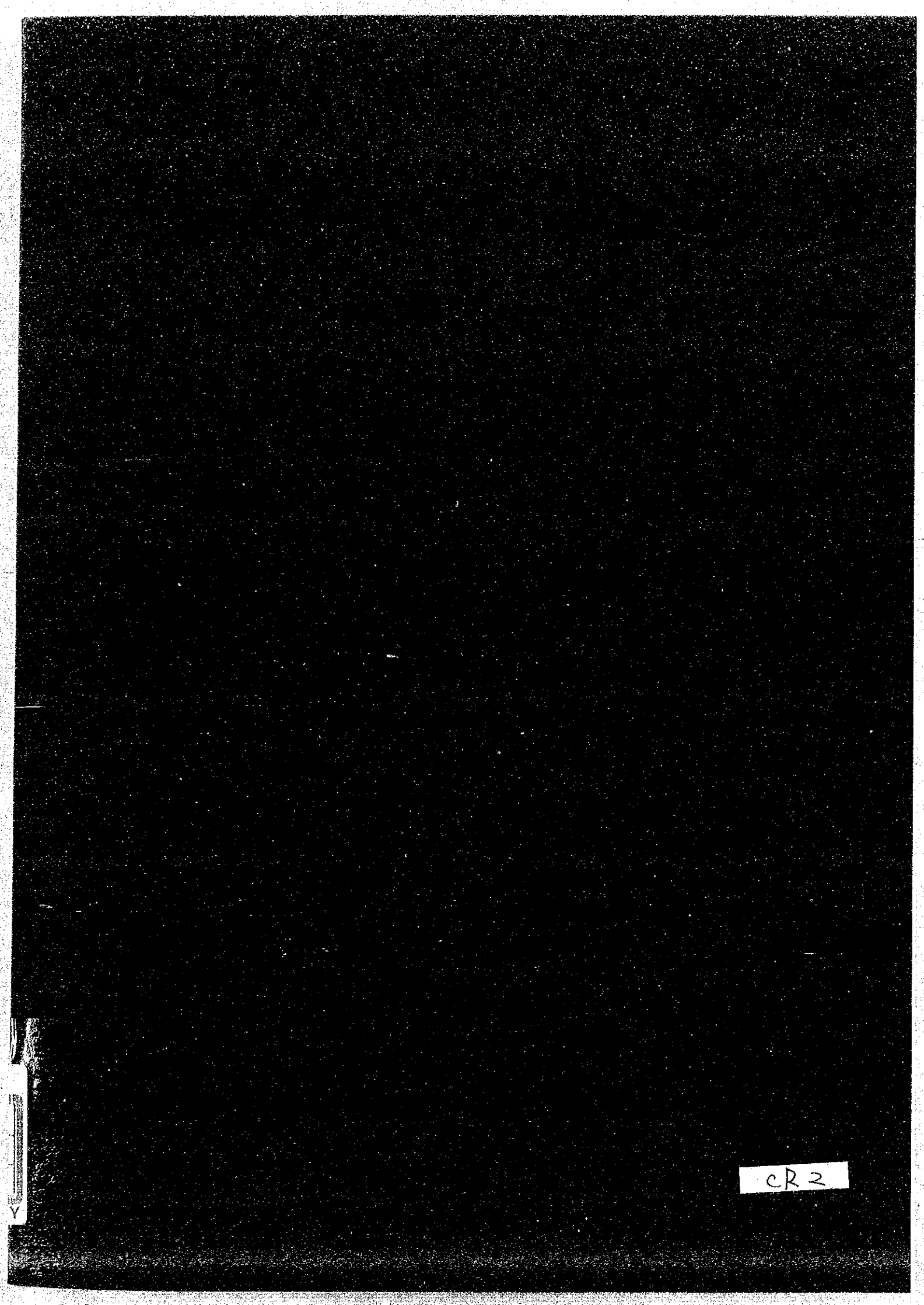
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No.

Japan International Cooperation Agency
The Republic of Indonesia, Ministry of Health

Basic Design Study Report

on

The Project for The Construction

of

The New Emergency Unit at Dr. Soetomo Hospital

in

The Republic of Indonesia

March 1993

NIHON SEKKEI INC.

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PERFACE

In response to a request from the Government of the Republic of Indonesia, the Government of Japan decided to conduct a basic design study on the Project for the Construction of the New Emergency Unit at Dr. Soetomo Hospital and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Indonesia the Basic Design Study (I) team headed by Dr. Hidekazu Urakami, Director, ICU Department, St. Mary Hospital, and constituted by a member of St. Mary Hospital, from October 5 to 25, 1992.

Based on the result of the Basic Design Study (I), JICA dispatched the Basic Design Study (II) team headed by Dr. Kageshige Todo, Vice President and Director, Thoracic Cardiovascular Surgery Department, St. Mary Hospital, and constituted by members of Nihon Sekkei Inc., from November 9 to December 12, 1992.

The teams held discussions with the officials concerned of the Government of the Republic of Indonesia and conducted field studies at the study area. After the teams returned to Japan, further studies were made. Then, a mission was sent to Indonesia in order to discuss a draft report, and the present report was prepared.

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 Republic of Indonesia for their close cooperation extended to the teams.

March, 1993

Kensuke Yanagiya

Kensuke Yanagiya
President
Japan International Cooperation Agency

March, 1993

Mr. Kensuke Yanagiya
President
Japan International Cooperation Agency

Letter of Transmittal

We are pleased to submit to you the basic design report on the Project for the Construction of the New Emergency Unit at Dr. Soetomo Hospital in the Republic of Indonesia.

This study has been made by Nippon Sekkei, Inc., based on a contrast with JICA, from October 20, 1992 to March 31, 1993. Throughout the study, we have taken into full consideration of the present situation in the Republic of Indonesia, and have planned the most appropriate project in the scheme of Japans grant aid.

We wish to take this opportunity to express our sincere gratitude to the officials concerned of JICA, the Ministry of Foreign Affairs, the Ministry of Health and Welfare and the Embassy of Indonesia in Japan. We also wish to express our deep gratitude to the officials concerned of the Ministry Health of Indonesia, JICA Indonesia Office and Embassy of Japan in Indonesia for their close cooperation and assistance during our study.

Finally, we hope that this report will be effectively used for the promotion of the project.

Very truly yours,

Ichiro Kanagawa
Project Manager
Basic design study team on
the Project for the Construction
of the New Emergency Unit
at Dr. Soetomo Hospital
in the Republic of Indonesia

Nihon Sekkei Inc.

INDONESIA

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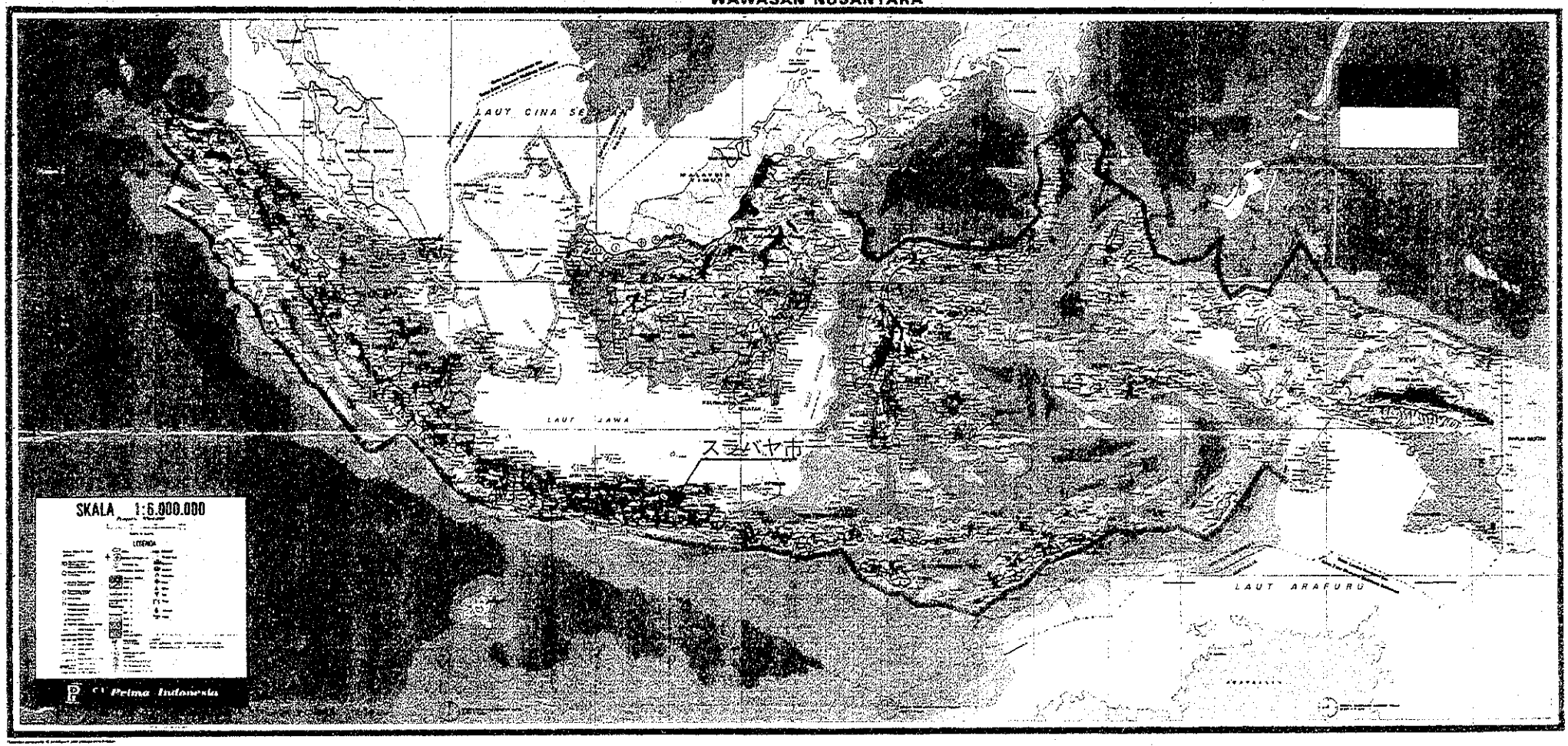

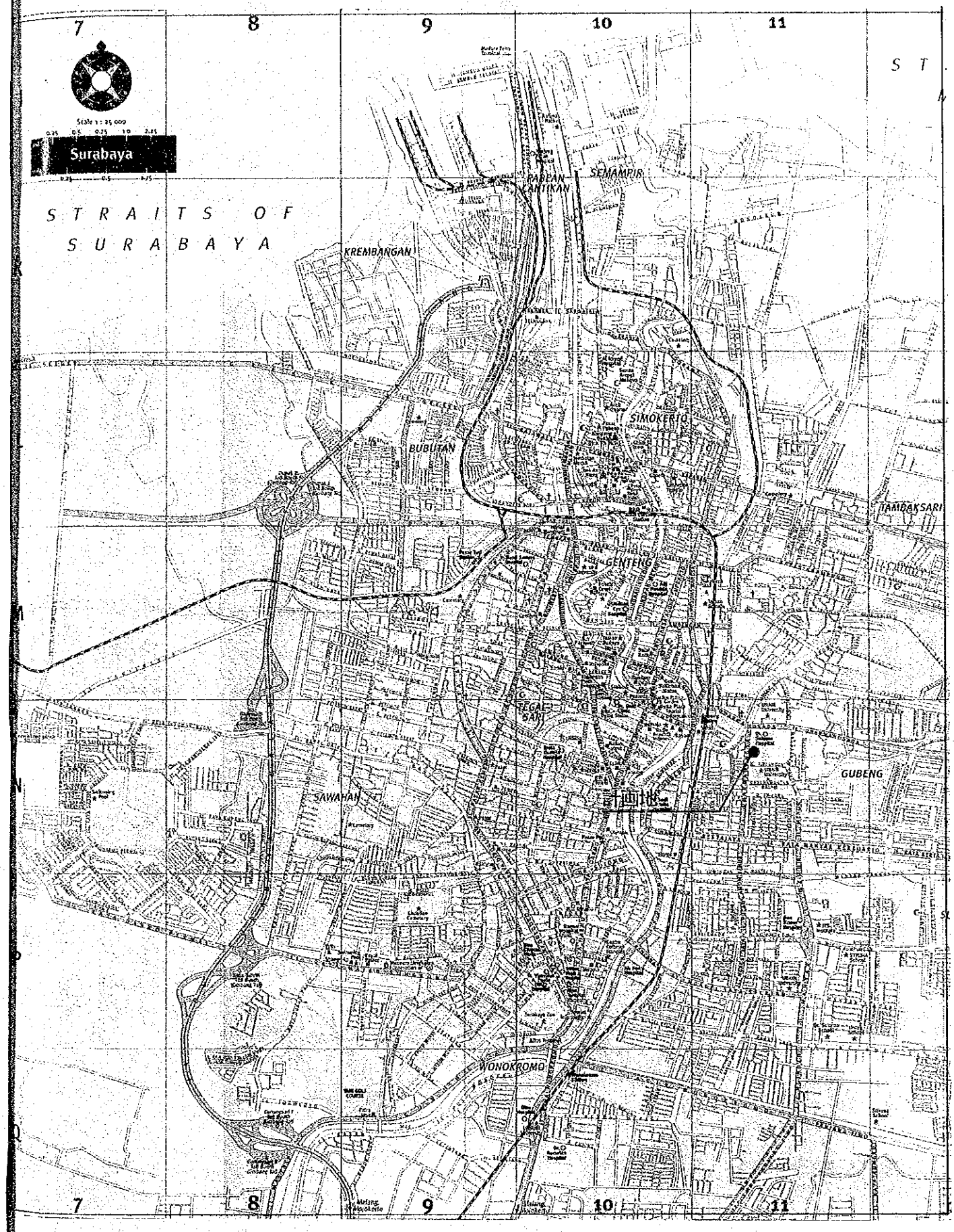
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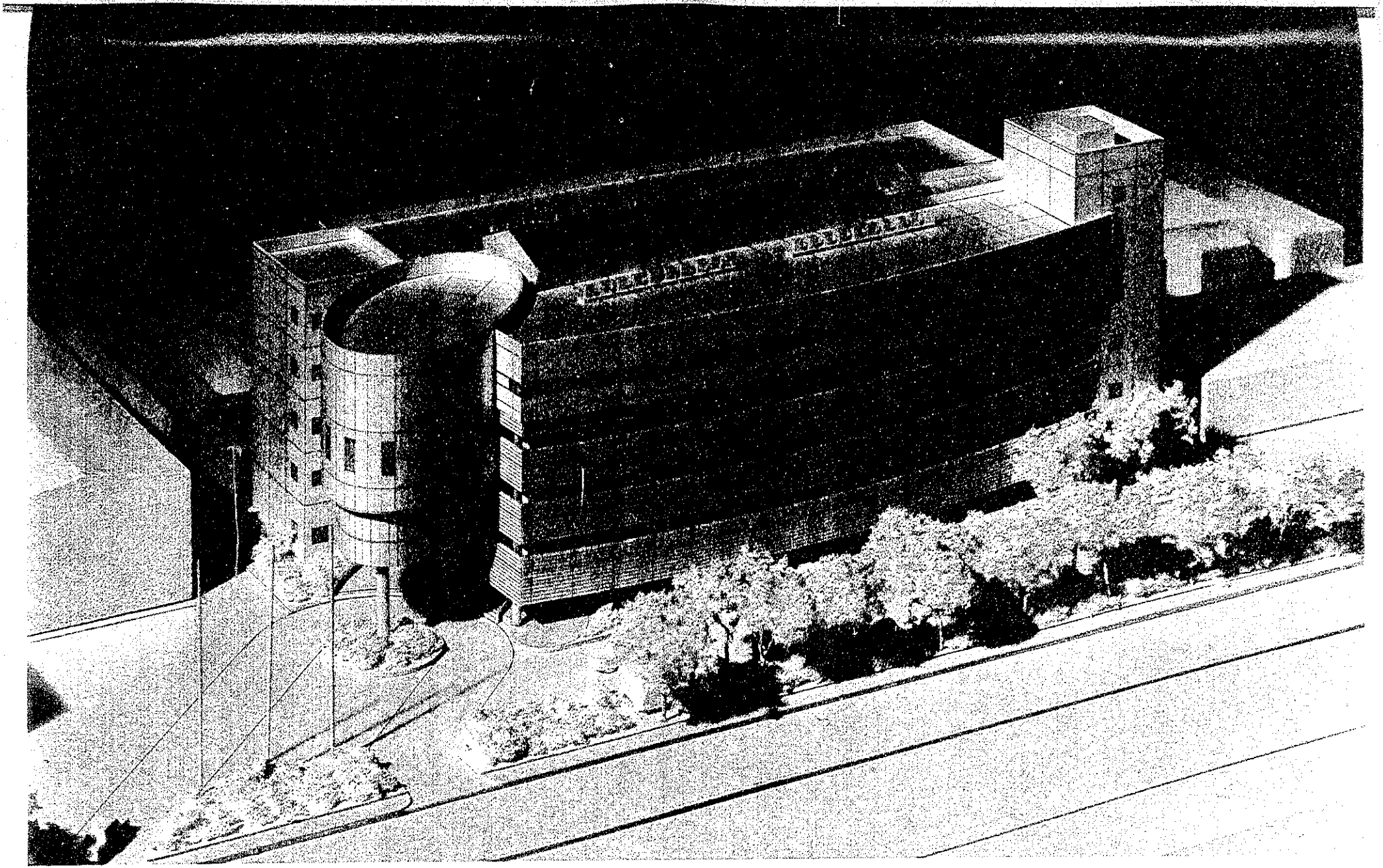

CONTENTS

SUMMARY

Surabaya, which is the second largest city in the Republic of Indonesia, has a population of approximately 2.5 million (1991). In recent years there has been remarkable industrial growth in the area (the growth rate of East Java was 8.9% in 1990). This growth in industrial and economic activity is estimated to continue for at least five years, and is feared to increase traffic and industrial accidents. An increased need for emergency medical services is therefore becoming a major issue.

In its Fifth Five-Year Development Plan, the government of the Republic of Indonesia decided that development of the people's living standards and improvements in medical services are two of its prime policies. In response, the Ministry of Health and other related agencies are making great efforts to increase the number of people engaged in medical services and to improve and enforce the related laws and regulations. However, due to financial and other reasons, they have not been able to produce sufficient results.

In the area around Surabaya City, there are only 18 hospitals to cope with the rapidly increasing need for emergency medical services. Among these, Dr. Soetomo Hospital (RSS) is the only one A-class public hospital. Moreover, these hospitals' facilities have become obsolescent and the equipment's quality is low and limited in number.

RSS's emergency medical care unit (EMU) treated as many as 130,000 emergency outpatients and performed approximately 7,400 emergency operations in 1991. Compared with the emergency department of the Dr. Cipto Mangunkusumo Hospital, which is also an A-class national hospital located in Metropolitan Jakarta, RSS has been handling over twice the number of outpatients and surgical operations. Moreover, because emergency medical systems in a wide area around Surabaya, particularly transporting emergency patients and communications systems, are not fully functioning, EMU is lagging behind in the area of hardware given what is being demanded. Because the number of medical facilities in the area around Surabaya City is insufficient, EMU's role in this area exceeds that of the emergency department of the Dr. Cipto Mangunkusumo Hospital in Jakarta City. Updating the department's facilities and equipment is believed indispensable in securing the level of the medical services now required by the area.

Under these circumstances, the Indonesian government has formulated a project for constructing new EMU building for the purposes of expanding EMU and improving the quality of emergency medical services provided for a wide-area in East Java Province. However, due

to budgetary limitations in developing the department's facilities and equipment, the Indonesian government has requested the Japanese government for grant aid assistance and technical cooperation to implement this project.

In response, the Japanese government decided to examine the project, and the Japan International Cooperation Agency (JICA) hence dispatched a Basic Design Study (I) team in October of 1992 to confirm the background and contents of the request by consulting officials concerned in Indonesia, studying the related facilities and gathering the necessary data. Following this study, JICA concluded that it was necessary to conduct a Basic Design Study (II) and dispatched a team to Indonesia in November of 1992. Based on the results of Basic Design Study (I), this team consulted with the Indonesian government, studied the construction site and gathered additional data. Through the subsequent analysis in Japan and explanation of the draft report in Indonesia in March of 1993, JICA has prepared this Basic Design Study Report.

As a result of these studies, the Japanese team concluded that it is necessary to improve EMU not only for Surabaya City but for all eastern Indonesia including the East Java Province. Since RSS closes at 2:00 pm, the EMU must be able to serve independently. The EMU is designed for treating emergency patients and therefore keeps patients in its IOU for a maximum of 24 hours, if necessary, the EMU transfers them to an intermediate ward and then to a general ward. For facilities such as central supply and sterilization, laboratory, kitchen, laundry and workshops, the EMU will rely on RSS main facilities. ESS will have only limited functions for these facilities. The new facility will serve as a model emergency medical facility for B and C class hospitals in East Java Province.

Major functions of new EMU will be as follows,

1) Medical examination and treatment in the area of emergency medical services:

   Medical examination and treatment department (medical, surgical and pediatric), IOU department, surgical and obstetric department, X-ray, physiological and clinical examination department and others.

2) Top referral activities in the area of emergency medical services:

   Positioning itself as a major hospital which provides emergency medical services in eastern Java Province and the eastern half of the Republic of Indonesia.

3) Medical staff training activities in the area of emergency medical services:

As a training hospital for the medical department of the adjacent National Airlangga University, acceptance of trainees associated with emergency medical services.

4) Central emergency medical activities at the time of major disasters:

To serve as the central base when major natural disasters and accidents occur.

This emergency medical care unit will be constructed on the premises of the Dr. Soetomo Hospital in Surabaya City. It will serve to replace the present emergency department building (surgical department).

The planned facilities and equipment are as follows:

Site area	:	approximately 5,300m^2
Total floor area	:	approximately 7,800m^2
Structure and scale	:	ferro-concrete building, five stories

Main sections and rooms

1F: Emergency treatment and diagnosis section
Reception room, waiting room, examination room, treatment room, pharmacy, X-ray examination room, emergency examination room, morgue

2F: Emergency obstetrics-gynecology department
Examination room, treatment room, delivery room, labor room, nurse station, IOU, premature infants' room

3F: IOU (Intensive Observation Unit)
IOU-1, IOU-2, nurse station

4F: Education, training and management section
Administrative office, medical office, lecture room, cafeteria, machinery-related rooms, etc.

5F: Emergency surgery section
Operating room, central supply and sterilization room, preparatory room, linen and equipment storage

Equipment

Basic medial equipment, ambulances, etc., necessary for diagnosis and treatment, training, research and information services

This project will be implemented by the Directorate General of Medical Care, Ministry of Health. The medical care unit will be managed and operated by the national Dr. Soetomo Hospital which is under the Directorate's control.

The present EMU has a staff of 358 including doctors, nurses and other staffs. On the completion of new EMU, the staff will be increased by 28 to 386. And in 2002 it shall be 514.

At the opening of the new EMU, the costs for operating the new emergency medical care unit are estimated to be Rp. 2,217,587,000. This will be 8.6% of the total operating cost of RSS. When the Swadana Concept is executed, the added expense of the new EMU will be covered to a certain degree by the increased income from the increase in patients. Since the Ministry of Health is actively supporting the EMU, it is believed fully possible to provide the necessary budgetary allocation for covering the increase of new emergency medical care maintenance and control expenses. Also, materials which can locally be procured will be used on a priority basis in constructing and installing the facilities, and the construction project has been planned so as not to bring about an indiscriminate increase in heat and light expenses. In selecting the medical equipment, the project has emphasized the availability or absence of locally available maintenance and control systems. Hence, there are no particular problems anticipated in the operation, budgetary measures, or maintenance and control of the project after the facilities have been completed.

The project, when implemented, is expected to produce the following effects and improvements in developing the Indonesian medical standards for emergency medical services.

1) The qualitative and quantitative improvements in the emergency medical capabilities at the new EMU will make the facilities capable of handling the increase in patients anticipated over the next ten years.

Outpatients	:	surgical and internal medical dept.: 450/day, obstetrics-gynecology dept.: 25/day
IOU	:	surgical and internal medical dept.: 53/day, obstetrics-gynecology dept: 12/day (premature infants: 3)
Surgical operations	:	Surgical dept.: 20/day, obstetrics-gynecology dept.: 8/day

It will also make it possible to cope with the increasing emergency medical needs in East Java including Surabaya City.

2) When the new EMU becomes a model of emergency medical services to meet Indonesia's actual conditions it can be used as a reference facility in improving other medical facilities of the similar type located throughout the country. It will also contribute to develop the manpower necessary for emergency medical services and develop their skilled knowledge of new equipment.

3) Through training of the new EMU's medical staff and by providing information to other medical institutions about the results of research activities at the new EMU, it is possible to spread the success of the project throughout the country.

The growth of the industry and economy is inevitably leading to increasing traffic and industrial accidents in Indonesia. Moreover, because this project is designed to benefit many ordinary people including low-income people, the project is believed to contribute toward stabilizing the Indonesian people's livelihood. It is hence believed fully appropriate that this project be implemented through grant aid assistance by Japan.

In order to enhance the effect of implementing this project, it will be necessary for the Directorate General of Medical Care, Ministry of Health to take the following actions. The first is to improve B and C class hospitals to ease the concentration of emergency patients in A class hospitals such as RSS. The second is to upgrade emergency transportation and communication systems and the referral function throughout East Java. The third is to educate the medical staff in the concept of sanitation in order to improve the hospital environment. Finally, it is important to create a situation so that such as RSS can acquire enough budget for the EMU in the future.

CHAPTER 1 INTRODUCTION

CHAPTER 1 INTRODUCTION

In order to expand the emergency medical activities and to develop the quality of the wide-area emergency medical services in East Java Province, the Government of the Republic of Indonesia formulated a plan to construct the new Emergency Medical Unit (EMU) Building of Dr. Soetomo Hospital (RSS) to strengthen the functions of the emergency medical facilities of the said hospital located in Surabaya City. In order to implement this project, in April of 1992 it requested the Japanese government for grant aid assistance and technical cooperation regarding emergency medical services.

In response, for 21 days beginning October 5, 1992, the Japan International Cooperation Agency (JICA) dispatched a Basic Design Study (I) team headed by Hidekazu Urakami, Director, ICU Department, St. Mary Hospital, to consult with the related Indonesian officials, inspect the related facilities and gather the necessary data and study the contents of the emergency department's operations. As a result, JICA concluded that it was necessary to conduct another basic design study. Hence, from November 9 to December 12 of 1992, JICA dispatched a Basic Design Study team (II) headed by Kageshige Todo, Vice-President and Director, Thoracic Cardiovascular Surgery Department, St. Mary Hospital, to confirm the results of the preliminary study and to examine more thoroughly the specific contents of the project. Based on the project's positioning, roles, etc., in Indonesia's emergency medical system, the study team conducted the following studies related to the possibility of grant aid assistance for this project.

(1) Study of the present state of RSS
(2) Study of the present state of the related medical facilities
(3) Examination of the necessity of the requested facilities and equipment
(4) Confirmation of the project implementation system, personnel plan, management and operation budget and the works to be implemented by the Indonesian side
(5) Study of the construction site and related infrastructure
(6) Study of the circumstances related with construction and medical equipment

The study team analyzed the results of the field survey after returning to Japan, prepared a draft Basic Design Study Report, explained this report in Indonesia in March of 1993, discussed its contents with the Indonesian side and the both sides reached an agreement. This report has assimilated the results of the above mentioned studies. The composition of the study teams, schedule of the field survey, list of the Indonesian counterparts and a copy of the minutes of discussions have been attached at the end of this report.

CHAPTER 2 BACKGROUND OF THE PROJECT

CHAPTER 2 BACKGROUND OF THE PROJECT

2-1 Health and Medical Care in Indonesia

2-1-1 Health and Medical Care Circumstances

(1) The Fifth Five-Year Plan

By March of 1989, the Indonesian government had executed four five-year national development plans. The country has achieved marked development both in the areas of economic and social development. At present it is promoting the Fifth Five-Year Plan (April 1989 to March 1994).

In the area of health and medical services, the country has set forth policies emphasizing development of the people's health standards and improvement of the medical services. Specifically, it has set forth the following five goals for its "National Health System."

(1) Promotion of voluntary participation in the efforts to develop the level of health and medical services

(2) Strengthening of the medical personnel in such a way as to reflect the social demand

(3) Sufficient supply of pharmaceuticals and strengthening of the monitoring for harmful foodstuffs and chemicals

(4) Improvement of the nutritive standards and environmental hygiene

(5) Strengthening of the regulatory capacities of the medical administration and development and enforcement of the related laws and regulations

Based on these medical policies, the country has promoted establishment of nation-wide medical service systems. The Fifth Five-Year Plan emphasizes the following two points in providing the medical services to as many people as possible.

(1) Qualitative improvement and development of the efficiency of the comprehensive medical referral system

(2) Improvement of hospital operation, qualitative development of the medical services and improvement of financial conditions

(2) Health and Medical Administration

The country's Ministry of Health is the organization in charge of the central health and medical administration. As shown in Figure 2-1-1, the Ministry consists of four Directorates and their supporting departments and agencies. The Directorate General of Medical Care controls all hospitals, dental, psychiatrical and other medical facilities and medical testing facilities in Indonesia.

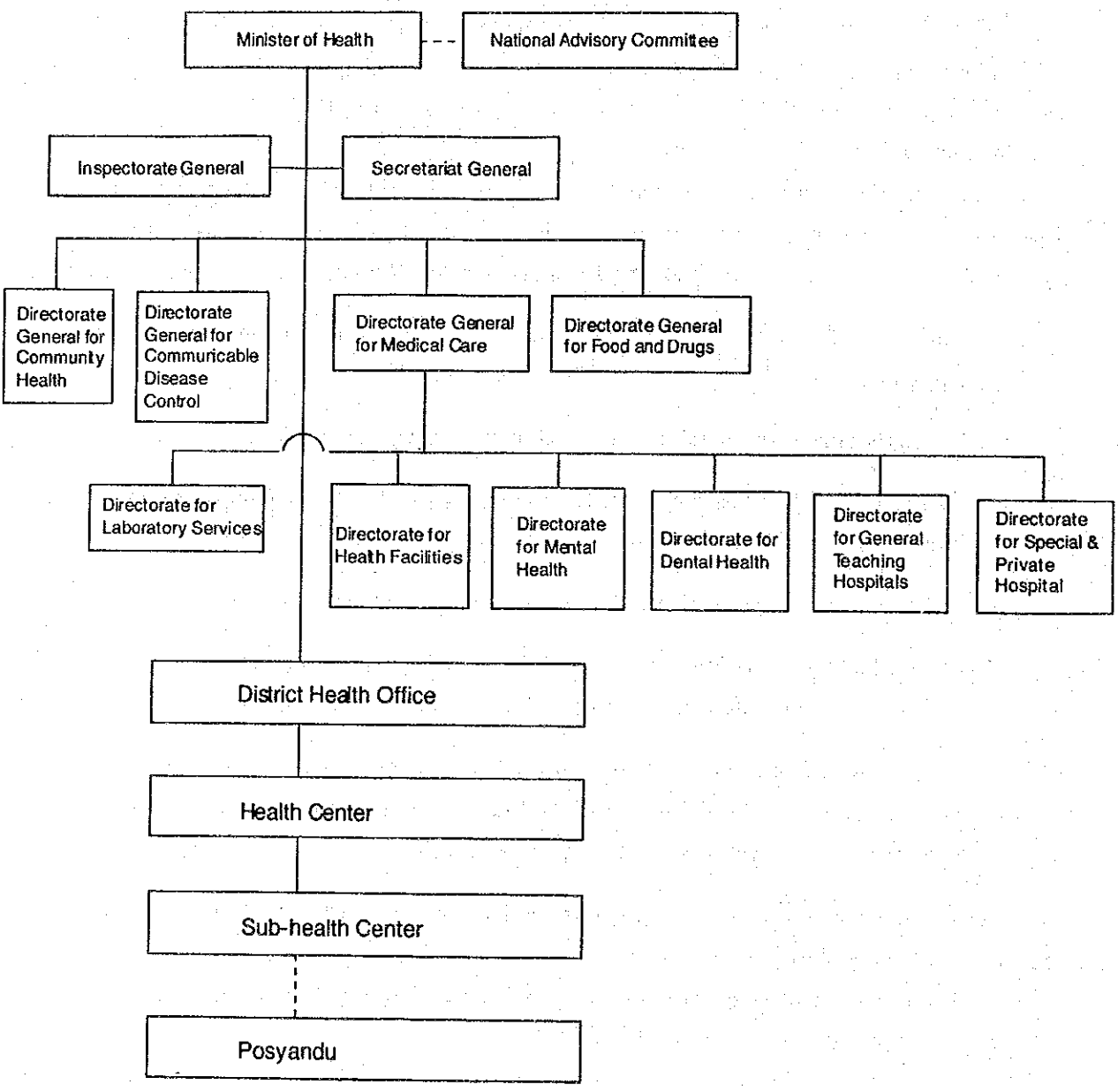

Fig. 2-1-1 Organization Chart of Ministry of Health

(3) Budget for the Ministry of Health

The budget for the Ministry of Health has grown 3.2 times from Rp. 71,942,700,000 in 1989 to Rp. 226,129,500,000 in 1991. The budget allocation for the D.G. of Medical Care has also grown 4.75 times from 19,924,482,000 RP in 1989 to 94,767,345,000 RP in 1991. 27.69% of the entire Ministry budget was allocated to the D.G. of Medical Care in 1989. In 1991 this figure had increased to 41.9% (Table 2-1-1).

Table 2-1-1 Budgetary Changes in Ministry of Health

(×1000RP)

	1989/1990	%	1990/1991	%	1991/1992	%	Increase Rate
Secretariat General	15,928,499	22.14	20,943,618	15.91	28,715,858	12.70	180.28
Inspecurate General	325,000	0.45	873,900	0.66	1,743,573	0.77	536.48
Directorate General of Community Health	15,357,001	21.35	10,008,432	7.60	47,377,625	20.95	308.51
Directorate General of Medical Care	19,924,482	27.69	63,020,521	47.88	94,767,345	41.91	475.63
Directorate General of Communicable Disease Control	17,453,201	24.26	29,507,118	22.42	43,156,267	19.08	247.27
Directorate General of Foods & Drugs	2,454,927	3.41	6,329,936	4.81	8,319,400	0.91	410.22
Expenditure for Research & Development	499,590	0.69	948,849	0.72	2,049,432	0.91	410.22
Total	71,942,700	100.00	131,632,374	100.00	226,129,500	100.00	314.32

(Source: Ministry of Health)

The Ministry of Health is also planning to utilize a method called the Suwadana Concept. This method is to improve cost awareness in the hospitals and endeavor to increase income by permitting the hospitals to handle finances independently without first paying into the Public Treasury, and thereby stimulate independent operation of each hospital.

The deficit will be subsidized by National and Provincial budgets. Social insurance is also being promoted to ease the financial burden on the patients.

(4) Medical Service Systems

The medical services for the people are mainly being provided through hospitals, clinics, health centers, health subcenters and posyandu .

The country has 1,474 national/public and private hospitals (1988 and 1989). These have a total of 114,846 beds. While there are more or less equal numbers of national/public and private hospitals, around 70% of the beds belong to national/public hospitals. In 1989 the number of beds per population of 100,000 was 64. The national/public hospitals are relatively uniformly situated in the various regions and the private hospitals financed by religious foundations and other organizations are concentrated in large cities. Hence, there is great similarity between the population distribution and that of beds. For example, Java Island which has 60% of the population has 56.4% of the beds in the entire country. On the other hand, however, this means that the opportunities for receiving medical services is very low in the areas with low population densities.

The Ministry of Health directly controls 15 of the national/public hospitals. Others can be divided into hospitals controlled by the Ministry of Interior, Ministry of Transport, Ministry of Posts and Ministry of Agriculture and military hospitals. These national/public hospitals are classified from A to D based on the contents of their medical services, scale and functions.

Under these hospitals are health centers (Puskesmas), health subcenters (sub-Puskesmas) and Posyandu which are in charge of primary health care on the front line. However, because the population density greatly differs from one region to another, and the fact that in rural districts or isolated islands the means of transportation have not been developed, there are regions where the people do not receive sufficient medical services because health centers and subcenters are located too far away.

(5) Medical Referral System

In order for the people to receive medical services equally, the Indonesian government has been making efforts to develop the medical referral system as shown in Figure 2-1-2. According to this system, the patient first visits the nearby health center or subcenter. If his /her sickness, symptoms or injuries exceed the capacity of the medical services provided, depending on the seriousness, he/she is transported to a higher class hospital ranging in rank from D to A. However, with special cases such as serious injuries and difficult diseases, the patient is directly transported to hospitals of the class which can provide the treatment that meets with the situation.

At present however, this medical referral system is not smoothly functioning due to the following reasons.

1. Because the facilities and equipment of C- and D-class hospitals are not fully equipped, these hospitals are not fully playing the roles expected of them.
2. Because of a shortage of medical personnel, it is difficult to appropriately post the personnel.
3. The systems and means for transporting patients and wide-area communications systems are underdeveloped in rural areas, especially remote islands.

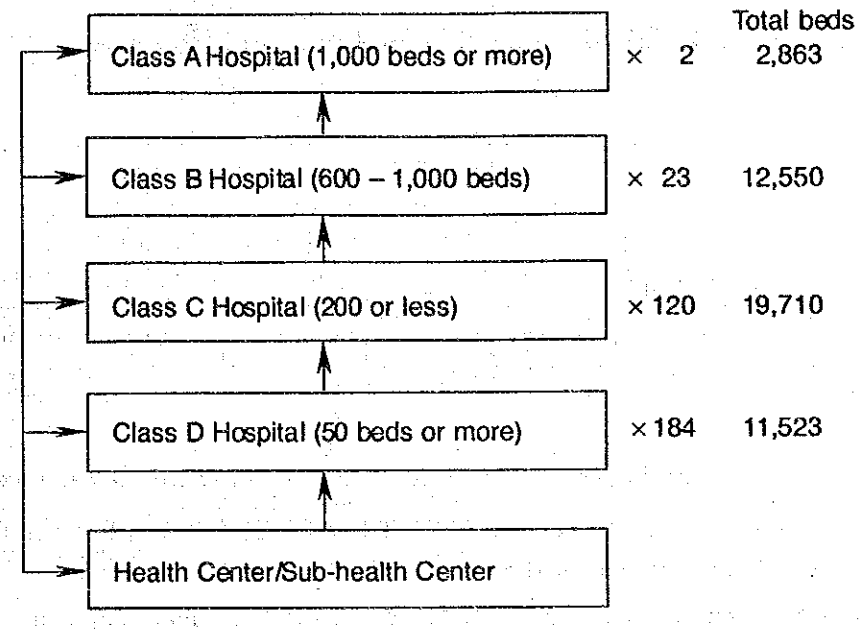

Fig. 2-1-2 Medical Referal System

Given the great demand for medical services, the Indonesian government has been pressed to solve these problems. As part of the current Fifth Five-Year Plan, it has been promoting further development of the referral system as a priority measure for medical sector.

In addition to the two A-class hospitals, the Dr. Cipto Mangunkusumo Hospital (RSCM) in Jakarta and RSS in Surabaya, the country is also constructing A-class hospitals in Ujung Pandang and Medan. It is also implementing a plan for upgrading six C-class hospitals into B-class through improvement, and increasing C-class hospitals by improving 62 D-class hospitals. Additionally, it is reinforcing the activities of C-class hospitals by assigning dental, radiological, anesthesiological and bacterial specialists to them.

2-1-2 Conditions of Emergency Medical Care Services

The demand for emergency medical care services in Indonesia is increasing at the rate of 15 to 20% a year. One of the causes of such a rapid increase in demand has been a population increase of approximately 2% a year and its concentration in cities. Table 2-1-2 shows the trends in the ratios of the population residing in cities and rural areas from 1971 to 1991. The population increase has been marked every year in cities. Around 30% of the entire population lived in cities in 1991.

Table 2-1-2 Trend of Population in Urban and Rural Area

(X million)

	1971	1980	1983	1988	1991
Urban Area	20.7 (17%)	32.8 (22%)	37.9 (24%)	48.4 (28%)	51.3 (28.6%)
Rural Area	98.5 (83%)	113.9 (78%)	120.2 (76%)	127.2 (72%)	128.1 (71.4%)
Total	119.2 (100%)	146.7 (100%)	158.1 (100%)	175.6 (100%)	179.3 (100%)

The expansion of new employment opportunities due to progress of urbanization and industrialization has been serving as a great absorption factor for the increase of population in cities. This trend has also appeared in the changes in the country's employment structure. Table 2-1-3 shows that although in 1991 51.5% of the total number employed worked in agriculture, forestry and fisheries and that the dependence on these industries is still great, the ratio has considerably declined from 66% in 1976. In recent years, urban industries such as manufacturing, commerce and food business have markedly grown to replace agriculture, forestry and fisheries. It is therefore possible to understand that the employment opportunities are continuing to expand in cities.

Table 2-1-3 Trend of Working Population in Each Industry

	1976		1980		1985		1991	
	×1,000	%	×1,000	%	×1,000	%	×1,000	%
Total Working Population	53,433	100.0	51,553	100.0	62,475	100.0	75,784	100.0
Agriculture, Forestry, Hunting, Fishery	35,258	6,600	28,834	55.9	34,142	54.7	39,038	51.5
Manufacturing Industry	44	0.1	387	0.8	416	0.7	527	0.7
Mining and Quarrying	3,560	6.7	4,680	9.1	5,796	9.3	8,644	11.4
Electricity, Gas and Water	34	0.1	66	0.1	70	0.1	142	0.2
Construction	1,098	2.1	1,657	3.2	2,096	3.3	2,499	3.3
Wholesale Trade, Retail Trade, Restaurants and Hotel	6,253	11.7	6,679	13.0	9,345	15.0	111,934	15.7
Transportation, Storage, Communication	1,112	2.1	1,468	2.8	1,958	3.1	2,376	3.1
Financing, Insurance, Real Estate and Business Service	74	0.1	302	0.6	250	0.4	598	0.8
Public Services	5,157	9.6	7,145	13.9	8,317	13.3	9,819	13.0
Others	853	1.6	334	0.6	67	0.1	203	0.3

(Central Statistics Bureau)

With concentration of population in cities and changes in the employment structure, the number of vehicles owned in Indonesia has grown considerably. Table 2-1-4 shows the changes in the number of vehicles registered in the country from 1986 to 1990. During that period the number of vehicles increased by 390,000 a year or 1.5 million in total. In the case of Surabaya City, 505,000 vehicles were newly registered from 1986 to 1991 which is an increase of over 100,000 a year.

Table 2-1-4 Annual Vehicle Registration (1986 ~ 1991)

	1986		1990	1991
	Indonesia	Surabaya	Indonesia	Surabaya
Car	1,063,959	184,218	1,313,210	169,366
Bus	256,574	11,440	468,550	106,786
Truck	882,331	145,002	1,024,296	165,606
Motorcycle	5,118,907	1,098,581	6,082,966	1,503,191
	7,321,771	1,439,241	8,889,022	1,944,949

(Annual Increase) Indonesia: 391,812, Surabaya: 101,141

While there are no nationwide statistics on emergency patients, in the RSCM of Jakarta City in 1991 52,077 or 8.1% of the patients totaling 644,564 were emergency patients, whereas, in RSS, emergency patients numbered 115,207 (surgery, internal medicine, pediatrics, obstetrics and gynecology alone) or 15.4% of the total of 749,871 patients for the same year, which clearly indicates the need for emergency medical service.

The emergency system in Indonesia is as follows:

When an accident occurs, the first thing is to make an emergency telephone call. Indonesia has two emergency numbers, 118 and 199. The later however requires a fee. In response, the ambulances available at major emergency hospitals in the city are dispatched.

When the ambulance cannot reach the spot on time, the patient comes to the hospital by himself/herself or is taken there by a helper. If this hospital cannot fully cope with his/her injuries, he/she is administered first-aid and transferred to a higher-class hospital based on the referral system. This system however is not necessarily working smoothly. Its problems are as follows.

(1) Emergency Communications

Radio communications network of hospitals is serving an important role in emergency communications since the telephone network is still inadequate.

(2) Ambulance System

There is a severe shortage of ambulances in Indonesia with the principal hospitals having only two to three. Use of these ambulances is also difficult since they are not free of change.

(3) Referral system

The A to D-class hospitals have not fully been equipped so it is difficult to enforce the referral rule which states that minor cases be handled at nearby low-class hospitals and only serious cases are referred to higher-class hospitals. As a result, even minor cases directly go to higher-class hospitals. Because of this situations, it is becoming difficult for A class hospitals to carryout the role as the tertial care hospital.

(4) Level of treatment

The risks of infectious diseases due to urbanization and high density, and of adult diseases and mental diseases due to stress, are increasing. These diseases do not require simple first-aid but more prompt and advanced treatment.

This resulted in an increase in surgical operation and inpatients. These patients require higher-class hospitals which can offer advanced treatment. Consequently, the number of patients in those higher-class hospitals has been increasing.

2-1-3 Outline of Surabaya City

Surabaya City is located at the eastern end of Java Island (long. 112°45' E, lat. 7°16' S) at the mouth of Brantas River and is the capital of the East Java Province. The East Java Province consists of eight municipalities and 29 regencies. Surabaya City is not only the center of politics and economy of East Java but also is an important base for supplying goods and materials to Kalimantan, Sulawesi and Bali.

The city of Surabaya is located near the equator, and has a tropical climate with an average annual temperature of 27°C and humidity of 80%. It has no distinguishable four seasons but has the dry (May-October) and rainy (November-April) seasons. During the rainy season it is often hit by severe rain.

According to a 1990 survey, Surabaya City had a population of around 2.47 million. This was the second largest population among the major Indonesian cities following Jakarta. Like other Indonesian cities, the scale of Surabaya is expanding every year.

Surabaya City's administration is divided into five districts which are further divided into sub-districts. The city consists of 19 sub-districts. Table 2-1-5 shows the name and area of each district and sub-district.

Table 2-1-5 also shows Surabaya City's population distribution based on these districts and sub-districts. The table shows that the city can be divided into densely populated areas with population exceeding 20,000/km^2 and less populated areas with population under 7,000/km^2. The densely populated areas are the 11 sub-districts mainly in central area of the city. 60% of

the city's entire population live in these sub-districts. In terms of the annual rate of population increase, the population has been decreasing in the central district in the recent years. In contrast, it has markedly been increasing in suburban Surabaya. This shows that urbanization is rapidly expanding to the suburbs.

Table 2-1-6 shows Surabaya City's industrial structure. Output by the primary industries such as agriculture and mining is close to zero. The secondary industries account for one third of the total output and tertiary industries two-thirds. Hence the city is centered around commerce and industry.

Table 2-1-7 shows the state of establishment of medical facilities which comprise the center of the health and medical administration in Surabaya City.

With the exception of western Surabaya, three to eight hospitals have been established in the other districts. At least one health center has been established in all of the 19 sub-districts or two to three in each district. Table 2-1-7 shows that many medical facilities are concentrated in densely populated central area of Surabaya.

Table 2-1-5 Population of Each District in Surabaya

No.	District	Sub-District	Population (persons)					Population Density (1990) (Person/km^2)	
			1971	1980	1990	1971 – 1980	1980 – 1990		
1	North Surabaya	Semampir	98,114	162,131	166,496	5.74	0.27	31,179	*
2		Pabean Cantikan	40,762	101,711	88,416	10.69	11.39	19,981	*
3		Krembangan	144,890	125,511	119,225	11.58	10.51	26,020	*
4		Kenjeran	21,768	41,709	84,364	7.49	7.30	6,750	
			(305,534)	(431,062)	(458,501)	(3.90)	(0.62)	(17,080)	
5	East Surabaya	Tambaksari	127,913	163,598	188,225	2.77	1.41	20,700	*
6		Gubeng	129,150	161,097	156,428	2.49	10.29	20,879	*
7		Rungkut	21,302	56,468	172,993	11.44	11.84	4,845	
8		Sukolilo	25,179	58,821	148,110	9.87	9.67	4,409	
			(303,544)	(439,984)	(665,756)	(4.21)	(4.23)	(7,752)	
9	South Surabaya	Sawahan	159,007	205,665	208,699	2.90	0.15	27,324	*
10		Wonocolo	40,884	86,234	140,614	8.65	5.01	2,526	
11		Karangpilang	48,666	81,677	140,046	5.92	5.54	5,549	
12		Wonokromo	217,203	171,845	171,421	12.57	10.02	25,604	*
			(465,760)	(545,421)	(660,780)	(1.77)	(1.94)	(11,351)	
13	Central Surabaya	Genteng	73,842	89,704	73,878	2.19	11.92	20,929	*
14		Tegalsari	92,441	129,570	117,837	3.82	10.94	24,048	*
15		Bubutan	156,715	122,802	109,214	12.63	11.71	31,629	*
16		Simokerto	101,965	112,470	98,107	1.10	11.36	36,910	*
			(424,963)	(454,546)	(399,036)	(0.75)	(11.29)	(27,442)	
17	West Surabaya	Tandes	27,920	91,799	196,119	14.14	7.89	6,094	
18		Benowo	15,659	23,157	35,986	4.44	4.51	877	
19		Lakarsantri	24,266	31,540	57,094	2.96	6.11	1,670	
			(67,845)	(146,496)	(289,199)	(8.93)	(7.04)	(2,692)	
		Total	1,567,646	2,017,509	2,473,272	2.84	2.06	8,516	

(Source: Dr. Soetomo Hospital)

Table 2-1-6 Industrial Structure in Surabaya

(1989)

	Industries	Production (%)
Primary Industry	Agriculture, forestry and fishery	1.1%
	Mining	0.1
		(1.2)
Secondary Industry	Manufacturing	17.5
	Electricity, gas and water	2.8
	Construction	9.0
		(29.3)
Tertiary Industry	Retail, Hotel, Restaurant	20.6
	Transportation, Communication	14.3
	Financial	16.5
	Other Service	6.9
	Real estate	5.5
	Public service and military	5.7
		(69.5)
Total		100%

(Source: Dr. Soetomo Hospital)

Table 2-1-7 Medical Facilities in Surabaya

No.	District	Sub-District	Hospitals (include clinic) (a)	Beds	Health Centers	Center Area of the City (b)
1	North Surabaya	Semampir	2	94	2	*
2		Pabean Cantikan	2	130	1	*
3		Krembangan			2	*
4		Kenjeran			1	
			(4)	(224)	(6)	
5	East Surabaya	Tambaksari			3	*
6		Gubeng	3	1,895	2	*
7		Rungkut			3	
8		Sukolilo			2	
			(3)	(1,895)	(10)	
9	South Surabaya	Sawahan			3	*
10		Wonocolo	1	600	3	
11		Karangpilang	1	35	3	
12		Wonokromo	6	1,046	3	*
			(8)	(1,681)	(12)	
13	Central Surabaya	Genteng	2	523	2	*
14		Tegalsari	1	88	2	*
15		Bubutan	1	217	2	*
16		Simokerto	1	59	2	*
			(5)	(887)	(8)	
17	West Surabaya	Tandes			4	
18		Benowo			1	
19		Lakarsantri			1	
			(0)	(0)	(6)	
		Total	20	4,687	42	

(a) include clinics
(b) the area with population density over 20,000/km^2
(Source: Dr. Soetomo Hospital)

2-1-4 Demand for Emergency Medical Care Services in Surabaya City

(1) Increase of Vehicles and Traffic Accidents

The number of vehicles registered has grown from 1,320,427 in 1985 to 1,944,949 in 1991 or by 100,000 a year. Particularly during the recent two years from 1989 to 1991, it has rapidly grown by 425,520 a year (Table 2-1-8).

The emergency surgical patients treated at the Dr. Soetomo Hospital emergency department in 1989 were composed of traffic accidents (27.6%), industrial accidents (10.8%), domestic accidents (15.8%), other accidents (33.2%) and sickness (12.6%)(Table 2-1-9).

(2) Infectious Diseases

563 people out of a population of 2.5 million have been affected by tuberculosis, therefore the occurrence rate of this disease is low. Potentially however, the number of patients is believed to be greater. (Table 2-1-10)

Cholera's occurrence rate is still high. Leprosy also has a high occurrence rate infecting 252 people in 1990 and 644 in 1991. Dengue fever is also occurring very frequently infecting 1,153 in 1990 and 1,103 in 1991. Relatively few (155) have been infected by typhoid fever, and there have been virtually no cases of malaria. As the occurrence rate of cholera and dengue fever is high in the central city, their sudden occurrence is feared in densely populated areas. (Table 2-1-10).

Table 2-1-8 Number of Registered Motor Vehicle in Surabaya

	1985	1987	1989	1991
Numbersol registered motor vehicles	1,320,427	1,625,355	1,519,429	1,944,949

(Source: Dr. Soetomo Hospital)

Table 2-1-9 Patient Categories in Emergency Department of Dr. Soetomo Hospital 1989

Type of Accident	Percentage (%)
Traffic Accident	27.6
Industrial Accident	10.8
Home Accident	15.8
Other Accident	33.2
Disease	12.6

(Source: Dr. Soetomo Hospital)

Table 2-1-10 Infectious Disease in Surabaya

No.		X1000 (persons/km^2)	Tuberculosis	Cholera	Leprosy	Dengue fever	Typhoid fever	Densely populated area
	North Surabaya							
1	Semampir	32	72	15	29	37		x
2	Pabian Cantikan	20	14	4	5	21		x
3	Krembangan	26	31	7	15	35	4	x
4	Kenjeran	7	21	14	14	26		
	East Surabaya							
1	Tambaksari	21	15	8	16	110	35	x
2	Gubeng	21	32	17	5	102	21	x
3	Rungkut	5	15	63	11	47	7	
4	Sukolilo	5	21	31	3	53		
	South Surabaya							
1	Sawahan	27	65	14	37	149	23	x
2	Wonocolo	9	27	14	4	81	31	
3	Karangpilang	6	15	5	6	55		
4	Wonokromo	26	9	18	15	93		x
	Center Surabaya							
1	Genteng	21	10	3	2	48	2	x
2	Tegalsari	24	23	9	1	72	2	x
3	Bubutan	31	29	8	8	45	28	x
4	Simokerto	36	81	13	37	58	2	x
	West Surabaya							
1	Tandes	7	65	20	20	102		
2	Benowo	1	8	2	21	6		
3	Lakarsantri	2	2	3	3	13		
	Total (1990)	–	555	268	252	1,153	155	
	Total (1991)	–	563	74	644	1,103	153	

(Source: Dr. Soetomo Hospital)

(3) Emergency Medical System

The Dr. Soetomo Hospital (RSS), which is the only A-class national/public hospital in East Java Province, is designated as the Province's tertiary medical care hospital. At present, East Java Province has 92 hospitals and other medical facilities, including clinics. Among these are the navy hospital, the A-class RSS, three B-class Hospitals, and the others are C- or D-class. There are private hospitals, however, since their treatment and hospitalization are expensive, the ordinary people cannot easily use them. Under these medical facilities, public health centers have been set up in each district to provide daily medical examination.

Table 2-1-11 shows the number of patients treated at RSS. Patients have visited it not only from East Java Province but over 37% from other provinces. This clearly shows that the hospital has been functioning as eastern Indonesia's tertial care hospital. Emergency Medical Care System is also functioning in the above-mentioned system, with RSS as a top referral hospital.

As shown in Figure 2-1-3, in East Java Province, RSS is to be the headquarter and the B- and C-class hospitals Jember, Malang, Kediri and Madium are the relay bases. These communication networks can be used at the time of emergencies such as disasters.

An emergency network has also been constructed around Surabaya City (Figure 2-1-4). Here also, RSS is playing the central role. In northern Surabaya the Al Iryad and Adi Husada Hospitals, in central Surabaya RSS itself and in southern Surabaya the Catholic, Islam and Navy hospitals are serving as key hospitals. In the areas around the city, the cities of Bangkalan, Gresik, Lamongan, Mojokerto and Sidoarjo have bases to form an emergency network. In a way, each hospital comprises a detachment of the emergency squad. As shown in Table 2-1-12, 12,865 emergency cases a year or around 35 cases a day are handled by a wireless emergency communication network.

Table 2-1-11 Patients by Districts, Surabaya City and Surabaya Area

No.	District	Outpatients	Inpatients	Total	%
1	Bangkalan	493	320	813	0.19
2	Banyuwangi	187	130	317	0.07
3	Blitar	202	141	343	0.08
4	Bojonegoro	450	267	717	0.17
5	Bondowoso	60	35	95	0.02
6	Gresik	3,225	1,556	4,781	1.12
7	Jember	174	152	326	0.08
8	Jombang	931	354	1,285	0.30
9	Kediri	834	364	1,198	0.28
10	Lamongan	1,529	789	2,318	0.54
11	Lumajang	163	77	240	0.06
12	Madiun	285	192	477	0.11
13	Magetan	76	51	127	0.03
14	Malang	434	189	623	0.15
15	Mojokerto	1,538	752	2,290	0.54
16	Nganjuk	500	232	732	0.17
17	Ngawi	65	68	133	0.03
18	Pacitan	77	29	106	0.02
19	Pamekasan	242	64	306	0.07
20	Pasuruan	1,031	411	1,442	0.34
21	Ponorogo	154	85	239	0.06
22	Probolinggo	286	166	452	0.11
23	Sampang	159	105	264	0.06
24	Sidoarjo	9,228	3,149	12,377	2.91
25	Situbondo	65	42	107	0.03
26	Sumenep	165	67	232	0.05
27	Surabaya	202,611	30,953	233,564	54.88
28	Trenggalek	221	114	335	0.08
29	Tuban	425	290	715	0.17
30	Tuiungagung	396	174	570	0.13
31	Others	157,574	490	158,0640	37.14
		383,780	41,808	425,588	100.0

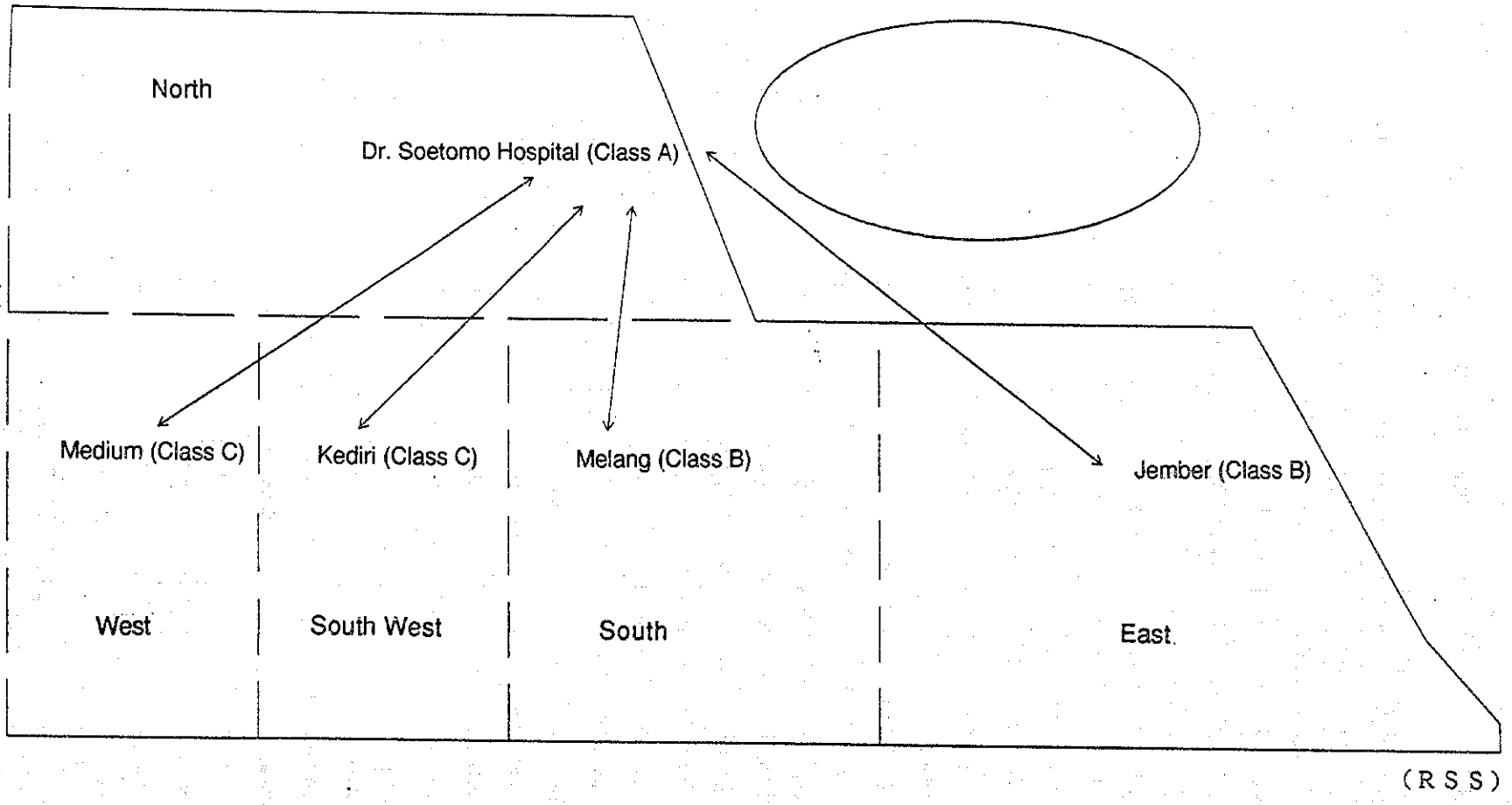

Fig. 2-1-3 Emergency Medical Network in East Java

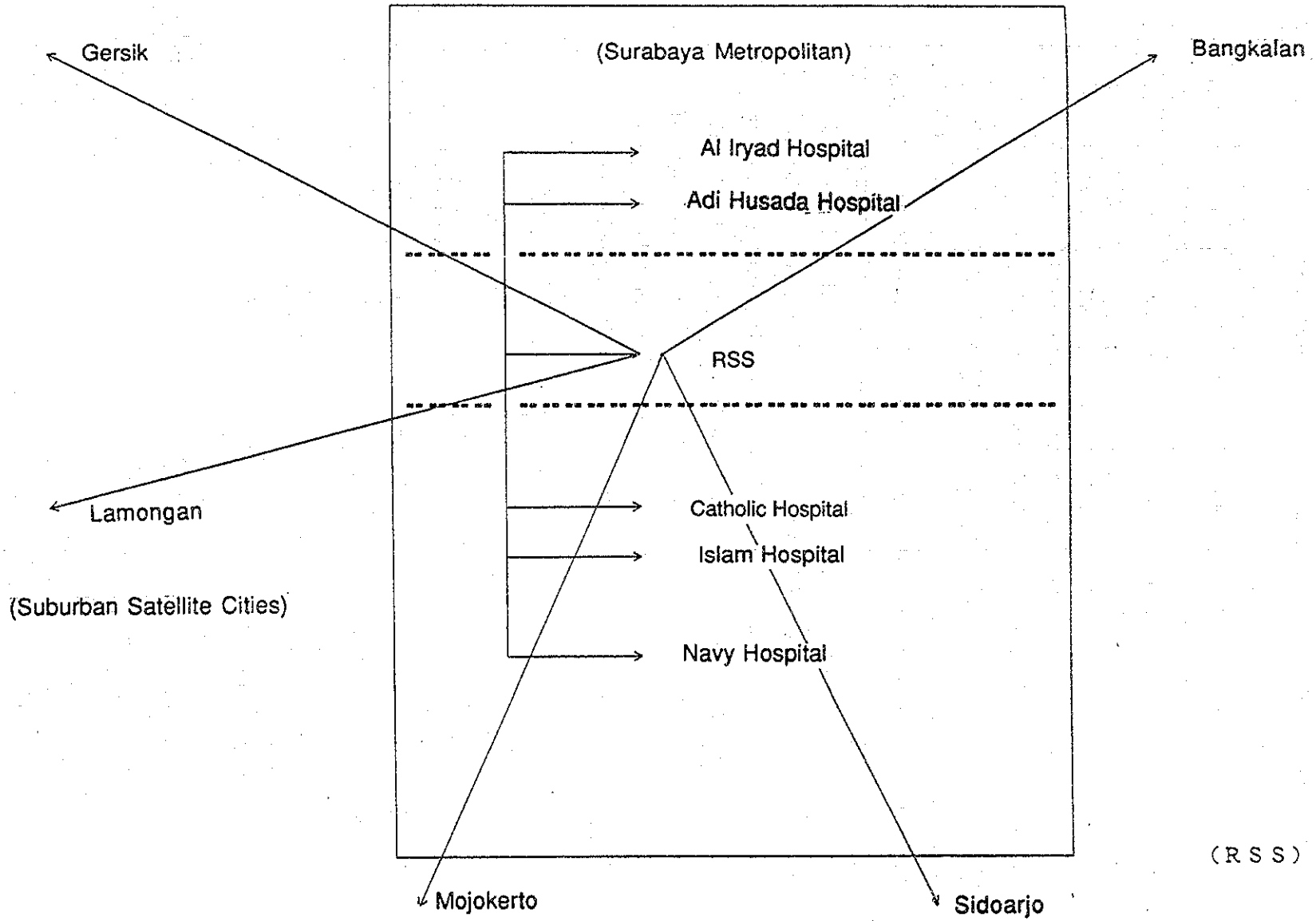

Fig. 2-1-4 Emergency Communication Network in Surabatya

Table 2-1-12 Communication Data/Medical Communication Center (1985 ~ 1991)

	1985	1986	1987	1988	1989	1990	1991
Official Communication	4,175	6,638	6,791	4,374	5,819	5,321	5,988
Medical Activities	2,969	2,153	3,332	3,892	5,484	5,977	5,997
Patient Support	132	264	193	444	381	353	492
Special Disease	139	212	169	223	204	171	388
Total	7,415	9,267	10,485	8,933	11,888	11,822	12,865

(Source: Dr. Soetomo Hospital)

2-2 Present State of Dr. Soetomo Hospital

2-2-1 State of Medical Activities

(1) Outline of the Dr. Soetomo Hospital

1) Organization and operations

RSS is a provincial hospital located in East Java Province. As shown in Figure 2-2-1 it is operated by the province and the Ministry of Health. It is one of the only two A-class hospitals in the country and is a general hospital with 17 medical and surgical departments.

As a teaching hospital, this hospital is also affiliated with the medical department of Airlangga University and most of the doctors teach at the university.

At present RSS has 1,544 working beds including those for newborns, premature infants and ICU. As of 1991 it had a total of 2,240 medical staff comprised of 970 doctors, 784 nurses, 126 assistant nurses, 151 midwives and others. Including other general staff, it has as many as 4,485 personnel. (Figure 2-2-2, Table 2-2-1).

Its medical services cover all of East Java Province. Slightly over a half (approximately 55%) of the total number of the patients it handled in 1991 (425,588) were from Surabaya City (Table 2-1-11).

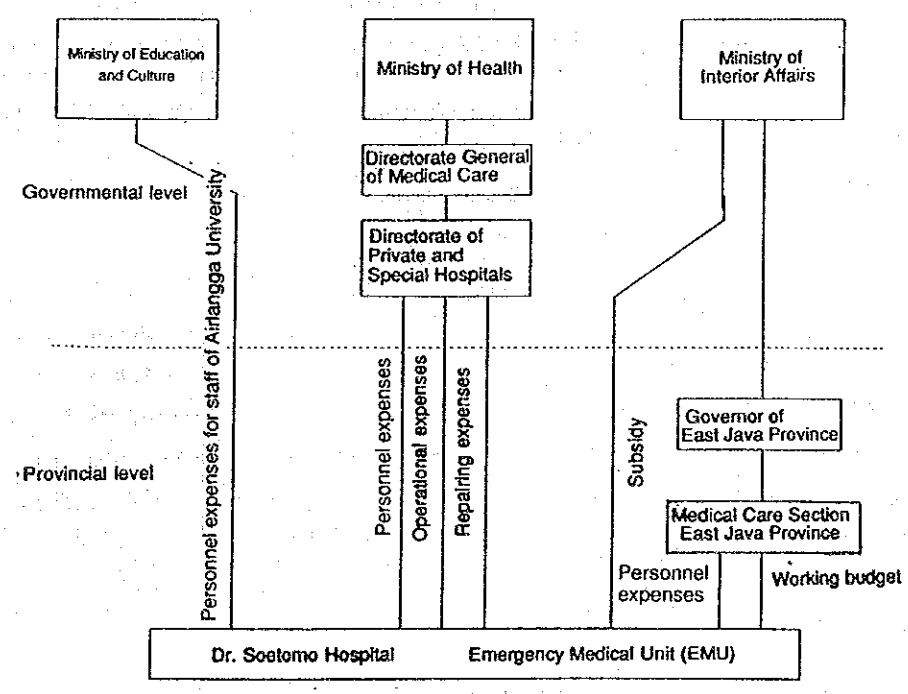

Fig. 2-2-1 Operation System of RSS

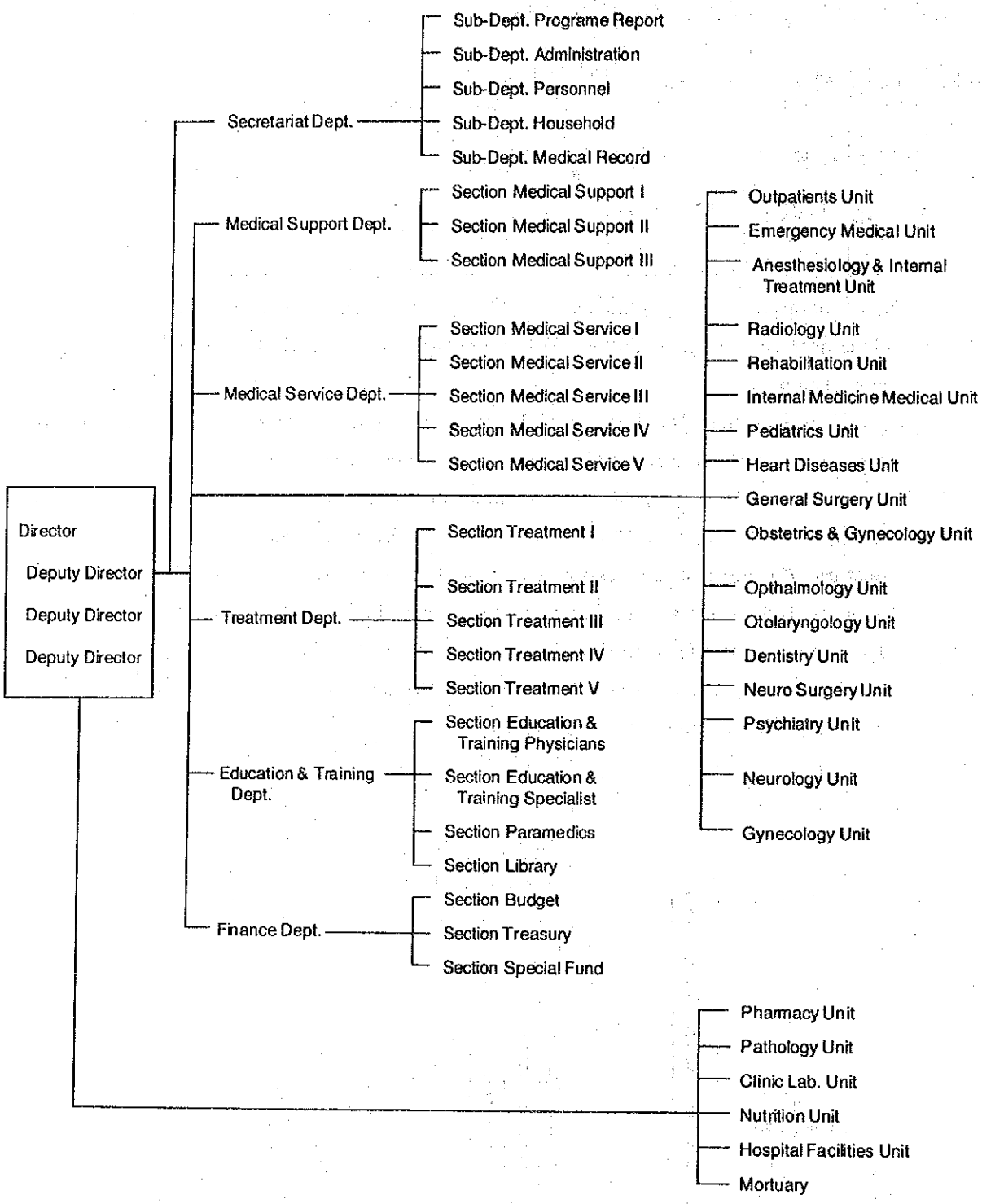

Fig. 2-2-2 RSS Organization Chart

Table 2-2-1 RSS Personnel (1986 ~ 1991)

	1986	1987	1988	1989	1990	1991
Administrator	1,442	1,462	1,414	1,445	1,422	1,579
Physician	677	823	790	859	860	970
Nurse	504	596	704	728	760	784
Assistant nurse	270	203	195	194	146	126
Midwife	140	452	133	154	154	151
Pharmacist	9	9	11	12	14	13
Assistant Pharmacist	25	26	25	26	26	26
Radiology technician	8	10	8	12	14	20
Assistant X-ray technician	8	7	5	6	7	6
Laboratory technician	3	3	2	2	1	1
Ass. lab technician	71	72	68	72	70	63
Physical therapist	4	4	4	4	2	4
Assistant physical therapist	20	20	20	22	23	21
Dentist	3	9	10	14	14	28
Dental technician	1	1	1	1	1	1
Dental hygienist	2	4	4	4	3	3
Dietitian	13	9	9	9	9	8
Cook	9	12	12	14	15	15
Medical social worker	789	781	661	604	664	578
Driver	4	4	4	4	4	4
Engineer (electric, mechanic)	2	2	2	3	3	4
Others	42	36	83	80	57	80
Total	4,046	4,545	4,165	4,269	4,269	4,485

2) Budget of RSS

The budget of RSS is provided entirely by Ministry of Health and East Java Province. Its growth rate has been around 15% annually. The medical fees, for examination, treatment and medicine, paid by the patients are received by the hospital but become the province's revenue. This amount is approximately 35% of the budget allocated by the province (Table 2-2-2).

In addition, the salaries of doctors who teach at the medical department of Airlangga University are directly paid by the Ministry of Education and Culture.

Table 2-2-2 Trend of Annual Budget

(FY 1986 ~ 1992)

	Income from the Patient	Subsidy from the Province	Subsidy from the Department of Health	Total
86/87	1,823,648,969 Rp	6,830,616,494 Rp	3,079,373,000 Rp	9,909,989,494 Rp
87/88	2,289,856,940	7,597,732,900	3,324,998,000	10,922,730,900
88/89	2,281,521,668	8,460,459,400	3,947,700,000	12,408,159,400
89/90	2,856,668,330	9,044,310,000	4,229,840,000	13,274,150,000
90/91	3,874,099,458	9,390,116,000	7,244,490,000	16,634,606,000
91/92	3,846,634,268	11,023,523,000	7,396,334,500	18,419,857,500
92/93	—	10,005,647,000	11,332,245,000	21,337,892,000

(Source: Dr. Soetomo Hospital)

As explained in Section 2-1-1 (3) Budget of the Ministry of Health, the budget system according to the Suwadana Concept will be implemented from fiscal 1994. To correspond to this, RSS is obtaining approval from the Ministry of Health to increase medical treatment cost and surgical operation cost in its emergency section as follows.

Present diagnosis and treatment cost of 1,500 Rp will be raised to 5,000 Rp and the present surgery costs of 7,000 to 10,000 Rp will be raised to 100,000 Rp.

3) Present activities

Table 2-2-3 through 2-2-5 show RSS's activity indicators, number of operations performed by department and the volume of clinical examination.

Table 2-2-3 Indicators of Activity in RSS

	1989	1991	
Working beds	1,556	1,544	beds
Inpatients	44,936	41,794	persons
Occupancy rate of beds	75.99	71.23	%
Average number of inpatients	123.11	114.50	persons/day
Average days of hospitalization	9.49	9.71	days
Deaths within 48 hours	2,729	2,619	persons
Less than 24 hours	1,264	1,093	persons
More than 24 hours	1,465	1,524	persons
Deaths per day	7.48	7.18	persons
Death rate	5.93	6.27	%
Delivery	6,080	5,792	cases
More than twins	90	102	cases
Stillborn	261	248	cases
Abortion	3,146	2,901	cases
Outpatients	815,208	749,871	persons
Consultation days	365	365	days
Average outpatients	2,690.45	2,483.02	persons/day

The hospital treats an average of 2,500 outpatients a day. The bed occupancy rate is 70 to 75%. Yet there is shortage of beds in some departments. For example, in the infectious diseases ward patients are placed on stretchers in the hallways.

The average length of hospitalization of 9.71 days, is long compared to that in Japan.

Table 2-2-4 Operation in RSS (cases)

	FY 1989	FY 1991
Surgery	29,173	20,369
Obstetrics & gynecology	6,078	4,442
Opthalmology	3,995	2,719
Otorhinolaryngology	1,681	1,126
Odontology(Dentistry)	997	143
Cardiology	58	17
Pulmonology	1,296	2,043
Total	43,278	30,859

Table 2-2-5 Laboratory Examinations in RSS (including emergency cases) (1991)

General	110,719	cases/year
Biochemical	398,466	cases/year
Hematological	431,136	cases/year
Bacterial	35,535	cases/year
RIA	2,118	cases/year
Others	15,907	cases/year
Total	93,881	cases/year

The hospital performs 85 operations a day and the surgical department alone performs 56 a day. The hospital administered 993,881 clinical examinations in 1991. Considering the annual number of outpatients of 750,000, these numbers cannot be considered small.

Table 2-2-6 Patients Referred to Dr. Soetomo Hospital (1991)

District	Referred Patients
Pacitan	33
Trenggalek	55
Tulungagung	75
Blitar	36
Kediri	82
Nganjuk	84
Jombang	281
Mojokerto	352
Sidoarjo	2,742
Banyunwangi	34
Jember	89
Bondowoso	14
Situbondo	12
Pasuruan	199
Probolinggo	148
Malang	39
Bojonegoro	34
Tuban	74
Lamongan	247
Gresik	1,078
Magetan	29
Ngawi	34
Ponorogo	13
Madiun	75
Madura	99
Surabaya	20,613
Total	26,571

The number of referral patients sent from various areas (see Table 2-2-6) composes 3.5% of the outpatients, but this percentage becomes higher when viewed from the emergency section alone.

Along with the increasing demands on the referral system, there are increasing cases of patients bypassing the lower grade D.C. class hospitals and going directly to the Class A hospitals. For this reason, convergence of patients may also be observed at RSS. This is proving to be an obstacle to the basic referral system so a screening function will be provided for the overall RSS system in which screening and guidance will be provided to emergency patients during initial diagnosis by the EMU.

4) Role as an educational hospital

RSS provides a place for the practical education of the students and staffs of the Medical Department of the national Airlangga University. The hospital's main staff also teach at this university. According to the university's curriculum, the following training is required.

- Fifth-year medical student (Intern I): training of internal medicine in following departments.

Internal medicine:	12 weeks	(2 weeks in the emergency dept.)
Pharmacy:	4 weeks	
Neurology:	6 weeks	
Pediatrics:	8 weeks	(1 week in the emergency dept.)
Psychiatry:	6 weeks	
Radiology:	4 weeks	
Social health:	8 weeks	

- Sixth-year medical student (Intern II): training of surgery in the following departments

Surgery:	10 weeks	(4 weeks in the emergency dept.)
Anesthesiology:	4 weeks	(2 weeks in the emergency dept.)
Forensic medicine:	6 weeks	
Obstetrics and gynecology:	10 weeks	(4 weeks in the emergency dept.)
Otolaryngology:	6 weeks	
Ophthalmology:	6 weeks	
Regional Medical Services:	6 weeks	

In 1991, 132 Intern I's and 135 Intern II's were trained in the above courses.

- In addition to the foregoing, after graduating from the six-year Medical Department course, students must receive training as resident to acquire the qualification as a medical specialist. RSS also comprises a place of such training. In 1991, the following number of residents received training at the various departments.

Surgery:	15
Internal medicine:	6
Obstetrics and gynecology:	12
Ophthalmology:	7
Otolaryngology:	3

Pediatrics:	5
Total:	48

The hospital comprises a place of training not only for the Airlangga University students but for six nursing colleges and schools in Surabaya(1991).

Nursing colleges (AKPe):	450
Nursing schools (SPK, Dep, Kes):	17
Nursing schools (SPK, BSAD, Derp):	1,587
Other:	167
Total:	2,221

2-2-2 Present State of the Emergency Medical Unit

(1) Organization and Operations

RSS's Emergency Medical Unit (EMU) is located in the hospital premises. The emergency surgical and medical units are in different buildings. Figure 2-2-3 shows the operating organization.

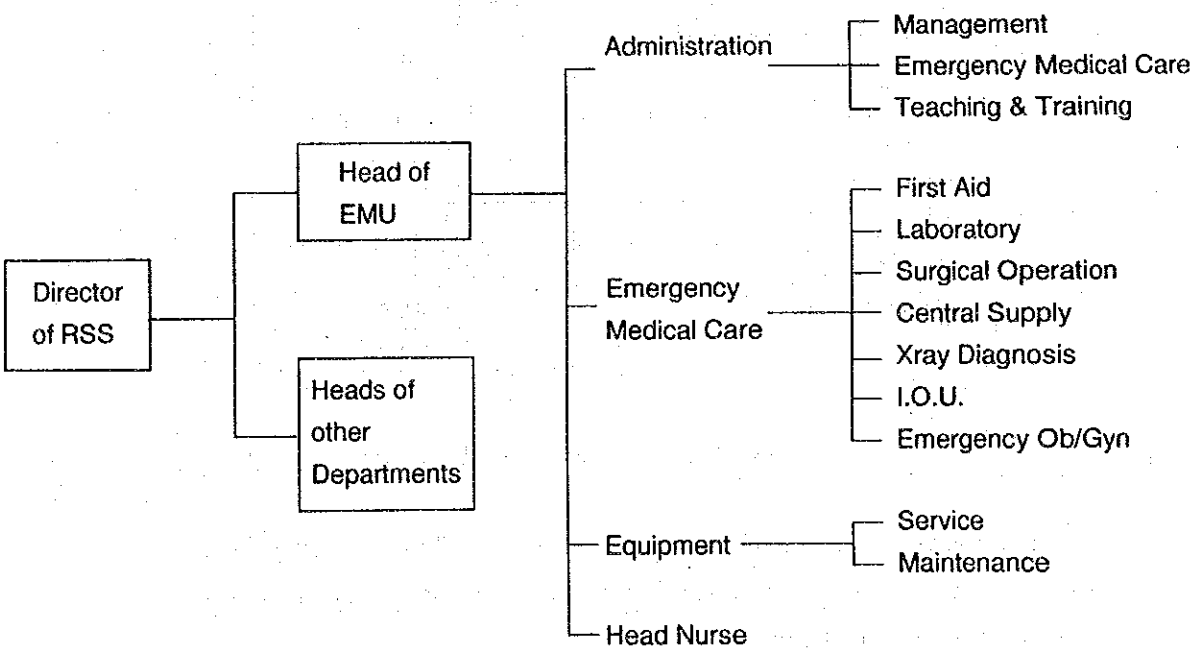

Fig. 2-2-3 EMU Management System

The present staff consists of two doctors, five first-year residents and four second-year residents on duty. In addition, several departments' doctors are on duty as the on-call doctors.

Among these staff, the residents team is replaced after one month. When they are on duty, they work 24 hours a day except for short naps or resting. As the first-year residents are not allowed to perform surgical operations, they are in charge of first-aid. The second-year residents are allowed to perform operations under the instruction of senior doctors. These residents are in charge of the front line of emergency medical services. In addition, 67 nurses and 96 other assistants make a total EMU staff of 187.

EMU is expected to play the role of shouldering tertiary emergency services in this area. Yet the actual situation is that it is handling all patients from primary to tertiary. This is because of the shortage of B-, C- and D-class hospitals, insufficiency of their manpower and lack of their equipment. Another reason is the public hospitals all close at 2:00 p.m., so patients who need after-hour treatment concentrate at the EMU of the Dr. Soetomo Hospital.

(2) Budget of EMU

The 1992 budget was Rp. 21,337,892,000 for the entire hospital. 6.9% of this amount of Rp. 1,474,722,200 was appropriated for the EMU. Table 2-2-6 shows the breakdown.

Table 2-2-6 Budget Related to EMU (1992)

(X 1,000 RP)

Pharmacy	453,248
Logistic	288,014
Tech & Maintenance	67,650
Electricity	220,000
Water supply	50,400
Telephone	2,715
Personnel	288,211.6
Kitchen & Dietary	104,483.6
Total	1,474,722.2

(3) The Flow of Patients in EMU

The flow of patients in the EMU is as follows. It is different from that of an ordinary hospital. The first aid and resuscitation come first, and treatments such as surgical operations must be administered without delay.

When the patient arrives, the reception assesses the seriousness of their problem. The patients are divided into those requiring resuscitation, first-aid and those who can be sent to the general outpatient department. Treatment is administered depending on the degree of

emergency. The patients could also be divided into those requiring emergency surgical operations or intensive treatment.

In addition to the ward which has 1,544 beds, the hospital has another intermediate ward with 30 beds which plays the role of screening before hospitalization in the main hospital after intensive observation in the EMU. For this reason, the emergency department does not have hospitalization facilities, except IOU where patients are only kept for 24 hours and are moved to the intermediary ward or discharged.

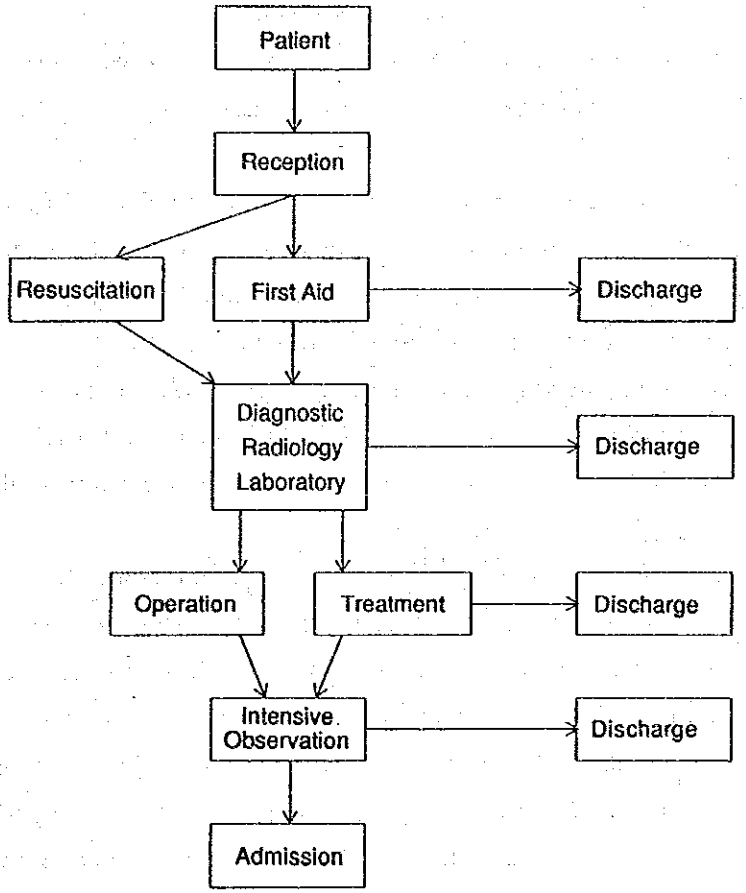

Fig. 2-2-4 EMU Patient Flow

(4) Activities in EMU

EMU handled 110,000 patients in 1991. The Emergency Surgical departments handled 32,895 or 28.5% of them, the Emergency Medical Department 74,858 or 65.8% and the Obstetric and Gynecological Department 7,454 or 6.5%.

The number of emergency patients admitted to RSS was 8,235 from the Surgical Departments, 3,084 from the Medical and 3,045 from the Obstetric and Gynegological Department, including premature infants.

The medical department treated 219 outpatients a day of whom 11.4% were admitted. The most frequent of the cases handled by the medical department was acute infection of respiratory organs. These were followed by infectious diseases such as fevers, diarrhea and bacterial enteritis of unknown causes.

There were 90 surgical outpatients a day, and 22 patients admitted a day. (Table 2-2-8)

The largest number of cases handled by the surgical departments were general external wounds. Major injuries were bone fractures, troubles of the spinal nerves, skull injuries other than fractures, and troubles caused by industrial and traffic accidents.

Among the 7,735 surgical operations performed at the EMU in 1991, the orthopedic surgeries accounted for 51.6%, the general surgeries for 23.9% and the neurosurgeries for 9.6%. These were followed by the ophthalmological, obstetrical and gynecological and otolaryngological surgeries. (Table 2-2-9).

At present, the departments carrying out activities 24 hours a day are the emergency units of the surgical, medical, pediatric and obstetric and gynecological departments. The emergency surgical and medical units are carrying out activities independently from the main hospital's surgical and medical departments. The emergency obstetric and gynecology and pediatric units are carrying out activities in a part of the examination and treatment sections of their main hospital departments. The fact that the emergency department is thus dispersed comprises a major obstacle for the emergency activities which cannot waste any time.

And also, since each department receive emergency patients in different places, it often has to transfer patients to other departments for sufficient theatment. The EMU, transferred 9,634 cases to other departments in 1991.

The system is also inefficient because in addition to the doctors and nurses on duty, the supporting teams of paramedics and administrative staff must also cope with a 24-hour system for each emergency unit.

Table 2-2-8 Patients in EMU

		1987	1988	1989	1990	1991
a. Outpatients	Surgery	37,217 102/day	35,639 98/day	35,697 98/day	36,441 100/day	32,895 90/day >
	Internal Medicine	84,204 231/day	91,635 251/day	85,226 233/day	79,890 219/day	74,858 205/day >
	Obs/Gyn	8,216 23/day	8,472 23/day	7,695 21/day	7,352 20/day	7,454 20/day >
	Sub-total	129,637	135,744	128,618	123,683	115,207
b. Admittance	Surgical	6,918 19/day	7,143 20/day	8,071 22/day	9,348 26/day	8,235 23/day >
	Internal Medicine	5,353 15/day	5,472 15/day	4,357 12/day	5,005 14/day	3,084 8/day >
	Obs/Gyn	2,598 7/day	2,651 7/day	2,418 7/day	2,338 6/day	2,460 7/day >
	Premature Babies	895 2/day	914 3/day	844 2/day	878 2/day	945 3/day >
	Sub-total	15,764	16,180	15,690	17,569	14,724

Table 2-2-9 Operations in EMU

Orthopedics	3,991 (56.1%)
Surgery	1,849 (23.9%)
Neuro Surgery	742 (9.6%)
Ophthalmology	692 (8.9%)
Obs/Gyn	348 (4.5%)
Otorhinolaryngology	113 (1.5%)
Total	7,735 (100.0%)

(5) Visits by Emergency Patients

Emergency patients visit the hospital either by ambulances dispatched on "118" calls and other emergency referral calls or on their own. These are described below.

1) Referral communication networks and dispatch of ambulances

In Indonesia, the fire station network is not linked with the ambulance network. The EMU, which plays the role of the emergency center in this area, first receives the "118" call. It then contacts the key station hospital nearest the accident site and has it dispatch an ambulance. The EMU is also a key station and covers central and eastern Surabaya City. It also serves as the center of Radiomedik and the hospital telephone.

In addition to the dispatches based on these communication networks, there are also emergency dispatches at the time of disasters, those to accompany VIP visitors based on written requests. The ambulances are dispatched around 2,550 times a year (Table 2-2-10).

Table 2-2-10 Activities of Ambulance Cars (RSS)

By emergency telecommunication system	(2 –3 times/day)	
By medical telecommunication system	(1 –2 times/day)	2,450 times/year
By inter-hospital telephone call	(0 – 1 time/day)	
At the cases of disaster		10 times/year
By written requests		90 times/year
		Total: About 2,500 times/year

2) Limitations of "118" calls

As can be seen in Table 2-2-10, the "118" call is not often used. Because the telephone network is not fully developed, and it is difficult to buy a telephone for an ordinary home. For the same reason one hardly find public pay phones. Secondly, the number of ambulances are limited. Accordingly it takes time for the ambulance to reach the spot. Therefore, in emergencies, the patient must come to the hospital by other means. Thirdly, the ambulances are mainly designated for traffic accidents. Because of these reasons, the ambulances are not fully utilized for emergency "118" calls. Therefore in addition to developing the telephone network, it will be necessary to improve the ambulance system itself.

3) Other means of visit

70% of the patients come to the hospital by themselves. The remaining 30% come accompanied. In this case they use bus, taxi or their own car. They often come by relative's or neighbor's car.

(6) Condition of RSS ambulances

The hospital now has five ambulances. Out of five, two were made in 1976 and were granted by the French government. They have run out of their durable years and are markedly superannuated. The other two were donated by an insurance firm. Although they are newer than the other two, they are prone to break down. Hence the number of ambulances fully operating at the hospital is only one.

2-2-3 Present State of Buildings and Facilities

(1) RSS Facilities

The site of RSS measures 350 meters east-west and 450 meters north-south. It has an area of 16 hectares. Dharmahusada Street is the main street running on the northern side of the building. On the other side of the street is the campus of the national Airlangga University and on the western side runs Dharmawangsa Street.

This hospital was established in 1916 as an educational hospital with a building constructed as a central hospital by Holland in 1935 as its core. These buildings are designed with steep red-tilled roofs, white walls, corridors and high ceilings for ventilation and coolness to agree with Indonesia's climate. Surrounding these buildings, the Medical Department of Airlangga University is located in the northeastern corner of the premises. At Westside of the Medical Department, there is RSS's management building. Facing the intersection of the Dharmahusada and Dharmangsa in the northwestern corner are the outpatients' buildings.

The Polyclink Building (main outpatients' building) is a four-storied, reinforced-concrete building. South of this building is the three-storied radiological building and pathological laboratories. (Figure 2-2-5)

(2) Present State of EMU

The emergency surgical building (around 1,500m^2) and emergency medical building (around 1,000m^2) are located on the premises facing Dharmawangsa Street on the southern side of the above facilities. The emergency surgical building is an old saw-shaped red-tile-

roofed one-story building. The rain leaks from many places, so the ceiling is coming off or is stained with mold. The building has a reception hall, treatment room, emergency operating rooms, an intensive observation room (seven beds), an X-ray room and a physiological testing room.

Only patients are supposed to go beyond the reception hall but families also want to go in. For this reason the examination room is crowded. In the treatment area two stretchers or treatment beds are placed in one booth. Two patients use the same booth by partitioning it with curtains. Patients being administered intravenous drip injection and those requiring intensive observation are also placed in these treatment booths because there is no other space except the 7 beds in IOU. Moreover, since these patients are accompanied by families, the treatment room is always crowded. There is a preparation room behind the treatment room but it is small. Stained bed sheets, clothes and equipment are placed here in a disorderly way. This room is also used as a passage, so it is quite unsanitary. Behind this room is a corridor leading to the operating rooms and IOU. The medical and administrative offices face this corridor. As the result, all the traffic becomes jammed together and creates confusion and contamination.

EMU has three operating rooms. One of them is being used for septic operations.

As the equipment for radiological diagnosis, EMU has X-ray photograph equipment for emergency external wounds. The department administers simple clinical examinations.

The emergency medical building added the second floor two to three years ago and it is being used as a resting space for the medical staff. The first floor of the emergency medical building has considerably deteriorated. It only has booths with examination tables.

The Central Surgical Operation Building and ICU, both very old, are located at the back and eastern side of this emergency surgical building.

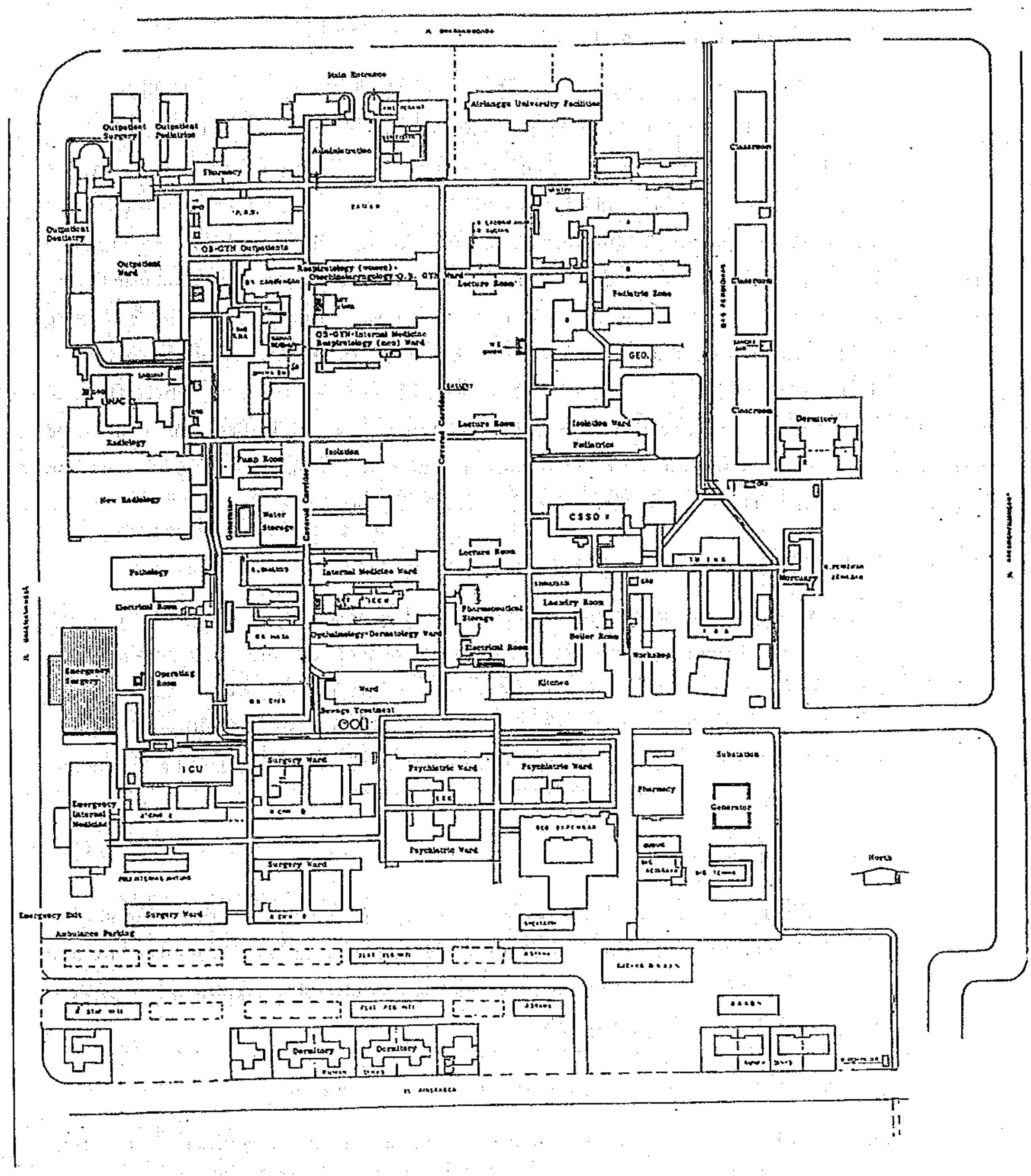
Main Entrance
Airlangga University Facilities
Outpatient Surgery
Outpatient Pediatrics
Pharmacy
Administration
Classroom
Outpatient Dentistry
OB-GYN Outpatients
Outpatient Ward
Respiratology (women)・Otorhinolaryngology・O.G. GYN Ward
Lecture Room
Pediatric Zone
OB-GYN・Internal Medicine Respiratology (men) Ward
GEO.
Radiology
Isolation Ward
Pediatrics
Dormitory
Pump Room
Isolation
Covered Corridor
New Radiology
Generator
Water Storage
CSSD
Lecture Room
Pathology
Internal Medicine Ward
Laundry Room
Mortuary
Electrical Room
Pharmaceutical Storage
Boiler Room
Opthalmology・Dermatology Ward
Electrical Room
Workshop
Emergency Surgery
Operating Room
Kitchen
Ward
Sewage Treatment
ICU
Surgery Ward
Psychiatric Ward
Psychiatric Ward
Substation
Pharmacy
Generator
Emergency Internal Medicine
Psychiatric Ward
North
Surgery Ward
Surgery Ward
Emergency Exit
Ambulance Parking
Dormitory
Dormitory

Fig. 2-2-5

2-2-4 Present State of Medical Equipment

(1) Condition of Medical Equipment at RSS

As a class-A hospital in Indonesia, the Dr. Soetomo Hospital has all the medical departments of a typical general hospital. It hence has diverse medical equipment.

Examining the main medical equipment RSS now has (Table 2-2-9) shows that its outpatient departments such as radiotherapeutic, examination, surgical, obstetric and gynecological, ophthalmological, otolaryngological and dental have at least the minimal medical equipment necessary for a major hospital. Such equipment as radiotherapeutic (X-ray photographers), examination equipment (such as microscopes), surgical equipment (operating tables), dental examination units, ophthalmological and otolaryngological departments, physical therapeutic equipment (such as hydrotherapeutic equipment), obstetric and gynecological equipment (delivery and examination tables) and dialyzers, are being used extensively. There are many which are not performing their proper functions due to aging and frequent breakdowns. The following can be stated as general problems.

1) Aging equipment

The durable years of equipment is far shorter than those of buildings. Some of the equipment had been manufactured over ten years or more ago and their durable years have passed for some time. An example of this is an aspirator, whose suction power has declined and whose sterilizers takes long time for the humidity to rise. In comparison to the original capability of the equipment, it has become inefficient and uneconomical.

2) Frequent breakdown

The main cause of equipment breakdown is its age. Other causes are lack of skill in using the equipment, insufficient regular inspections and parts replacement and lack of infrastructure development in areas such as electricity (voltage fluctuations and power failure) and water quality.

3) Shortage of equipment

The hospital is short of some equipment such as anesthesizers, artificial respirators, aspirators and dialyzers.

For example, the hospital has ten simple premature infant incubators only equipped with heat-insulators and only two incubators equipped with devices to regulate the oxygen density, humidity and temperature which is important for premature infants.

(2) Existing medical equipment of each department

1) Radiotherapy and Radiology

The hospital has medium-class radiology equipment for general photography, lacteal gland photography, fluoroscopy and circulatory organ photography. With this equipment, the hospital is handling an annual work load of around 58,000 cases (1991). The radiology department has eight doctors and five X-ray engineers. Its equipment is more or less effectively being utilized. However, much of the equipment has run beyond their durable years so that they must frequently be repaired. This has been lowering the efficiency.

The hospital is administering a wide range of examinations from X-ray photography of the chest and abdomen to vascular contrasting. It also has a CT scanner and angiographer (to photograph the heart and cardiac blood vessels) and is able to administer prompt and accurate examination for cerebral blood vascular diseases, cardiac diseases, external wounds and alimentary diseases. The X-ray engineers' technical level is also high.

As for radiotherapy, the hospital is treating 6,100 cases annual (1991) using cobalt 60.

2) Operating room

The hospital's surgical department alone performed an average of 56 operations a day in 1991 and many patients were waiting for their turn. As a whole, the equipment is well maintained. However, once some equipment break down, there are no replacements, and there is also a shortage of consumables.

3) ICU

The hospital has sufficient main equipment such as patient monitors, defibrillator and respirators, however, it is short of consumables such as blood transfusion sets.

4) Outpatient departments

The departments of ophthalmology, otolaryngology and urology have various treatment units for outpatients but many of them are old and have run beyond their durable years.

As a whole, both the surgical and medical departments are short of examination equipment such as manometers, stethoscopes, loupes and perception gauges. In comparison to other outpatient departments, the dental department had many kinds and numbers of equipment.

5) Obstetric and gynecological department

The obstetric and gynecological department performs an average of 13 deliveries a day. It has delivery tables, ultrasound, respirators for infants and examination tables. All the ten incubators are the old type, and they are also lacking in number.
The department has three dopplers fetus detector and fetal monitors respectively. Considering the number of patients, the department is markedly short of equipment.
None of the main equipment is broken down and it can be seen that the department is assiduously carrying out medical activities for vast number of patients.

6) Pediatric department

The department is more or less in the same situation as the other outpatient departments. Some of the phototherapeutic units, ultrasonic nebulizers, syringe pumps, oxygen monitors, scales and others necessary in treating infants and newborns have become antiquated.

7) Physical therapy department

The department has hydrotherapy bathtubs, treadmills, ergometers, low-frequency treatment equipment and ultrasonic treatment equipment necessary for hydrotherapy, thermotherapy, exercise therapy and electrotherapy. The department has relatively sufficient numbers and types of equipments.

8) Laboratory

The laboratory is administering urine and other general tests, biochemical, hematological, microbiological, pathological and RIA tests. It handles an annual work volume of around one million cases (including emergency, 1991).
Considering the work volume, the hospital has relatively little general testing equipment such as microscopes, spectrophotometers, centrifuges and colorimeters. Yet it is testing many specimens using automatic equipment such as automatic blood counters and automatic chemical analyzers.
The two Japanese-made automatic chemical analyzers are being maintained through maintenance contracts. The engineers of the hospital's maintenance and control department are making efforts to acquire the maintenance and control technology by taking part in the regular inspection undertook by the maker.

9) Equipment for physiological examination

The laboratory's main equipment is electrocardiographs (8), electroencephalographs (2), respiratory function checkers (2), ultrasound (2) and various endoscopes. As with

other departments, half of this equipment has run beyond their durable years, but the system to examine physiological functions has been established, and the laboratory is actively carrying out research and training.

For example, at its endoscope room, the vaginal operations using C-arm X-ray monitors along with endoscopes are being performed.

The endoscopes and illuminators are repeatedly being repaired, and they are more or less effectively being utilized.

The department is short of relatively expensive small equipment and consumables such as forceps for physiological examination, washing tubes, contrasting tubes and catheters.

10) Central Supply and Sterilization Department

The central supply and sterilization department has a large high-pressure steam sterilizer, washers, tube driers and others, and these are effectively being used without breaking down. However, the volume processed has increased and the equipment's processing capacity is reaching its limit.

11) Ambulances

The five ambulances are not equipped with emergency treatment equipment. They only carry stretchers and are being used in transporting patients. They are to load equipment such as resuscitators when necessary.

Table 2-2-9 Existing Equipment and Instruments in RSS

1. Radiological Diagnosis and Treatment	Number
General diagnostic X-ray unit	2
Chest X-ray unit	2
Mammography	1
Remote control X-ray TV system	1
Direct control X-ray TV system	1
Pediatric X-ray unit	1
Portable X-ray unit	2
Surgical X-ray unit	3
CT scanner	1
Angiography	2
Cobalt unit	1
Afterloading unit	1
Dental X-ray unit	1
Automatic film processor	2
2. Operating Theater	
General operation table	5
Multipurpose operation table	2
Orthopedic operation table	2
Gynecological operation table	2
Operation light	8
Desk top type film illuminator	4
Anesthesia machine with ventilator	4
Table type anesthesia machine	2
Electric surgical unit	7
Automatic suction unit	12
Patient monitoring unit	8
Defibrilator	7
Operation microscope	1
Ultraviolet ray water sterilizer	5

3. ICU (Intensive Care Unit)	Number
Patient monitoring unit	12
Portable defibrilator	5
Central monitoring system	1
Ventilator	6
Suction unit	6
Examination lamp	4
4. Test (General, biochemistry, blood, microbiologic, pathologic, RIA = radio-immuno-assay)	
Spectrophotometer	3
Colorimeter	3
Microscope	4
Automatic urine analyzer	1
Electrolyte analyzer	2
Automatic chemistry analyzer	2
Electrophoresis system	1
Centrifuge	3
Vacuum pump	2
Osmometer	2
Thinlayer chromatography	1
Automatic blood cell counter	2
Dry oven	2
Autoclave	3
Incubator	2
Automatic embedder	1
Automatic staining unit	1
Microtome	2
Carbon dioxide medium	1
Large distilation apparatus	2
Small distilation apparatus	1
Ultrasonic cleaner	2
Freezer	3
Medical refrigerator	3
Washer	3

5. C.S.S.D (Central Stuff Sterilization Division)	Number
Large tyme high pressure steam sterilyzer	4
Compact type high pressure steam sterilyzer	2
Washer	2
Dryer	2
6. Dental	
Dental unit	6
Dental diagnostic instrument set	6
Steam sterilyzer	3
Dental X-ray unit	3
Instrument set	2
7. Ophthalmology	
Diagnostic unit	3
Slit lamp	3
Fundus camera	2
Ophthalmoscope	2
Perimeter	1
Operating instrument set	3
8. E.N.T.	
Diagnostic unit	4
Audiometer	4
Endoscope set	2
Operating instrument set	2
Nebulizer	2
Laryngoscope	4

	Number
Aspirator	3
Operating microscope	1
Diagnostic chair	4
9. Urology	
Diagnostic unit	2
Cystoscope	2
Light source system	2
Operating instrument set	2
Examination bed	3
Aspirator	3
Artificial dialysis unit	6
Urethroscope	2
Electric Surgical unit	2
10. Function Test	
1-ch electrocardiograph	4
3-ch electrocardiograph	4
Encephalometer	2
Respiratory function test set	2
Ultrasonic diagnosis unit	2
Endoscope:	
Fiber optic gastroscope	2
Fiber optic bronchoscope	1
Fiber optic duodenoscope	1
Fiber optic scope	1
Rectoscope	2
Monitoring TV system	1
C-arm X-ray unit TV system	2
	1

11. Obstetrics	Number
Labor bed	8
Examination bed	8
Diagnostic unit	4
Fetel heat detector	3
Insufflation Apparatus	3
Fetel monitoring unit	3
Incubator	12
Light therapy unit	3
Ultrasonic nebulizer	4
Aspirator	5
Examination and operation instrument set	5
Colposcope	3
Resuscitater	3
Pediatric artificial respirator	2
Ultrasonic diagnostic unit	2
12. Pediatrics	
Diagnostic instrument set	7
Electrocardiograh	3
Spirometer	2
Light therapy unit	3
Ultrasonic nebulizer	4
Syringe pump	5
Oxygen tent	5
Resuscitater	3
Pediatric artificial respirator	2

13. Physical Therapy	Number
Hydrotherapy tank	1
Whirl pool bath unit	1
Treadmill	1
Ergometer	3
Uprise training table	1
Parallel bars	1
Arm training apparatus	2
Lower extremity training apparatus	2
Low frequency therapy unit	2
Ultra-short wave therapy unit	1
Ultrasonic therapy unit	1
Infrared therapy lamp	2
Traction unit	2
14. Kitchen	
Kitchen set	1 set
15 Washing	
Washing set	1 set

(3) Present Condition of EMU Medical Equipment

Table 2-2-10 shows the main equipment in the existing emergency department. Most of them have run beyond their durable years (five to ten years) and are overused under the 24-hour system. This has resulted in frequent breakdowns. The department has small numbers and limited kinds of medical equipment. With this equipment, its emergency medical and surgical units are treating 300 patients a day (1991). It is impossible to cope with this number of patients with the existing medical equipment. At present, the department is providing emergency medical services through efforts by the medical staff and support by the main hospital.

It is cooperating with the main hospital in administering clinical and X-ray examinations, material sterilization and surgical operations. However, because most of the main hospital departments end their activities at 14:00, there have been inconveniences in administering emergency X-ray and clinical examinations and surgical operations.

The department is particularly short of small equipment such as tracheo intubation sets, tracheotomy sets, resuscitation bags and catheters as well as aspirators, anesthesizers and defibrillators which it shares with the main hospital at present.

As for training and education, the present emergency department does not have training and educational equipment such as operation monitors, OHPs, slide projectors and anatomical models.

The equipment is being satisfactorily maintained by the engineers of the main hospital's technical and maintenance department. While the hospital is manufacturing parts such as the handles of operating tables, the equipment is frequently breaking down due to superannuation.

(4) Maintenance and Operation System

The hospital has 92 staff in its technical and maintenance department. It also has a fine workshop equipped with metal processing machines such as lathes, milling machines and drilling machines as well as various measuring tools so that it can even manufacture parts. Hence the department has been enriched to an extent incomparable with other hospitals'. In fact, lined up in the shop was many equipment waiting to be repaired such as blood counters, spectrophotometers and electric surgical equipment and the staff were assiduously repairing them according to the manual. However, problems are occurring such as lack of equipment manuals, equipment requiring servicing by the maker's engineers, parts need to be imported and it takes time, shortage of medical electronic measuring instruments.

Table 2-2-10 Existing Equipment and Instruments in EMU

1. Radiology	Number
Surgical X-ray unit	1
Chest-gastric X-ray unit	1
Portable X-ray unit	1
Automatic X-ray film processor	1
2. Operating Theater	
General operation table	3
Operation light	3
Desk top type film illuminator	2
Anesthesia machine with ventilator	3
Table type anesthesia unit	3
Electric surgical unit	3
Automatic suction unit	6
Labor and examination bed	1
Ultraviolet ray water sterilyzer	1
3. General Examination	
Examination bed	13
Stretcher	11
Sphygmomanometer	11
Electrocardiograph	2
Automatic resuscitator	2
Defibrilator	2
Desk top type autoclave	3
Infusion pump	2

4.	Emergency Laboratory	Number
	Microscope	1
	Blood gas analyzer	1
	Electrolyte analyzer	1
	pH meter	1
	Spectrophotometer	1
	Desk top type autoclave	1
	Medical refrigerator	1
	Blood bank refrigerator	1
5.	IOU (Intensive Observation Unit)	
	Gatch bed	7
	Stand type examination lamp	2
6.	Instruments for Obstetrics, Gynecology and Pediatrics	
	Examination table	2
	Treatment table	6
	Aspirator	3
	Resuscitater	2
7.	Ambulance	
	Ambulance car	5

2-3 Present State of Similar Facilities

2-3-1 Emergency Medical Center of Dr. Cipto Mangunkusumo Hospital (EMC of RSCM)

(1) Outline of the Hospital

Name	:	Dr. Cipto Mangunkusumo Hospital (RSCM)
Location	:	Jakarta
Area covered	:	Metropolitan Jakarta
Established	:	1919
Beds	:	1,153
Emergency Medical Center:		
Location	:	Inside the Dr. Cipto Mangunkusumo Hospital
Area covered	:	Metropolitan Jakarta
Examination departments	:	Emergency surgical, medical, ob-gyn, pediatric
Beds	:	64, emergency HCU (26), ICU (8), CCU (2), (emergency ob-gyn (16), newborns (8), premature infants (4))
Site area	:	1,942.2m^2
Structure	:	Reinforced-concrete, five stories
Total floor area	:	7,232.4m^2
Opened	:	August 1986

(2) Medical System at EMC

RSCM is the largest and highest-level national general hospital in Indonesia. The Ministry of Health is directly responsible for it financially, administratively and medically. It is also an educational hospital of the national Indonesia University.

The facilities of EMC were completed on the hospital premises in March of 1986 through grant aid assistance by Japan. The Center opened in August of the same year.

Figure 2-3-1 shows the Center's organization. It is made up of 328 staff namely comprised of three doctors, including the director, who mainly execute the managerial duties, 149 nurses, 33 midwives, 8 pharmacists, 10 radiological engineers, 11 testing engineers, 1 nutritionist, 5 cooks, 3 maintenance personnel, 31 clerks and 73 others.

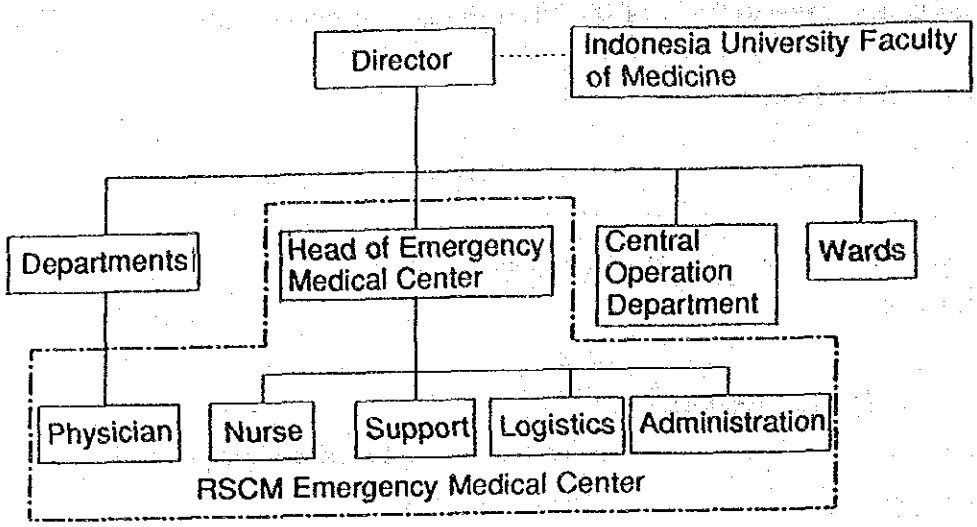

Fig. 2-3-1 Organization Chart of EMC

As shown in the above figure, the doctors to actually carry out the medical activities are secured through the rotation system in which the various departments support the emergency medical center. A total of 30 to 32 doctors consists of 23 to 24 residents, seven from the surgical department, five from the medical, four from the ob-gyn, four to five from the anesthetic, three from the pediatric and seven to eight on-call consultant doctors are on a 24-hour shift duty based on each department's rotation schedule. Higher-class residents who have completed two years of training are mainly carrying out the medical activities and most treatments are administered under their responsibility.

The 149 nurses are working through four shifts — (1) 7:30-14:00, (2) 14:00-21:00, (3) 21:00-7:30 and (4) rest.

(3) EMC

See Table 2-3-1 for the number of outpatients, inpatients and operations performed during the five years from 1987 to 1991.

(4) Present Condition of the Medical Equipment of EMC

The Center's main medical equipment is more or less effectively being utilized and is listed as follows.

Main equipment

(1) X-ray equipment for general photography
(2) CT scanner for the head
(3) Portable X-ray equipment
(4) Endoscopes
(5) ECG monitors
(6) Defibrillator
(7) Anesthesizers
(8) Artificial respirators
(9) Ultrasound diagnostic equipment
(10) Operating tables
(11) Operating room astral lamps
(12) Electric surgical knives
(13) Aspirators
(14) Hand-washing and sterilization equipment
(15) Ob-gyn examination tables
(16) Incubators
(17) Otorhinological treatment units
(18) Ophthalmological treatment units
(19) Auto clave
(20) Delivery tables
(21) Blood gas analyzers
(22) Electrolyte analyzers
(23) Beds
(24) Stretchers

(5) Comparison Between EMC of RSCM and EMU of RSS.

Table 2-3-1 shows the number of emergency patients handled at EMC.

1) Number of outpatients

Comparing the averages for the five years from 1987 to 1991 shows that EMU (97/day) handled around 3.4 times surgical outpatients of the EMC (28.6/day). EMU medical department handled 228 outpatients a day which was 3.6 times of the number handled at the EMC (63.8/day). The numbers handled by the ob-gy department were 18.2/day (EMC) and 21/day (EMU) which were more or less the same (1 : 1.1).

2) Number of inpatients

At EMC, the average length of hospitalization is relatively long at around three days. This is because RSCM main hospital is always nearly full so that it cannot accept patients from EMC. Hence EMC must hospitalize the patients for the necessary period using its own ICU and intensive care rooms.

In contrast, EMU only has intensive observation rooms, and the 30 beds in the intermediary ward, which serves as an intermediary function between hospitalization and the IOU in EMU, are available in the hospital compound. Hence, the length of hospitalization in EMU, 24 hours at maximum, is believed to be a third of that at EMC. This policy is also reflected in the daily number of inpatients. Hence, the number of inpatients at EMC is 35.6/day in the case of the surgical department. This is more than 22/day at EMU, because those hospitalized one or two days before are also counted as the day's inpatients. In terms of the number of inpatients accepted per day, that at EMC is believed to be around 12. This can also be said about the medical department.

The EMU ob-gyn department is part of the main hospital and is not independent as an emergency unit. Hence it is difficult to compare it with EMC.

3) Number of operations

EMC surgical department has performed 6.4 operations a day during the past five years and EMU surgical department has performed around twice that number, or 13 a day.

EMC ob-gyn department has performed three operations a day while EMU has performed five per day or 1.6 times.

Hence, in terms of the number of outpatients, inpatients and operations, although EMU and EMC are carrying out similar activities, those at EMU are two to three times in the scale of EMC.

Table 2-3-1 Number of Emergency Cases in Dr. Cipto Mangunkusumo Hospital

	1987	1988	1989	1990	1991	Average	Dr. Soetomo Hospital/Dr. Cipto Mangunkusumo
a. Outpatient							
Surgery	13,125 (36 persons/day)	10,203 (28 persons/day)	9,490 (26 persons/day)	7,417 (20 persons/day)	12,112 (33 persons/day)	28.6 persons/day	× 3.4
Medicine (incl. pediatrics)	27,368 (75 persons/day)	29,804 (82 persons/day)	22,406 (61 persons/day)	20,368 (56 persons/day)	16,309 (45 persons/day)	63.8 persons/day	× 3.6
Obstetrics and gynecology	6,909 (19 persons/day)	6,555 (18 persons/day)	6,894 (19 persons/day)	5,714 (16 persons/day)	6,841 (19 persons/day)	18.2 persons/day	× 1.1
b. Inpatient (3 days per patient in average)							Emergency department of Dr. Soetomo Hospital is for 24 hours inpatient only.
Surgery	12,465 (34 persons/day)	13,071 (36 persons/day)	13,425 (37 persons/day)	12,183 (33 persons/day)	13,881 (38 persons/day)	35.6 persons/day	× 0.6
Medicine (incl. pediatrics)	1,732 (5 persons/day)	1,556 (4 persons/day)	9,201 (25 persons/day)	1,278 (4 persons/day)	1,312 (4 persons/day)	8.4 persons/day	× 1.5
Obstetrics and gynecology	1,638 (4 persons/day)	1,716 (5 persons/day)	1,794 (5 persons/day)	1,769 (5 persons/day)	1,682 (5 persons/day)	4.8 persons/day	× 1.4
Immature fetus	1,503 (4 persons/day)	2,167 (6 persons/day)	1,493 (4 persons/day)	1,573 (4 persons/day)	1,419 (4 persons/day)	4.4 persons/day	× 0.5
c. Number of operating cases							
Surgery	2,345 (6 cases/day)	2,593 (7 cases/day)	2,736 (7 cases/day)	2,375 (6 cases/day)	2,181 (6 cases/day)	6.4 (cases/day)	× 2
Obstetrics and gynecology	1,212 (3 cases/day)	1,062 ((3 cases/day)	943 (3 cases/day)	1,098 (3 cases/day)	1,084 (3 cases/day)	3 (cases/day)	× 1.6

2-3-2 Sanglah Hospital Emergency Medical Center

(1) Outline of the Hospital

1) Name: Sanglah Hospital

Location	:	Denpasar, Bali Island
Area covered	:	Nusa Tenggara
Established	:	1956
Beds	:	664

2) Sanglah Hospital Emergency Medical Center

Location	:	inside the Sanglah Hospital
Area covered	:	Nusa Tenggara
Departments	:	emergency surgical, medical, ob-gyn and pediatric
Beds	:	52 (8 HCU, 8 ob-gyn, 36 general)
Site area	:	6,196.5m^2
Structure	:	reinforced-concrete, two stories
Total floor area	:	4,267.5m^2 (1F: 2,703m^2, 2F: 1,564m^2)
Opened	:	August 1986

(2) System of Sanglah Hospital Emergency Medical Center

The Sanglah Hospital is a B2-class hospital directly controlled by the Ministry of Health(a B-class hospital having the functions of an educational hospital). It is a general hospital made up of 17 medical and surgical departments. It is also an educational hospital of the medical department of the adjacent Udanaya University.

Its Emergency Medical Center was opened on its premises in March of 1991 through grant aid assistance by Japan.

Figure 2-3-2 shows the Center's organization. It is made up of 13 doctors including the director, 119 nurses, 12 pharmacists, 13 radiological engineers, 10 testing engineers, 9 in charge of the central equipment, 33 clerks, 36 cleaners, 10 ambulance drivers, 12 guards, 8 telephone operators for a total of 275.

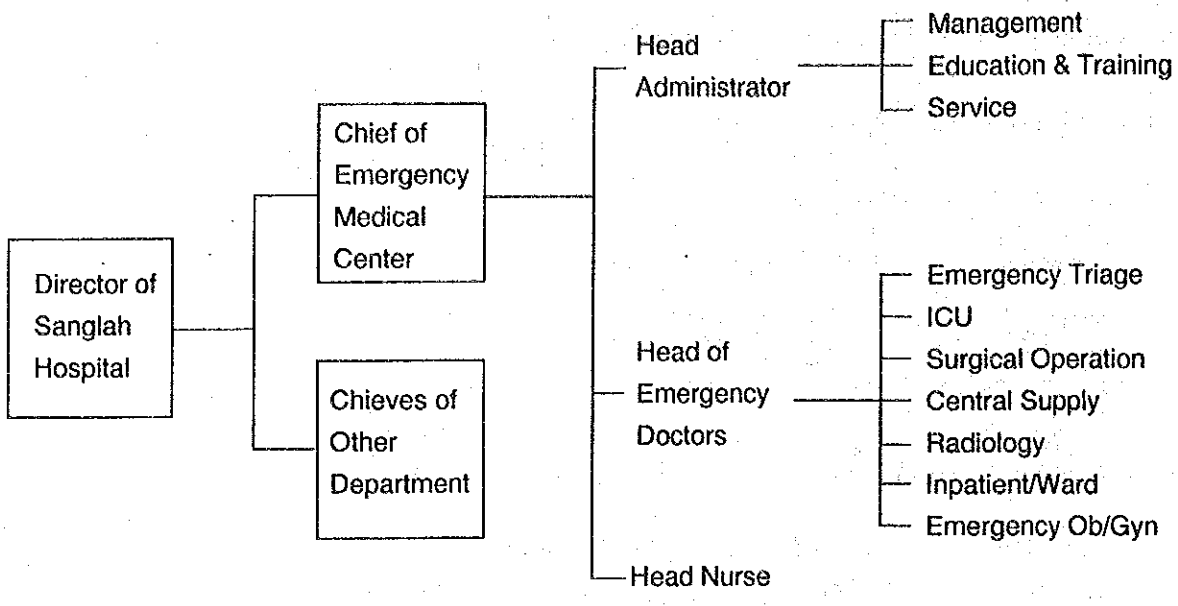

Fig. 2-3-2 Organization Chart of Emergency Medical Center (Sanglah Hospital)

The 13 doctors exclusively belonging to the emergency medical center are on an eight-hour shift based on four groups each made up of three doctors.

In addition to the above 13 doctors, those who carry out the actual medical activities are supplied through the rotation system as in the Cipto emergency medical center which has the various main hospital departments support the emergency center. A total of nine doctors, three surgeons, one internal medicine, one pediatric and one neurological, two ob-gyn and one anesthesiologist are on duty from 2:00 p.m. to 7:00 a.m. the next morning through a rotation schedule. The on-call (standby) system is adopted in the case of doctors of the otolaryngology, ophthalmology, anesthesiology and radiology departments.

The 119 nurses are divided into the five divisions of 1) initial treatment (5), 2) surgical (3), 3) HCU (3), 4) ob-gyn (4) and 5) hospital (6) and work through an eight-hour shift system. Two nurses are also dispatched from the anesthesiology department on a constant basis based on an eight-hour shift system.

Medical support staff such as radiological engineers and non-medical staff such as clerks are also on an eight-hour shifts by occupational category.

(3) State of Activities at the Sanglah Hospital Emergency Medical Center

The Center handles 38,954 patients a year. 25,951 of these are emergency surgical patients and 13,003 emergency medical. It performs 1,030 operations a year. There are 522 deaths a year 202 of which are due to traffic accidents.

(4) Present Condition of the Medical Equipment of the Sanglah Hospital Emergency Medical Center

The Center has the following equipment and it is effectively being used.

Main equipment

a. General X-ray TV system
b. CT scanner for the whole body
c. Ultrasound
d. X-ray equipment for the doctor's round of visits
e. Endoscopes
f. Electroencephalographs
g. Respirators
h. Defibrillator
i. Operating tables
j. Electric surgical knives
k. Surgical microscopes
l. High-pressure steam sterilizers
m. Anesthesizers
n. Hand-washing sterilizers
o. Astral lamps
p. ICU beds
q. Patient monitors
r. Delivery beds
s. Incubators
t. Distillers
u. Blood gas analyzers
v. Electrolyte analyzers
w. Urine analyzers
x. Eyeground cameras
y. Otolaryngological treatment units
z. Aspirators

Most equipment are effectively being used. It is important to select equipment having dealers locally which can promptly supply reagents and consumables. It is important to have the uninterrupted power supply system for critical equipments.

2-4 Background and Contents of Request

2-4-1 Background of Request

To improve the quality of health and medical services, the Government of the Republic of Indonesia enacted a "National Health Plan" in 1982 setting forth the fundamental principles of the national health policies. It sets forth the five major policies of 1) promotion of voluntary participation by the people, 2) qualitative and quantitative enrichment of the medical personnel, 3) stable supply of pharmaceuticals and foodstuffs and monitoring for harmful substances, 4) improvement of the nutritive and hygienic conditions and 5) development of health and medical laws and regulations. In addition, to achieve these policies the government has set forth as basic goals enrichment of primary health care, participation by residents and improvement and expansion of the inter-hospital referral system. Based on these basic goals, the government plans to develop the wide-area referral system in medical services by improving the medical facilities, training the personnel and improving the communications and transportation systems.

The Dr. Soetomo Hospital is one of the two A-class hospitals in Indonesia. It is located in Surabaya City which is the second largest city in Indonesia. It is the top referral hospital in the eastern Java area, including Kalimantan, and also functions as the educational hospital of the national Airlangga University. It is made up of 17 departments and has 1,544 beds, 970 doctors and 1,247 paramedics. It handles around 42,000 inpatients and 750,000 outpatients a year, around 27,000 of whom are referred from other hospitals. Its emergency unit (EMU) now consists of surgical and medical units. They were constructed in 1980 and 1986, respectively. The surgical unit handles around 33,000 patients a year and the medical unit around 75,000. Because the hospital's general outpatient departments close at 2:00 p.m., EMU which operates 24 hours a day must handle not only cases which truly require emergency treatment but those which are not urgent. The urban development in Surabaya has increased traffic and industrial accidents and increased the demand for the hospital's emergency medical care. In spite of this, such factors as cramped facilities, inappropriate flow of examination and treatment, shortage and wearing out of medical equipment and inadequate emergency networks are hampering the functions of the hospital as the top referral hospital in the East Java.

Given such circumstances, the Indonesian government has formulated a plan for developing the hospital's emergency department with the objectives of expanding the emergency department itself, developing its medical equipment, constructing the emergency network and with training emergency medical personnel. Having highly evaluated the results of cooperation by Japan with the projects for emergency medical centers in Jakarta and