 4,950,000 | 1,890,000 |
| Mobile X-ray unit | 1,520,000 | 1 | 1,520,000 | 580,360 |
| X-ray fluoroscopy unit | 1,980,000 | 2 | 3,960,000 | 1,512,000 |
| General purpose X-ray | 1,570,000 | 1 | 1,570,000 | 599,455 |
| Ultrasound | 1,492,500 | 2 | 2,985,000 | 1,132,090 |
| Ultrasound diagnostic for cardiac | 1,992,500 | 1 | 1,992,500 | 7,600,770 |
| Ventilator | 426,000 | 7 | 2,982,000 | 1,130,945 |
| Blood gas analyzer | 1,098,300 | 1 | 1,098,300 | 419,350 |
| Blood cell counter | 551,000 | 1 | 551,000 | 210,380 |
| Spectrophotometer | 548,000 | 1 | 548,000 | 209,236 |
| Hemodialysis unit | 1,300,000 | 3 | 3,900,000 | 1,489,090 |
| Bronco scope | 122,400 | 1 | 122,400 | 46,735 |
| Total | 13,128,500 | | 27,443,200 | 17,303,029 |

| Equipment | Maintenance contract | | Repair parts | | Consumable | | Sub Total (,000 yen) | Depreciation total (,000 yen) | cost/patient | notes | |
|--|-------------------------------|--------------------------|--------------|-----------|------------|------------------------|-------------------------|----------------------------------|--------------|-------|---|
| | Price / Time (,000 yen) | parts | price Qty | price Qty | price Qty | price Qty | | | | | |
| Ultrasound diagnostic unit operation : 250days patient : 15 / day | 150 | Amount | 1,000 | 0.5 | 500 | ultrasound gel (250ml) | 340 | 1,497,500 | 1,181 | 2,674 | 713yen / pt. (no Depreciation fee include) |
| | 150 | probe A | 1,000 | 0.5 | 500 | ultrasound gel (250ml) | 340 | 1,497,500 | 1,181 | 2,674 | 713yen / pt. (no Depreciation fee include) |
| | 150 | probe B | 1,000 | 0.5 | 500 | recording paper | 340 | 1,497,500 | 1,181 | 2,674 | 713yen / pt. (no Depreciation fee include) |
| | 150 | probe C (1time/2yers) | 1,000 | 0.5 | 500 | recording paper | 340 | 1,497,500 | 1,181 | 2,674 | 713yen / pt. (no Depreciation fee include) |
| Ultrasound diagnostic unit for cardiac operation : 250days patient : 15 / day | 150 | Amount | 1,000 | 0.5 | 500 | ultrasound gel (250ml) | 340 | 1,497,500 | 1,181 | 2,674 | 713yen / pt. (no Depreciation fee include) |
| | 150 | probe A | 1,000 | 0.5 | 500 | ultrasound gel (250ml) | 340 | 1,497,500 | 1,181 | 2,674 | 713yen / pt. (no Depreciation fee include) |
| | 150 | probe B | 1,000 | 0.5 | 500 | recording paper | 340 | 1,497,500 | 1,181 | 2,674 | 713yen / pt. (no Depreciation fee include) |
| | 150 | probe C (1time/2yers) | 1,000 | 0.5 | 500 | recording paper | 340 | 1,497,500 | 1,181 | 2,674 | 713yen / pt. (no Depreciation fee include) |
| Ventilator operation : 300days patient : 1 / day | 150 | Amount | 1,500 | | 0 | Filter | 343 | 1,992,500 | 1,181 | 3,174 | 850yen / pt. (no Depreciation fee include) |
| | 90 | Humidity chamber | | | | | 36 | | | | Electric fee not include |
| | 2 times / yr | parts, | | | | | 101 | | | | Electric fee not include |
| | technical fee included (3.0%) | | | | | | 36 | | | | Electric fee not include |
| Blood gas analyzer sample : 50/days sample : 30 / day | 90 | Amount | 0 | | 0 | Amount | 356 | 426,000 | 416 | 842 | 2,800yen / day (no Depreciation fee include) |
| | 80 | PCO2 electrode | 150 | 1 | 150 | Call liq (pH7.4) | 8 | | | | |
| | 150 | PO2 electrode | 150 | 1 | 150 | Call liq (pH6.8) | 5 | | | | |
| | 130 | pH electrode | 130 | 1 | 130 | juice liq | 50.0 | 115 | | | |
| sample : 50/days sample : 30 / day | 130 | Ref electrode | 130 | 1 | 130 | Salt-bridge liq | 9 | | | | |
| | parts, | | | | | | 2 | | | | |
| | technical fee included | | | | | | 3 | | | | |
| | Amount | 80 | Amount | 560 | Amount | Amount | 468 | 1,096,500 | 526 | 1,626 | 180yen / time (no Depreciation fee include) |

| Equipment | Maintenance contract | | Repair parts | | Consumable | | | Sub Total | Depreciation | Total | cost/patient | notes |
|---------------------|----------------------|---------|----------------|--------|------------|--------|----------------------|-----------|--------------|-------|--------------|--|
| | Price / Time | 000 yen | parts | price | Qty | price | Qty | | | | | |
| Blood cell counter | | | | | | | | | | | | |
| | | 80 | Transducer | 76 | 1 | 76 | dispensing solution | 6.00 | 6 | 36 | | |
| | | | solenoid valve | 20 | 1 | 20 | line solution | 22.00 | 2 | 44 | | |
| | | | transmitter | 6 | 1 | 6 | calibration solution | 10.00 | 2.0 | 20 | | |
| | 2 times / yr | | pitch valve | 10 | 1 | 10 | beaker disposable | 13.00 | 6 | 78 | | Electric fee not include |
| | parts, | | vacuum pump | 20 | 1 | 20 | recording paper | 40.00 | 3 | 120 | | |
| | technical fee | | PC board | 32 | 1 | 32 | | 1.80 | 5 | 9 | | |
| operation : 300days | | | | | | | | | | | | |
| sample : 50 / day | | Amount | 80 | Amount | 164 | Amount | | 307 | 551,000 | 528 | 1,079 | 72yen/time (no Depreciation fee include) |
| Spectrophotometer | | | | | | | | | | | | |
| | | 80 | | | | | recording paper | 10.00 | 4 | 40 | | |
| | | | | | | | (2000/SET) | 4.00 | 10 | 40 | | |
| | 2 times / yr | | | | | | ribon | 95.00 | 2.0 | 190 | | |
| | parts, | | | | | | lamp | 6.00 | 5 | 30 | | |
| | technical fee | | | | | | lamp (tangram) | 17.00 | 5 | 85 | | |
| | included | | | | | | Cell | 83.00 | 1 | 83 | | |
| operation : 300days | | | | | | | Cell holder | | | | | |
| sample : 30 / day | | Amount | 80 | Amount | 0 | Amount | | 468 | 548,000 | 200 | 748 | 83yen/time (no Depreciation fee include) |
| Hemodialysis unit | | | | | | | | | | | | |
| | | 100 | | | | | Dializer | 3.00 | 200 | 600 | | |
| | | | | | | | patient circuit | 0.90 | 200 | 180 | | |
| | 2 times / yr | | | | | | needle | 0.10 | 200 | 20 | | |
| | parts, | | | | | | Bl can | 1.40 | 200 | 280 | | |
| | technical fee | | | | | | Liquid dialysis | 0.60 | 200 | 120 | | |
| | included | | | | | | (6) | | | | | water,Electric fee not include |
| operation : 200days | | | | | | | | | | | | |
| turnament : | | | | | | | | | | | | |
| 2times/patient/week | | Amount | 100 | Amount | 0 | Amount | | 1,200 | 1,200,000 | 840 | 2,140 | 10,700yen/time (no Depreciation fee include) |
| Bronchoscope | | | | | | | | | | | | |
| | | 100 | | | | | lens cleaner | 2.50 | 4 | 10 | | |
| | | | | | | | lesion bag | 0.70 | 4 | 3 | | |
| | 2 times / yr | | | | | | filter | 0.90 | 12 | 10 | | |
| | parts, | | | | | | | | | | | |
| | technical fee | | | | | | | | | | | |
| | included | | | | | | | | | | | |
| operation : 200days | | | | | | | | | | | | |
| patient : 3 / day | | Amount | 100 | Amount | 0 | Amount | | 22 | 122,400 | 420 | 542 | 603yen/time (no Depreciation fee include) |

Chapter 4 PROJECT EVALUATION AND RECOMMENDATION

Chapter 4 Evaluation of the Project and Recommendations

4-1 Propriety and Beneficial Effects of the Project

(1) Propriety

Health care services have been greatly improved in the past 20 years. In this respect, the Ministry of Health has made substantial effort in accordance with policies established by the government. Yet, health care services need further improvement as the economy of the country progresses and the population increases. It is especially true in the capital city, Damascus, which is the center of governmental administration and economic activity. As the city experiences concentration of population, demand for medical services has been steadily increasing, and Damascus Hospital, which is the highest referral hospital, has been experiencing a heavy load of medical examinations and treatments. This hospital was established many years ago, so the facilities and equipment have decayed so much as to impede the functions of the hospital severely. In such condition, the Ministry of Health of the Government of Syria, while undertaking renovation of the buildings of the hospital with funds coming from the national coffers, has asked the Government of Japan for a grant in assistance to procure medical equipment for the hospital because it is financially difficult for the Government of Syria to carry out such procurement requiring a large amount of foreign currency.

In response to this request, a basic policy was decided to procure equipment necessary for improving examinations and treatments of patients, and educational and training activities for medical personnel development for the purpose of improving the hospital. In accordance with this basic policy, the study team conducted a field study of the present state of Damascus Hospital, held discussions with officials of the Government of Syria, and analyzed the information collected in the field study. As a result, the problems of the hospital are identified as ineffective organization of departments and related units which perform ordinary hospital functions in addition to the dilapidated buildings and equipment. Also, problems are congestions of outpatients in the emergency department and clinics and ineffective operation of the referral system. The facilities of the hospital have been expanded and added with new departments since the establishment 40 years ago, making the layout of the hospital complex so much as to hamper the effective operation of the hospital. This layout problem will be solved by the renovation project which is currently under way. ICU rooms, which are dispersed in various sections of the hospital at present, will be integrated into one section or one department in the hospital. Also, patient transfer from wards to operation rooms and vice versa will be straightened out for smooth and quick inpatient movement. However, more serious is the problem of daily congestion of patients. Damascus Hospital is

congested with a number of patients because some patients who live near the hospital can visit the hospital directly without referrals from other hospitals of lower level.

The study team, in view of the present state of Damascus Hospital and in appreciation of efforts spent by the Ministry of Health, has actively involved itself in discussions with the Syrian party and has offered proper advice. Although hospital operation can be limited by insufficient hardware, i.e., dilapidated buildings and old equipment or shortage of equipment, improvement can be effected by revision of software, i.e., staff organization, staff management, patient care, etc.

On the above background, the study team has proposed that this project be considered as a project to improve hospital functions in addition to a project to improve the medical equipment of National Damascus Hospital (refer to Material 6. Minutes of the Meetings and Material 7. Schematic Drawings of Project Concept). The following approaches for hospital improvement are intended to improve Damascus Hospital comprehensively.

Measures to be effected for improvement of Damascus Hospital

1. Revitalization of the hospital
 - 1) Renovating the facilities (Renovation of the buildings is being carried out with funds from the national budget.)
 - 2) Improving the medical equipment (Request for a grant is made to the Government of Japan.)
 - 3) Developing medical personnel
 - 4) Improving the hospital administration
2. Revitalization of the referral system covering the Governorate of Damascus and the Province of Damascus
 - 1) Improving medical facilities of lower levels
 - 2) Educating people of appropriate use and availability of health care services
 - 3) Enforcing referral rules to prevent patients who are not seriously ill or without a referral, from receiving treatment at the tertiary care facility, directly.

Functions to be Improved

- Hospital administration (including management of flow of orders, staff organization, financial management, maintenance of facilities and equipment, and collection of health care statistics)
- Medical activities performed at each department (including medical examinations and treatments rendered with proper techniques of staffers, and clinical researches)

- Other services (prescribing and dispensing medicines at pharmacy, preparation of diets at kitchen, washing and drying linens at laundry, disposing medical wastes, providing health care education)
- Training to interns (with proper training facilities and equipment, curriculums and an appropriate system)
- Relations to other medical facilities (including the referral system).

At present, the renovation of the facilities, which is listed at the above 1-1), is being carried out with funds from the national budget. In addition, the project which is to improve the medical equipment of Damascus Hospital is positioned as a project of the above 1-2). With respect to this project, a grant is requested to the Government of Japan because it requires a large amount of foreign currency for the Government of Syria to procure medical equipment necessary for the hospital in such a large scale as mentioned previously. It is important for the Government of Japan to assist the Government of Syria for the execution of this project financially because such assistance will greatly facilitate self-effort of the Syrian party for carrying out other improvements such as listed above.

Therefore, it is appropriate that this project be implemented with a grant from the Government of Japan because such assistance helps to promote further self-effort of the Government of Syria in improving the health care system, in which the revitalization of Damascus Hospital is one of the most important items of the health care development program. The study team considers that this project, with appropriate input from the Syrian party, will bring about a great number of beneficial effects.

(2) Beneficial effects to be expected

As this project is implemented together with the renovation of the buildings carried out by the Syrian party, the equipment procured on the project will effect significant and sufficient improvements in medical examinations and treatments and educational and training activities which are being carried out at the hospital. This is a direct effect which will be brought about by improvement on the hardware of the hospital on this project, and it is considered as a first step in this hospital improvement.

(3) Long-term effects to be expected

If improvements of the above concept for hospital improvement are actively executed in addition to the renovation of the facilities and the procurement of new medical equipment, then daily congestions of patients will be alleviated, and improvement will be

effected on all aspects of hospital functions. Also, the referral system can be strengthened by improving other medical facilities of lower level in the region and by promoting people's awareness of the system at the same time. In this way, this project can greatly contribute to health care improvement in the City of Damascus and the Province of Damascus. Furthermore, as Damascus Hospital plays an important role in offering specialized courses to interns, the improvement made by the project in the educational and training function of the hospital will contribute greatly to the development of medical personnel. Therefore, it will be possible for medical facilities in the provinces to secure well-trained medical personnel for their staffs. In this way, health care improvement will be effected all over the country with superior medical techniques and quality services. As the government intends to improve health care service nationwide, if improvement of Damascus Hospital, which is the most important of the health care policy, is effected in accordance with the above concept, then the knowhow built up in the process of improving the hospital can be applied to improvement of examinations, treatments, and other medical services performed at other medical facilities throughout the country.

4-2 Recommendations

(1) Recommendations Regarding Improvement of Hospital Function by Syrian Side

The study team hopes that this project will bring about great beneficial effects in the above mentioned hospital improvements. Hospital activities are totally analyzed, and then each function is improved respectively, including hospital administration, medical examinations, treatments and other services, training courses, and relations with other medical facilities.

For example, sections or functions of the hospital which are commonly used by all departments of the hospital can be reorganized in management by improving communication among the departments for the purpose of improving efficiency in the administration of the hospital. Also, the present system of assigning or shifting staffers including doctors, nurses and paramedics can be improved to strengthen the availability of medical services, covering overtime and night hours. Furthermore, the delivery of meals to patients can be made timely, and the meals can be prepared more in consideration of diets appropriate to respective patients. Cleanliness can be promoted further by improving the frequency and way of washing linens including pajamas for patients. Such software-side improvements are possible along with the improvement of the hardware, i.e., the renovation of the kitchen and the laundry, which is under way at present.

The study team appreciates that the effort spent by the Ministry of Health in improving the medical service has resulted in improvement of medical facilities and their administrative systems. In the field study, it was evident that the staffs of the Ministry of Health, Department of Health of Damascus Province, and Damascus Hospital were all earnest and eager to carry out the project successfully. Here, the study team, hoping that further effort of the Syrian party may produce substantial achievements, would like to propose the following recommendations.

Recommendation 1: Restructuring of the Hospital Operation

At present, the premises of Damascus Hospital is surrounded by streets in four directions. The outpatient clinics and the emergency department are located opposite to each other, one in the north and the other in the south, respectively. While the outpatient clinics are not open, the emergency department is crowded with patients. This congestion of patients is caused partly from unavailability of outside paths which lead from the emergency department to other wings of the hospital. Moreover, most parts of the buildings of the hospital are occupied by wards, and office rooms are provided near the entrances to the wards. Because of this arrangement or layout, inefficiency is observed in execution of services such as transportation of patients and provision of nursing services. Furthermore, control of visitors is not efficiently performed. Even though a waiting room is provided for visitors behind the emergency department, visitors are not using it because no guidance is posted for them. The hospital has four operation rooms on each floor, and each of these operation rooms is equipped with a sterilizer. Also, inpatient wards are provided along the operation rooms on the same floors. This layout is advantageous in bringing-in of patients for operations and observations after the operations. However, in this layout, the floor area is not effectively used, and there is a question of security of cleanliness. All in all, the study team remembers most vividly congestions of patients and visitors in the hospital. As mentioned previously, the objectives of the renovation of the buildings are to renew and improve not only the buildings of the hospital but also the operation of the hospital. In connection with this restructure of the hospital, the followings are recommended to solve the problem of patient congestion.

- * Post a floor map of the whole hospital for guidance, for example, at the main entrance of the hospital;
- * Post a signboard on each floor;
- * Post a signboard on the door of each examination room, etc.;
- * Draw lines on the floors of corridors, each line in a different color so that patients are

- guided to a respective ward, outpatient clinic, etc.; and
- * Provide sections for waiting in corridors or halls in the outpatient clinics.

Recommendation 2: Staff Motivation for Improvement

As mentioned previously, all operation and maintenance of medical equipment, management of personnel, and purchase of medicines and consumables of the hospitals under the Ministry of Health are administered by the Ministry of Health or the Department of Health of the respective provincial governments. Even budgetary account and statistical work are not carried out by individual hospitals alone. However, to promote improvements in the quality of medical services and in the effectiveness of operation and maintenance of the hospitals, it is important to motivate the staffs so that individual staffers can analyze problems which are affecting their work and can come up with some solutions.

This approach can be introduced or organized in a simple form by asking staffers to participate at their work place in the present staff organizations without creating a new office or a new post, and each problem can be attacked to produce a specific integrated solution. As the staff of Damascus Hospital including doctors, nurses, and clinical technicians are well educated and highly trained, this kind of motivation may bring substantial improvement in the hospital operation. The following examples are based on an exciting discussion which was held during the field study.

Theme: Improving the control of outpatients and visitors

Facilitator: Staff of Ministry of Health or Directorate of Health, Director or Head Officer of Hospital

Work Team: The work team comprises a receptionist of the hospital, a staffer of the head office, and an engineer at the workshop as hospital operator; a doctor and a nurse at the outpatient clinics, a nurse at the wards, and a staffer at the emergency department as medical service provider; and an HCO engineer and an engineer at the Department of Health as person in charge of the renovation.

Assignments: To study the causes of the current congestion of patients;
To study ills arising from the congestion;
To suggest improvements necessary for solving this problem;
To identify possible impediments to the improvements suggested; and
To study and propose specific measures and expected effects.

- Theme:** Improvement of maintenance system
- Facilitator:** Staffer of the Ministry of Health or of the Department of Health
- Work Team:** The work team comprises an HCO engineer, a representative of the Department of Health, the director of the hospital, etc. as administrator; a doctor, a clinical technician, a nurse, and a representative of the engineers at the workshop as field worker in the hospital; and a representative of the Department of Maintenance of the Ministry of Health and a local representative of manufacturers as engineer.
- Assignments:** To study the current methods which are applied to daily checkups and repairs of the equipment;
 To identify problems and to suggest improvements;
 To identify possible impediments to the improvements suggested; and
 To study and propose specific measures and expected effects.

Recommendation 3: Improvement of Statistic Activity

Some statistics are being collected by the Ministry of Health and also by Damascus Hospital at present. These statistics should be effectively used to determine the present state of the hospital or problems which are affecting the operation of the hospital so that new measures of improvement can be targeted specifically where they are needed. Therefore, the statistical items should be reexamined for their intended purposes, and additional statistical items should be added if necessary.

(a) Use of Statistics Collected in the Present System

The statistics which are collected at present should not be left only as a record for the purpose of record keeping, but they should be analyzed effectively for making meaningful evaluations of the hospital operation. A following example lists statistics which are now being recorded and are available, under a specific evaluation item, and describes a method for evaluation.

[Example 1]

Evaluation item: Use of equipment after procurement

Objective: To evaluate specific effects which have resulted from renewal of or addition to the existing equipment.

Statistics: Number of examinations performed with each item of the equipment.

Statistics collected in 1995

| | |
|---|---------|
| Number of X-ray examinations: | 73,754 |
| Number of patients receiving physiotherapy: | 106,256 |

| | |
|--|---------|
| Number of laboratory examinations: | 632,818 |
| Number of general ultrasound examinations: | 6,629 |
| Number of cardiac and renal ultrasound examinations: | 7,032 |
| Number of patients receiving artificial dialysis: | 1,610 |
| Number of electrocardiograms: | 8,810 |
| Number of electroencephalograms: | 335 |
| Number of electromyograms: | 372 |

The numbers of diagnostic examinations performed are being recorded currently. It is expected that these numbers can reflect certain effects of this project. Therefore, it is preferable that the number of examinations performed with each item of the equipment be recorded individually so that the use of each item will be evaluated objectively. Such quantitative evaluation is critical in determining the usefulness of each item and invaluable in planning a procurement of equipment logically and efficiently in the future. This kind of evaluation method can be easily put into effect in the current system of the Ministry of Health. As the diagnostic examinations performed at the hospital and the use of the equipment are considered to reflect the demands for respective examination items, it is desirable as a next step that statistics be collected further in detail, for example, for each type and each item of diagnostic examination.

By starting from available statistics and by improving the method in steps, meaningful evaluations can be achieved. The following is a specific example.

[Example 2]

Evaluation item: Improvements in medical services which have resulted from improvement of the equipment

Objective: To evaluate effects which have resulted from improvement of the facilities and equipment for the purpose of maintaining the facilities and equipment effectively.

Statistics: Numbers of examinations and operations, and condition of each item of the equipment.

Notes: *The numbers of examinations and operations are recorded for each item of examination or operation. These statistics are then used to determine the number of patients for each type of disease so that the pattern of diseases which are affecting the people can be comprehended.
*The frequency of use, the number of years past after the procurement, and the details and frequency of repair work are recorded for each item of the equipment which is used for an examination or an operation.

This is to determine the condition of the equipment, and, thereby, rational and logical determination can be reached as to whether the time is right for replacement of certain parts or of whole equipment for the maintenance of the equipment.

[Example 3]

Evaluation item: Monitoring services provided at the outpatient clinics and the emergency department for the purpose of determining real demand of medical services.

Objective: To reduce the load of work at the outpatient clinics and the emergency department while satisfying real demand by appropriate measures.

Statistics: Numbers of outpatients, emergency patients, operations, etc.

Notes: *It is important to determine long-term specific needs of medical services which the hospital faces as a top referral hospital. In this respect, the numbers of outpatients and emergency patients, their reasons of receiving services or diseases, and treatments including operations should be recorded categorically for analysis of the real demand of medical services. In this way, the real demand can be compared to the original role which is assigned to the hospital so that the difference can be reflected into future projects, which can be planned for specific improvements in the functions of the hospital or of lower medical facilities in the network of the referral system.

*The number of patients can be categorized by the month of the year, the day of the week, or the hour of the day; or by their genders, male or female, or into age groups. This information can be useful in controlling outpatients including visitors when a new layout of the hospital is planned.

The following table shows some statistics of medical services which are provided at the hospitals under the Ministry of Health in the Governorate of Damascus and the Province of Damascus (data collected in 1995).

| | No. bed | inpatient | outpatient | | emergency | | surgical op. | genecolo gical op. | lab. | X-ray | ultra-sound |
|----------------|---------|-----------|-------------|------------|-------------|------------|--------------|--------------------|---------|--------|-------------|
| | | | out-patient | in-patient | out-patient | in-patient | | | | | |
| Damascus | | | | | | | | | | | |
| Damascus hosp. | 650 | 27,117 | 85,362 | 4,116 | 168,331 | 22,901 | 10,954 | 0 | 614,454 | 74,155 | 13,971 |

| | | | | | | | | | | | |
|---------------------------|-----|--------|--------|--------|--------|-------|--------|--------|---------|--------|--------|
| Al-Zehrawi hosp. | 85 | 17,762 | 23,789 | 17,945 | 0 | 0 | 18,665 | 18,665 | 50,410 | 0 | 9,122 |
| Ibn Al-Naffis hosp. | 150 | 4,461 | 21,770 | 1,689 | 51,509 | 2,504 | 2,618 | 0 | 125,752 | 14,530 | 4,549 |
| Kidney hosp. | 150 | 3,742 | 6,631 | 687 | 12,526 | 1,838 | 3,391 | 0 | 98,213 | 6,586 | 16,300 |
| Ophthalmology hosp. | 120 | 5,304 | 53,500 | 4,799 | 6,800 | 702 | 4,193 | 0 | 2,441 | 462 | 0 |
| Red crescent hosp. | 130 | 7,266 | 28,587 | 2,261 | 56,862 | 4,264 | 2,937 | 0 | 129,533 | 10,941 | 10,976 |
| Damascus suburb | | | | | | | | | | | |
| Al Lieha Al Hassusi hosp. | 180 | 19,230 | 44,117 | 1,727 | 30,236 | 1,717 | 9,010 | 6,883 | 86,531 | 14,401 | 4,952 |
| Al kalamon hosp. | 60 | 5,356 | 10,995 | 3,620 | 5,420 | 1,736 | 2,346 | 1,242 | 36,008 | 4,540 | 0 |
| Basil hosp. | 65 | 3,440 | 7,717 | 1,759 | 9,616 | 1,711 | 2,486 | 1,420 | 34,147 | 5,160 | 970 |
| Kahla hosp. | 25 | 559 | 4,162 | 186 | 5,310 | 448 | 232 | 117 | 8,136 | 578 | 146 |

(b) Statistics to Be Collected Additionally in the Present System

By analyzing the condition of Damascus Hospital more specifically, the contribution of the hospital to the health care system as a whole can be effectively increased in the referral system of patients and in the training of interns. For this reason, some statistic items should be additionally collected. The following examples are given for this purpose.

Evaluation item: Condition of patient referral

Objective: To evaluate the referral system and to determine the real demands for medical services provided by the Damascus Hospital and by other hospitals at lower levels in the referral system.

Statistics: Hospitals referring patients, diseases of the referred patients, treatments given to the referred patients, etc.

Evaluation item: Condition of intern training

Objective: To study the condition of intern training and to monitor the distribution of medical personnel in the provinces throughout the country.

Statistics: Specialized fields of interns who are admitted for training, their alma maters, ages, genders, birth places, places they are posted after intern training, etc.

These recommendations are only a few examples which are suggested by the basic design study team on the basis of the results of the field study. The study team

appreciates the work of the Syrian party and hopes that the recommendations of this report can be a help to the implementation of this project or to the future development of policies for health care service.

(2) Project Evaluation

For carrying out any project effectively and successfully, it is essential that past activities be evaluated for successful execution of future measures. For the evaluation of this project, objective indices should be applied to the conditions prior to the implementation of the project and to the conditions after the implementation so that what are achieved by the project will be objectively evaluated by comparing these indices. Then, what haven't achieved by the project can be effectively targeted by following actions. Therefore, the present condition is studied by assigning the following indices prior to the implementation of the project, and then such evaluation will be made three to five years after the implementation of the project. The results of the evaluation should be reported to the JICA by the HCO of the Ministry of Health.

Evaluating the Project for Improving Medical Equipment of Damascus Hospital

The following indices are applied to the evaluation of the effects of the project, i.e., Project for Improving Medical Equipment of National Damascus Hospital, assisted by the Government of Japan with a grant.

The condition of the equipment procured on the project should be reported with information of:

- the frequency of use of each item of the equipment (e.g. number of tests performed),
- the maintenance condition of each item of the equipment compiled as maintenance report, and
- the location of each item of the equipment in the hospital.

Monitoring and Evaluating the Project for Improving Hospital Function of Damascus Hospital

In addition to the monitoring of the equipment, medical activities should be monitored in accordance with the following classifications for the purpose of evaluating effects of the project on the medical services with respect to the functions of the hospital. Monitoring hospital activities and evaluating hospital functions in the following

classifications:

1. Improvement of hospital function by:
 - a. advancement of medical techniques including diagnostic and clinical examinations and surgical operations;
 - b. efficiency of hospital administration;
 - c. efficiency of central supplies and storage.
2. Improvement of regional health care by:
 - a. efficiency of the referral system;
 - b. effectiveness of the PHC activities; and
 - c. health care information presented at conferences for representatives of medical facilities.
3. Improvement of training activities by:
 - a. increase of the number of available courses;
 - b. curriculums of training courses;
 - c. attendance of interns;
 - d. satisfaction felt by the interns;
 - e. development of text materials used for training; and
 - f. achievements of the interns at their work after completion of respective training courses.

As each function of the hospital improves, the quality of medical services rises. Therefore, the following statistics can reflect such improved condition of medical services, and they can be used as the indices to evaluate achievements of this project.

The Ministry of Health is collecting these statistics in the present system, so there is no need to introduce a new system for the purpose of evaluation. However, at present, these statistics are taken mainly for the hospital as a whole. Instead, they should be recorded separately for each diagnostic or clinical examination or surgical operation.

Statistics to be applied as indices for monitoring improvements in medical services:

- death rate for the hospital as a whole;
- death rate for each type of disease;
- average days of hospitalization;
- incidence rate of complications;
- satisfaction of patients;
- number of inpatients;

- number of outpatients;
- referral rate of outpatients; and
- occupancy rate of hospital beds.

The study team hopes that the Ministry of Health, the Department of Health of Damascus Province, and Damascus Hospital will actively promote such approaches as recommended above for effecting further improvement in the health care services of the country.