2-4 General Situation of the Sanglah Hospital

2-4-1 Outline of the Hospital's Main Facilities

(1) Organization and Activities

The Sanglah Hospital is a Class B2 hospital under the direct control of the Ministry of Health (a class hospital provided with the facilities of an educational hospital). It is located in Denpasar on Bali and is a general hospital with 17 clinical departments, including internal medicine and surgery departments.

The total number of hospital beds in use is 664, of which 506 are for general patients, 28 for tuberculosis patients and 130 for patients suffering from infectious diseases. The hospital beds for general patients include 58 for newborn and premature babies, and 6 ICUs. In 1987, the hospital's 801-member clinical staff consisted of 120 medical doctors, 340 registered nurses, 129 practical nurses and 113 midwives. The total number of staff at the hospital was 1,213 (see Table 32).

Table 32 Personnel assigned by kind of job and by year in Sanglah Hospital

Occupation	1983	1984	1985	1986	1987	since 1990	For new emergency medical care center
Adminstrator	147	174	182	186	188	258	(13)
Physician	90	99	108	107	120	152	(50)
Nurse	292	294	291	323	340	534	(126)
Assistant nurse	207	168	168	142	128	315	(30)
Midwife	107	111	111	113	113	113	( )
Pharmacist	4	5	5	4	4	5	(2)
Assistant pharmacist	18	18	17	18	18	18	
Radiology technician	1	1	2	3	3	8	(4)
Assistant X-ray technician	6	6	6	7	9	9	
Laboratory technician	1	1	1	2	3	4	(10)
Ass. lab. technician	10	10	11	12	14	16	
Physical therapist	1	8	8	8	8	8	
Assistant physical therapist	3	3	3	3	3	3	
Dentist	6	6	6	7	8	10	
Dental technician	1	1	1	1	1	2	
Dental hygienist	4	4	8	10	10	10	
Dietitian	2	2	4	4	4	5	
	11	12	12	13	13	14	
Medical social worker	1	2	2	2	2	4	
Worker	215	231	221	209	192	233	
Driver	11	11	11	12	12	12	(5)
Engineer (electric, mechanic)	-	-	-	-	-	2	(5)
Others	10	16	29	22	20	59	(5)
Total	1,156	1,183	1,199	1,208	1,213	1,809	(340)

Bali and the other 3 islands in the region together are supposed to constitute the medical service area covered by this hospital. In actuality, most (99.2 percent) of the total number of patients diagnosed and/or treated at the hospital in 1987 (126,543) were residents of Bali. The remainder consisted of 348 Indonesians living on the other islands (0.3 percent) and 650 foreigners (0.5 percent).

As a top referral hospital, the hospital is treating patients referred to it from other hospitals in the medical service area. Most of these referral patients (99.2 percent) are residents of Bali. Patients referred to the hospital from the district of the island account for 79.2 percent of the total. (see Table 33)

Table 33 Patients by district (1987)

District	Outpatients	Inpatients	Total	(%)
Badung	87,684	12,515	100,199	(79.2)
Tabanan	6,590	1,421	8,010	(6.3)
Negara/Jembrana	796	330	1,126	(0.9)
Buleleng	830	262	1,092	(0.9)
Karang Asem	1,172	518	1,690	(1.3)
Klungkung	1,164	323	1,487	(1.2)
Bangli	1,114	364	1,478	(1.2)
Gianyar	8,023	2,439	10,462	(8.3)
Other	261	87	348	(0.3)
Foreign country	548	102	650	(0.5)
Total	108,182	18,361	126,543	
	(85.5%)	(14.5%)	(100%)	

(2) Activities

Of the total number of patients diagnosed and/or treated at the hospital during 1987, 20,492 were inpatients. The hospital bed utilization rate was 64.1 percent. There were 425.7 inpatients per day on average. Inpatient stays were 8.03 days on average. The total number of inpatients was broken down into 4,306 suffering from disease in the perinatal period (21.0 percent), 4,283 treated at the Surgery Department

(20.9 percent), 3,996 treated at the Obstetrics Department (19.5 percent), 2,698 treated at the Internal Medicine Department (13.2 percent), 1,852 treated at the Gynecology Department and 1,810 treated at the Pediatrics Department (8.8 percent). It should be noted that patients suffering from diseases in the perinatal period and those treated at the obstetrics and gynecology departments accounted for nearly 50 percent of the total number of inpatients (see Table 34).

Table 34 Patients by department in Sanglah Hospital (hospitalize)

Fiscal year / Department	83/84	84/85	85/86	86/87	87/88	(%)
Internal medicine	2,001	2,379	2,442	2,001	2,658	(13.0)
Respiratory	977	936	1,013	946	846	(4.1)
Surgery	4,167	3,927	3,776	4,943	4,233	(20.7)
Pediatrics	3,038	2,574	2,405	2,142	1,810	(8.8)
Gynecology	2,021	2,043	1,906	1,874	1,852	(9.0)
Obstetrics	3,754	3,554	3,909	4,377	3,996	(19.5)
Ophtalmology	526	525	477	574	521	(2.5)
Dermatology	-	-	-	-	180	(0.9)
Diseases on perinatal period	2,645	3,317	3,370	4,225	4,306	(21.0)
Total	19,129	19,260	19,290	20,137	20,492	

A breakdown of disease by type for the total number of inpatients shows that patients suffering from symptoms and diseases falling under the category of "conception, delivery and related diseases" numbered 4,939, or 31.7 percent of the total, followed by those suffering from diseases classified as "accidents, poisoning & violence" who numbered 2,407, or 15.5 percent of the total (and those suffering from diseases classified as "communicable & parasitic diseases"). Thus, treatment of patients suffering from diseases classified as "conception, delivery and related diseases" is the most important task for the hospital (See table 35). In 1987, the total number of outpatients was 208,379. During the year, 794 outpatients visited the hospital per day on average. Since many patients are usually accompanied by their families and/or relatives, the hospital's

waiting rooms and passages are crowded with patients and their attendants all day long (See table 35).

Table 35 Patients by type of disease in Sanglah Hospital (hospitalized)

Classification / Fiscal year	1986	1987	(%)
Communicable diseases & parasite disease	1,522	1,476	(9.5)
Tunior	681	602	(3.9)
Disorder of internal secretion	834	289	(1.9)
Disorder of blood and myelopoietic function	134	128	(0.8)
Mental disorder	5	16	(0.1)
Diseases of neuro-system and sense organ	512	516	(3.3)
Diseases of circulatory organ	786	710	(4.0)
Diseases of respiratory organ	1,423	1,214	(7.8)
Diseases of digestive organ	1,478	1,438	(9.2)
Diseases of urological organ	913	753	(4.8)
Conceive, delivery and its united diseases	4,651	4,939	(31.7)
Diseases of skin and under skin	95	132	(0.8)
Diseases of muscle, skeletal and connective tissue	60	123	(0.8)
Congenital abnormality	116	93	(0.6)
Diseases on perinatal period	61	11	(0.1)
Unknown symptom or diagnostics	936	655	(4.2)
Accident, poisoning and violence	2,435	2,407	(15.5)
Prosthetic dentistry and treatment before, after delivery	35	57	(1.4)
Total	16,684	15,564	

In 1987, 526 patients died within 48 hours, and 653 over 48 hours after their arrival at the hospital. An average of 3.23 patients died a day at the hospital. A total of 9 foreign patients died at the hospital during the year (See table 36 and 37).

Table 36 Death in Sanglah Hospital

Unit: person

Country	1986	1987
Indonesia	1,247	1,179
Foreigner	3	9
Total	1,250	1,188

In 1987, the hospital handled a total of 3,595 cases of delivery, approximately 10 cases per day on average. There were 99 cases of stillbirth, about 3 percent of the total cases (See Table 37).

Table 37 Indicators of activity in Sanglah Hospital

	1986	1987
Working beds	660	664 beds
Inpatients	2,973	19,824 persons
Occupied rate of beds	73.44	64.11%
Average number of inpatients	472.8	425.7 persons/day
Average days of hospitalization	8.63	8.03 days
Death within 48 hours		
· Less than 48 hours	536	526 persons
· More than 48 hours	1,711	653 persons
Deaths per day	3.41	3.23 persons
Death rate	6.01	6.06 %
Delivery	3,970	3,595 times
More than twins	57	59 times
Stillborn	116	99 persons
Abortion	1,007	1,084 times
Outpatients	221,077	208,379 persons
Reexamination	77,451	76,248 persons
Consultation days	293	291 days
Average outpatients	732.54	794 persons/day

In 1987, the total number of operations performed at the hospital was 7,246 -- 39.5 percent at the Surgery Department, 18.6 percent at the Otorninolaryngology Department, 18.3 percent at the Ophthalmology Department, 17.9 percent at the Obstetrics and Gynecology Departments and 5.7 percent at the Odontology Department (See table 38).

Table 38 Operation in Sanglah Hospital (cases)

	1986	1987
Surgery	3,344	2,861 (39.5%)
Obstetrics & gyrecology	1,530	1,300 (17.9%)
Ophtalmology	1,663	1,327 (18.3%)
Otorihinolaryngology	2,056	1,347 (18.6%)
Odontology (Dentistry)	434	411 (5.7%)
Total	9,027	7,246 (100%)

A breakdown, by scale, of the total number of operations shows that 36.2 percent were small-scale operations, 27.2 percent medium-scale operations, 21.2 percent emergency operations, and 15.4 percent large-scale operations. In parallel, a breakdown by type of anesthesia given shows that 72.1 percent were operations under local anesthesia and 24.1 percent, or about one- fourth of the total, were operations under general anesthesia (See tables 39 and 40).

Table 39 Operation by scale in Sanglah Hospital (cases)

	1986	1987
Major	988	1,118 (15.4%)
Intermediate	2,603	1,972 (27.2%)
Minor	3,804	2,623 (36.2%)
Emergency	1,632	1,533 (21.2%)
Total	9,027	7,246 (100%)

Table 40 Operation by anesthesia in Sanglah Hospital (cases)

	1986	1987	
Genral	4,866	4,092	(24.1%)
Lumbar	545	631	(3.7%)
Local	12,581	12,231	(72.1%)
Total	17,992	16,954	(100%)

Table 41 Examinations in Sanglah Hospital (cases)

	1987
ECG	1,721
Endoscopy	133
Tissue	19
Hemodialysis	101
Ocular	71
Others	1,644

Of the total number of examinations performed, 10 to 20 percent were contracted out.

As the laboratory department is not furnished with sufficient laboratory equipment, it can accept biochemical tests for only about 100 patients per day on average.

Table 42 Laboratory examinations in Sanglah Hospital (including emergency cases)

General	71,775 cases/year
Biochemical	60,044 cases/year
Hematological	63,637 cases/year
Bacterial	Several
RIA	No
Physiologic	Being done in each department

Table 43 Transfusions in Sanglah Hospital (provided by the Red Cross)

	1987
Collection (250 cc/each)	6,725 times
Need (250 cc/each)	6,586
Packet cell	40
Plasma	174
Receiver	3,438 persons

2-4-2 Outline of the Emergency Unit

(1) Organization and Activities

① Organization of the Emergency Unit

The existing emergency unit of Sanglah Hospital is located on the premises of the hospital. It consists of Surgery and Internal Medicine departments. Currently, it is equipped with a total of 8 beds. The Surgery Department includes an orthopedics section and a urology section, but not a neurosurgery section. The obstetrics and gynecology department belongs to the main facilities of the hospital. The surgery ward, which is part of the hospital's main facilities, includes 60 beds. The facilities of the Internal Medicine Department include a 6-bed ICU and an 8-bed CCU.

The current clinical staff of the emergency unit includes no full-time medical doctors. A total of 7 medical doctors working at the clinical departments of the main facilities are serving concurrently as medical doctors responsible for medical examination and treatment at the emergency unit. Dr. Nyoman Sukerena, a surgeons is the chief doctor of the emergency unit. Two residents (trainee doctors) from both the Surgery and Internal Medicine Departments are working in rota-tions of 3 months. These residents are responsible for general emergency medical care. For specialized medical care at the emergency unit, 5 specialists from the Surgery Department, 5 specialists from the Internal Medicine Depart-ment, 5 specialists from the Obstetrics and Gynecological Department, 3 specialists from the Anesthesiology Department and 4 specialists from the Pediatrics Department diagnose and/or treat patients at the emergency unit on an "on-call" basis. Also, 47 nurses and 2 ME technicians work at the emergency unit.

The four provinces of the region, including the province of Bali, constitute the medical service area covered by this emergency unit. The medical service area has a population of approximately 9.34 million (as of 1985). In actuality, however, most of the patients diagnosed and/or treated at the emergency unit are residents of the province of Bali, which has a population of approximately 2.62 million.

While this emergency unit is designed to serve as a tertiary emergency care center, in actuality it accepts all types (primary through tertiary) of patients. After 2.00 p.m. when the hospital's main facilities stop providing services for general outpatients, the emergency unit operates virtually as a clinic for outpatients.

As few Class C and Class D hospitals and health centers have their own specialists, patients who need to undergo surgery, or those suffering from very special diseases are usually referred to the emergency unit by these medical facilities. These referral services where emergencies are con-cerned are limited to Bali due to the current status of communication and transportation systems, as well to as geographical constraints.

(2) Activities

① Current Situation at the Emergency Unit

In 1987, the emergency unit's Surgery Department accepted a total of 18,280 patients while its Internal Medicine Department accepted a total of 3,106 patients. An average of 86 patients visited the emergency unit per day, of which 60% were cases requiring surgical treatment. The year-to-year increase in the number of patients was 0.05 percent for the Surgery Department. The hospitalization rate was 28.5 per-cent (5,213 cases of 18,280 seen) for the Surgery Department and 28.8 percent (3,788 cases of 13,106 seen) for the In-ternal Medicine Department. Although most of the patients hospitalized were mild cases, 51 patients treated at the Sur-gery Department and 13 patients treated at the Internal Medicine Department died. There were 3,875 outpatients and 816 inpatients referred to this emergency unit, most of them residents of the province of Bali. Only 23 patients accepted by the Surgery Department and 18 patients accepted by the Internal Medicine Department were referred to this hospital from provinces other than Bali. Almost all of the foreign patients who received medical care at the emergency unit (551 outpatients and 106 inpatients) in 1987 were considered to be emergency patients. These foreign patients were mainly from Australia (131 outpatients and 31 inpatients), Japan (63 outpatients and 12 inpatients) and West Germany (71 out-patients and 4 inpatients).

Table 44 Tourist outpatients and inpatients in Sanglah Hospital

Unit: person

	1987/1988		1988 (April - June)	
	Outpatients	Inpatients	Outpatients	Inpatients
Australia	131	31	22	7
Japan	63	12	18	2
West Germany	71	4	26	9
Italy	32	7	4	1
U.S.A.	46	8	12	1
France	26	4	5	2
United Kingdom	46	6	3	-
Netherland	Unknown	Unknown	9	1
Switzerland	15	2	4	-
Canada	11	2	5	-
Sweden	28	5	-	-
New Zealand	10	3	1	-
Austria	8	1	-	-
Denmark	1	3	-	-
Belgium	3	1	2	-
Pakistan	1	-	-	-
Spain	1	-	1	-
Singapore	4	1	-	1
Greece	2	1	-	-
Norway	4	1	-	-
Brazil	5	-	1	-
Other	18	4	14	2
Total	551	106	127	26

The most common health problems are traumatic injuries. In January 1988, for example, the total number of emergency patients accepted at the emergency unit was 2,792, of which 1,428 were patients suffering from injuries that had to be treated surgically, and from that number, 348 were those who were injured in traffic accidents.

Table 45 Emergency patients in Sanglah Hospital

	1986	1987
Surgical emergency		
Inpatients	2,738	5,213
Outpatients	14,826	13,023
Other	2	3
Deaths	51	51
Total	17,467	18,280
Non-surgical emergency		
Inpatients	3,688	3,788
Outpatients	11,174	9,192
Other	129	113
Deaths	8	13
Total	15,001	13,106

In 1987, a total of 1,053, procedures were performed at the emergency center, most of which were internal surgery and setting fracture of bones. The number of small-scale operations, like the treatment of traumatic injuries has not been included in the figures mentioned above.

Most internal surgery performed at the emergency unit was for a traumatic injuries or orthopedic operations. Also, operations for traumatic injuries to the abdomen were often performed in the emergency unit. In 1987, a total of 62 abdominal operations for abdominal traumatic injuries were performed in the emergency unit. A break down of abdominal operations is made up of: operations for appendicitis (251), operations for hernias (143), operations for intestinal blockages (42) and operations for peritonitis (41). There were relatively few thoracic operations (18). Of a total of 48 urological procedures, 15 were for anuria and 15 were for

torsion of the testicles. At present no neurosurgical operations have been performed in the emergency unit.

The emergency unit consists of two operating rooms, where it is possible to perform surgery under general anesthesia. (The number of operations performed under general anes-thesia has not been accounted for as of now.)

In 1987, the emergency unit diagnosed and/or treated a total of 5,623 patients suffering from internal traumas, such as shock, asthma, fever, stomach/ache, convulsions and pneumonia.

The emergency unit reported a total of 61 deaths, of which 34 were cases of traumatic injury to the head. It should also be noted that 30 patients died from traumatic injuries caused by traffic accidents. Of the patients who died from internal trauma, 3 died of heart disease.

In the area of X-ray examination, examinations using con-trast mediums were conducted in addition to taking general X-ray photographs. X-rays using contrast mediums to examine the urinary organs, and the digestive organs were conducted at the emergency unit. The emergency unit is not equipped with a CT scanner or an ultrasonograph, and therefore no examination of blood vessel using contrast mediums can be conducted at the emergency unit. The total number of X-ray examinations carried out at the emergency unit is not accounted for at this time.

Clinical tests are conducted in the central testing room of the hospital's main facility. The automatic measuring instrument is presently not functioning and so eletrolyte measurements are not possible.

There is a basic shortage of equipment used in diag-nosis and treatment of patients. The existing equipment is to old to function anymore. As a result, the emergency unit is forced to provide very limited emergency medical care. At present, the emergency unit's only advanced emergency medical care unit is a CT scanner. There is a great need for basic medical equipment. As the types of diseases and injuries the emergency unit must treat become more better known, it will become neces-sary to furnish the emergency unit with advanced equipment.

Table 46 Operations at emergency unit of Sanglah Hospital (1987)

Disease	Operation	case
1) Surgery		
Abdominal contusion	Abdominal section	42
Abdominal trauma	"	16
Lacerated wound of liver	"	2
Injury of liver	"	1
Peritoritis	"	46
Intestinal of struction	"	42
Volrulus	"	3
Intussusception	"	22
Enterocutaneous	"	1
Abscess	"	1
Traumatic perforation of colon	"	1
Megacolon (Hirschsprung disease)	"	1
Suicide	"	1
Perforation appendix	"	3
Acute appendicitis	Appendicectomy	251
Strangulated hernia	Herniaplasty (herniorrhaphy)	143
Diaphragmatic hernia	Abdominal section	1
Brust trauma	Thoracotomy	2
Vascular truncate	Erasion and amputation	5
Foreign body	Section	4
Pus	Incision	45
Pneumothorax	Thoracentesis and drainage of thoracic cabity	6
Obstructive jaundice	Drainage	1
Rectum hemorrhage	Ligation	1
Pleural effusion	Thoracentesis and drainage of thoracic cavity	7
Colostomy		11
Abdominal section	Suture	7
Strumectomy		3
Tumor	Examination	1
Aproctia	Colostomy	10
Hemothorax	Thoracentesis and drainage of thoracic cavity	2

Hemorrhage	Erucleation	1
Emphysema	Thoracentesis and drainage of thoracic cavity	1
Disorder of passage	Colostomy	1
Snakebite	Incision	1
Burn	Emergency measures/ return home	271
Snakebite	Emergency measures	75
Abdominal trauma	Emergency measures	52
Brust trauma	Emergency measures	11
Hernia	"	175
Appendicitis	"	368
Intestinal obstruction (ileus)	"	131
Peritonitis	"	46
Pain	"	348
Hemorrhage	"	1,288

2) Orthopedics		
Antebrachial injury	Debridement	35
Crural injury	"	129
Femural injury	"	28
Metatarsal injury	"	23
Humeral injury	"	12
Gangrene	Amputation	7
Lacerated wound of tendon	Debridement	35
Metacarpal injury	"	8
Ankle injury	"	1
Patellar injury	"	4
Mandibular injury	Taxis	8
Clavicular trauma	"	2
V. Apertum Besar	"	10
Neuritis of phalynx	Amputation	1
V. Penetran	Taxis	13
V. Clopectrum	Examination	4
Femur	Emergency measures	90

3) Urology		
Orchidic torsion	Incision	15
Urinary stenosis	"	2
Diabetes inspidiaus	Besicotomy	16
Ureterolithiasis	Lithuresis	42
Urethral injury	Urethrotomy	1
Urolithiasis	Vesicotomy	5
Nephrolithiasis	Nephrotomy	1
Hydrorephrosis	Nephrotomy	2
Urethrophraxis	Emergency measures	242
4) Head surgery		
Frontal depressed fracture	Transforation	7
Extradural	Trepanation	1
5) Obstetrics and Gynecology		
Childbirth	Treatment/return home	1,506
Total		5,646

Table 47 Death of surgical patients at emergency department, Sanglah Hospital (1987)

1. Drowning	2
2. Cerebral contusion	34
3. Intussus ception	3
4. Impatent abdominal trauma	3
5. Intestinal obstruction	2
6. Open abdominal trauma	1
7. Strangulated hernia	2
8. Thoracic trauma	2
9. Strumectomy	1
Total	50

Table 48 Deaths of non-surgical patients at emergency unit of Sanglah Hospital (1987)

1. Heart failure	3
2. Hypertension	2
3. Anemia with shock	2
4. Neonatal sufocation	2
5. Asthma	1
6. Meningitis	1
Total	11

Table 49 Death by etiology at emergency unit of Sanglah Hospital (1987)

1. Traffic accidents	30
2. Heart failure	17
3. Drowning	7
4. Hypertension	4
5. Meningitis	3
6. Diabetes mellitus	3
7. Suicide	2
8. Hepatitis	1
9. Intussus ception	1
10. Ovariocarcinoma	1
Total	69

Table 50 Non-surgical patients at emergency department, Sanglah Hospital (1987)

1. Colic	600
2. Asthma	814
3. Shock	982
4. Suicide	250
5. Heart failure	172
6. Hepatitis	180
7. Pneumonia	444
8. Hypertension	86
9. Typhoid fever	125
10. Cerebral vascular accident	68
11. Diabetic coma	74
12. Dengue	154
13. Anemia	64
14. Amphibolic	96
15. Tetanus	34
16. Bronchitis	10
17. Fever	680
18. Convulsive fits	500
19. Digestive diseases	268
20. Diphtheria	22
Total	5,623

② The technical Level of the Emergency Unit's Staff

As mentioned earlier, the 7 main members of the emergency unit's staff are from the hospital's main facilities who are working part-time. In emergency case, specialists are available on call at the hospital's main facilities. Each clinical department of the hospital has some specialists working full-time. A graduate from medical school is required to work at the health center for a period of 1 to 2 years and then work as a resident at an educational hospital for 4 to 5 years. After this initial period, they may work as a general practitioner for a clinical department of the hospital for more than 5 years. It should be noted that equipment and the reliability of case histories differs from hospital to hospital.

In the case of the Sanglah Hospital, the available equipment as well as reliably field case histories are insufficient. This implies that the technical level of the staff is most likely not very high. Some of the hospital's medical doctors have some experience using a CAT and possibly other advanced equipment, but these doctors limited hands on experience a points to a desperate need to receive further inservice training.

While investigating the facilities of the hospital, we interviewed some of the medical doctors working part-time at the emergency unit. We got the impression that they are very positively motivated medical doctors. They are eager to learn more about emergency medical care. However, they have few op-portunities to improve their skills given the scarcity and poor quality of the available facilities and equipment.

Most of the emergency operations being performed are rudimentary in nature. It is advisable, therefore, to start improving the level of skill from a basic starting point. Where abundant case histories are available, it appears that emer-gency units will be able to function satisfactorily as educational and training centers. Already the surgeon in charge of neurosurgery at the emergency unit is receiving in-service training and will soon be able to work back at this unit. It is very likely that there will be remarkable progress in raising the level of skill through training at this unit.

Most of the residents working at this hospital are graduates of Udayana University. Some of them expressed their desire to work at Class

A hospitals which are furnished with more advanced equipment. It should be noted that there is a basic shortage of residents. For example, there are only four residents for a total of 225 beds in the surgical department with 60 beds from the emergency unit. Given the small number of residents, they are required to be on duty every 3 days. As shown in the table below, other clinical departments have a very limited number of residents also. It will be necessary for the proposed new emergency medical care center to employ a similar rotation system, due to the limited number of residents available. In fact, there are too few currently available residents to even impliment such a rotation system. For this reason, the Ministry of Health and Udayana University are jointly planning to increase the number of regular residents to take advantage of this opportunity for expansion of the emergency unit. Also, it can be said that the technical level of these residents is low due both to an inadequate number of histories and poor equipment. In fact, the equipment installed at this hospital is of lesser quality than that which residents working at the RSCM Hospital have at their disposal. It appears that an improvement of the facilities and equipment is indispensable to raising the technical level of skill.

③ A Relation and Sharing Roles of a Unit to Other Medical Facilities

Although designed to function as a Class B hospital, Sanglah Hospital actually must serve as this region's top referral hospital, and accepts patients referred from Class C and Class D hospitals in the region. The hospital's system for communicating with other medical facilities is very underdeveloped. Its patient transportation system is also unsatisfactory. Patients prefer better equipped hospitals, and as a result, virtually no hospitals in this region can classify patients by type and seriousness of disease or injury.

The hospital is also must function as an educational hospital for various medical facilities in this region. Accordingly, its emergency unit is responsible for education on emergency medical care.

As shown in Table 51 below, every year the hospital accepts co-assistance students for in-service training from the ad-jacent Udayana University. The emergency unit also trains these co-assistance students by incorporating tasks for them into the 24 hour medical care system. The

hospital also accepts many university graduates for their training. It also accepts some students from the Medical Science Foundation and the engineering department of the university. It should be added that the hospital also takes on students who want to train as paramedicals.

On the other hand, the hospital trys to serve as a center for in-service training of the medical workers at Class C and Class D hospitals in this region. However, it has not yet achieved satisfactory results in this area.

As can be clearly seen, this hospital plays an important role in this region. It is regrettable, therefore, that it has no lecture room or training room to use. It is very necessary that these facilities be added to the hospital.

Table 51 Teaching System of Sanglah Hospital

i) Coassistance students from medical department, Vdayana University

1985	115 (persons)
1986	120
1987	143

ii) Students from medical fundation

1985	30 (persons)
1986	26
1987	52

iii) Study hours for training students

7:30 - 13:30 (Several students are in 24 hours system)

iv) Scheduled rotation

Surgery	12 (weeks)
Obstetrics and genecology	12
Internal medicine	12
Pediatrics	8
Otorhinolaryngology	4
Dermatology and reneology	6
Ophtalmology	4
Radiology	4
Anesthesiology	4
Dentistry	2
Forensic medicine	4

v) Residents by department

Department/fiscal year	(1985)	(1986)	(1987)
1. Surgery	6	4	4
2. Internal medicine	4	4	5
3. Obstetrics and genecology	6	6	7
4. Ophtalmology	1	2	1
5. Otorhinolaryngology	2	2	2
6. Pediatrics	9	8	6
Total	28	26	25

vi) Five students of the department of technology receive training each year.

vii) Paramedical students in Sanglah Hospital

Field/fiscal year	(1985)	(1986)	(1987)
1. Nursing collage	40	78	76
2. Nursing school	292	300	402
3. Sanitary school	19	-	-
4. Nursing school (SPK, BSAD, Denp)	115	165	260
5. Dental nurse	23	22	40
6. Private nursing school	252	294	303
7. Others	46	46	40
8. Dietitian	-	-	18
Total	787	905	1,139

2-4-3 The Present Condition of Facilities and Equipment

(1) The Present Condition of the Sanglah Hospitals Main Facilities

Name of the Facility: Sanglah Hospital

Address: Diponegore Street, Denpassar, Province of Bali

Establishing Ministry: The ministry of Health

Size of the Facility:

Area:	13.2 HA
Floorage:	45,867.41 M^2
Total Floor Spaceace:	47,555.4 M^2

Structure of the Building:
A ONE STORY REINFORCED CONCRETE BUILDING (ADDITIONAL FACILITIES ARE CONSTRUCTED FROM WOOD)

TOTAL NO. of Beds: 664

Clinical Departments: Internal Medicine, Gastroenterology, Trachea-esophagology, Otorinolaryngology, Circulatory, Orthopedics, Surgery, Psychiatry/Neurology, Pediatrics, Obstetrics/Gynecology, Ophthalmol-ogy, Dermatology, Urology, Odontology, Physiotherapy, radiol-ogy, Anesthesiology

History of Bed Increases:
1956
1968 - 452
1983 - 625
1988 - 664 (general: 506, Tuberculosis: 28, Infectious Diseases: 130)
2000 - 900

Total Special Beds for Newborns and Premature Babies: 58
ICU: 6
CCU: 8
Dialysis: (4)
Recovery (INSTALLED IN EACH OPERATION ROOM)
Emergency: 8

(2) The Present Condition of the Medical Equipment Installed in the Main Facilities of Sanglah Hospital

As shown in Table 53, the medical equipment installed in the main facilities of Sanglah Hospital meets the minimum requirements for providing medical care services for outpatients in for of X-ray examinations, out patients tests, surgical operations, ICU, and clinical facilities for obstetrics/gynecology, ophthalmology and otorinolaryngology. However, a close look at the current state of the utilization of facilities reveals that while the equipment being used for X-ray examinations, tests, surgical operations, and dental, ophthalmological and otorinolaryngological treatments is functioning sufficiently, some other pieces of equipment are superannuated (too old to use) or not maintained suffciently well.

1) General Problems

a) The hospital is utilizing equipment procured with loans from France and that has been provided by Taiwan, in addition to that which has been procured at the hospital's own expense. Some equipment was purchased more than 10 years ago and is therefore extremely superannuated (too old to use) (e.g., operation tables which do not incline, defective aspirators, etc...).

b) Some equipment is not serviced in terms of maintenence maintained (e.g., spectrophotometers, some endoscopes, blood counters, eletrolyte measuring equipment, etc...).

c) There are basic shortages of some types of equipment (e.g., NICUs, anesthsizing equipment, etc...).

2) Specific Problems of Clinical Departments

a) Equipment for X-ray Examination/Treatments

Equipment is used for areas of pediatrics treatment, diagnosis of mammary glands, the head and cardiovascular diagnosis etc. In 1987, a total of 35,000 cases were diagnosed using the X-ray equipment. This number of cases diagnosed was made possible due to the 6 medical

doctors available to the department and a sufficient number of radiographers.

Major operations conducted by the department take general X-ray photographs, and use fluoroscopy, as well as carry out examinations using contrast mediums. Examinations, using contrast mediums, of the urinary organs, and the digestive organs, are conducted. No examinations of the blood vessels using contrast mediums are conducted at the department.

Table 52 Activities of Radiology Department in Sanglah Hospital (Case/year)

	1987			1986			1985		
	Whole Hospital	Emergency	Others	Whole Hospital	Emergency	Others	Whole Hospital	Emergency	Others
Diagnosis									
General photographing	19,628	9,354	0	18,428	5,614	0	18,578	624	0
Fluoroscopy	3,609	251	0	3,856	0	0	923	0	0
Dental photographing			736	0	0	817	0	0	610
Ultra sound	849	0	0	501	0	0	696	0	0
Total	24,086	9,605	736	22,785	5,614	817	18,197	624	610
Treatment									
Cobalt		485		478				423	
Position									
Photographing									
Cobalt 60		3,680		4,308				5,637	
Total		4,163		4,786				6,060	

No CT scanner equipment is installed in the hospital, and this fact makes it very difficult to quickly and accurately diagnose cerebrovascular diseases, or head and or visceral injuries in traffic accidents and diseases of the digestive organs. Abdominal examinations are conducted with general X-ray photographs and the ultrasonic equipment.

Most of the members of this department's staff have limited experience with radiography from other medical facilities, and feel there is a strong demand for the introduction of CT scanner equipment. They are well equipped to operate CT scanner equipment if it is to be made available to them.

In 1987, a total of 3,680 cases were treated by cobalt 60 radiation.

b) While the ICUs and ICCUs of the hospital are equipped with patient surveillance equipment, portable defibrillator and ventilators, it is important to note that such basic equipment, such as infusion equipment, is in short supply.

c) As for the laboratory equipment that is available, the hospital has equipment for use in biochemical and hematological examinations, except for testing of immune serums, bacteriological examinations and RIA. The hospital is conducting an average of more than 190,000 testings a year. It should be noted, however, that most equipment was imported from the Netherlands, France and other foreign countries. In many cases, equipment that is in need of repair + maintenance work, (e.g., blood gas analyzing equipment), has been negleted and therefore can not be used any more.

The hospital doesn't have a sufficient supply of chemical reagents. As a result, the number of patients to be examined a day is limited by equipment that can be used with available chemical reactions. (e.g., automatic analyzing equipment).

It should also be noted that examinations required by the emergency unit are conducted at the central laboratory of the hospital's main facilities. This is a great setback to the efficiency of the emergency unit.

d) Each clinical department is equipped with an operating room, however, the possibility of establishing centralized operating rooms is being examined. The hospital currently has only 7 operating tables for use in general surgical, orthopedic and gynecological operations and only

4 anesthesia apparatuses. This shortage presents a great hindrance to the efficient utilization of the operating rooms.

e) A recovery room is attached to each operating room. This room is equipped with a postoperative care unit, and a respirator.

f) The central sterilizing supply department is equipped with washers, and autoclaves. As the present operating rooms are not centralized, transportation of equipment and materials to the operating rooms is inefficient. This is a great inconvenience for the emergency unit in particular.

g) Each of the odontology, ophthalmology and otorinolaryngology departments is equipped with a medical examination unit. But some of these units are now extremely superan-nuated. Also, equipments such as microscopes for use in operations and ultrasonic examinations are in short supply.

h) Equipment for use in physiological examinations includes 5 portable electrocardiographs and endoscopes presented by Japanese electrocardiograph manufacturers. However, about 50 of the total number of the electrocardiographs now in use at this hospital are defective. Also, it appears that the light source gener-ators are in need of repairs.

i) The facilities of the physiotherapy department include a bath for hot water treatment, a treadmill, an electric massage unit, and an ultrasonic treatment unit. It should be noted that the local manufacturers of auxiliary equipments and the technicians responsible for handling these equipments are competent.

j) The mortuary is equipped with a refrigerating unit, a necropsy table. The equipment of the mortuary is also available to the emergency unit.

k) The Department of obstetrics/gynecology handles an average of 10 deliveries a day. Its facilities include 4 delivery tables, 4 respirators for infants and 2 incubators. However, most of them are outdated which im-pedes their use. Some equipments must be used for 2 newborns at a time. It is clear that there is a shortage of these basis and necessary equipments.

1) The hospital owns a total of 3 ambulances, 2 of which are for transportation only. The remaining one unit can be equipped with emergency medical care equipment but is not at present.

Some patients referred to this hospital from other parts of this region and all emergency patients taken in directly are treated with the equipment mentioned in Table 27.

Table 53 List of existing equipment in Sanglah Hospital

1. Radiology	
General X-ray unit	1
X-ray unit for group examination	1
Mammographic X-ray system	1
X-ray TV system	1
X-ray unit for head	1
X-ray unit for children	1
Angio cardio diagnostic X-ray system	1
Portable X-ray unit for fluoroscopy	1
Dental X-ray unit	1
Dental panoramic X-ray unit	1
Ultrasonic diagnostic unit	2
Manual developing tank	2
Automatic film processor	1
Processing tank	1
After-loading	1
2. ICU, ICCU	
Patient monitoring system	6
Portable defibrillator	2
ICU central monitor	1
Ventilator	4
Aspirator	1
3. Laboratory (Parasitology, biology, biochemistry, pathology, toxicology, pharmacology)	
Colorimeter	9
Drying oven	3
Hemoglobinmeter	2
Electric dryer	2
Table-top general purpose centrifuge	1
Autoclave (samll size)	2
Distillatory equipment	2
Vacuum pump	1
Spectrophotometer	3
Electro phoresis apparatus	1

Bul electrophoresis apparatus	1
Densitometer	2
Coagulometer	2
Voltage regulator	5
Automatic dyeing equipment	1
Automatic wrapphing unit	1
Rotary microtome	1
Binocular microscope	1
Chromatograph	1
Autoclave	1
Automatic washing apparatus	1
4. Operation	
General and orthopedic operating tables	2
General operating table	1
Obstetric operating table	2
Operating light	3
Operating light for minor operation	3
Anesthesia apparatus	3
Resuscitator	3
Patient monitoring equipment for operation	3
Electro-surgical unit	4
Portable operating light	3
Film illuminator	4
Automatic-suction unit	4
Ultraviolet ray running water sterilizer	3
5. Recovery room	
Portable examination light	6
Portable suction unit	9
Postoperative care unit	2
Recovery bed	2
6. C.S.S.D.	
Cleaner	3
Autoclave (large size)	2
Autoclave (medium size)	2

7. Plaster room	
Electric gypsum cutter	2
Ambulatory	
8. Dentistry	
Dental care unit	3
9. Ophthalmology	
Care unit	1
Skiascope	1
Ophthalmological care set	3
10. Otorhinolaryngology	
Care unit	5
Armchair	1
Fluoroscope	7
Ear speculum	9
Nasopharingoscope	9
Endoscopy set	1
Operating microscope	1
Audiometer	3
11. General laboratory	
Portable electrocardiograph	4
12. Endoscopy	
Portable diagnostic lamp	1
Anesthesia table	1
Bronchofiberscope	1
Gastrointestinalscope	1
Cold light source	1
Urethroscope and cystoscope	1
	1
13. Physiotherapy	
Water bath	1
Heated water bath	1
Treadmill	2
Portable massage unit	2

Ultra-violet lamp	2
Ultra microwave therapy apparatus	2
14. Mortuary	
Mortuary refrigerator	2
Autopsy table	2
15. Obstetrics and gynecology	
Delivery table	4
Portable operating light	2
Anesthesia table	2
Infant ventilator	4
Fetal monitor	2
Vacuum extractor	2
Ultrasound scanner	1
Kimograph	1
Phototherapy unit	3
Incubator	2
Neonatal monitor	2
Infant resuscitator	2
16. Kitchen	
Equipment of kitchen	1 set
17. Laundry	
Washing machines	1 set
18. Electricity	
Main-panel 2 × 125 kVA, 2× 8 kVA	1
Main-panel (Kitchen and laundry)	2
Diesel generator 125 kVA	1
Incinerator	1
19. Other	
Ambulance	3

(3) The Present Condition of the Emergency Unit of Sanglah Hospital

The Present Condition of the Hospital's Facilities

Name of the Facility: Sanglah Hospital's Emergency Unit
Address: RSUP Sanglah Hospital, Denpasar, Province of Bali
Establishing Ministry: The Ministry of Health
Chief Administrator: Dr. Nyoman Sukerena (surgeon)
Size of the Facility: Floor Space: approx. 700m^2
Total Floorage: approx. 700m^2 Structure of the Building: RAINFORCED CONCRETE BUILDING
No. of Beds: 8

(4) The Present Condition of the Medical Equipment Installed in the Emergency Unit of Sanglah Hospital

Outline of the equipment of the emergency unit of Sanglah Hospital is as shown in the table below.

Table 54 List of existing equipment at emergency unit of Sanglah Hospital

1. Radiology	
Portable X-ray unit	1
General parpose X-ray unit for emergency trauma	1
X-ray unit for urology	1
Automatic film processor	1
2. Operation	
Universal operating table	2
Operating light	2
Operating light for minor operation	1
Anesthesia apparatus	1
Film illuminator	1
Automatic suction unit	1
Scrub unit	1
3. Equipment for phisiological	
Portable electrocardiograph	1
4. Equipment for resuscitation	
Resuscitator	2
Defibrillator	2
Vacuum pump	1

The emergency unit equipment for X-ray examinations includes a portable X-ray machine, an emergency X-ray machine for examining emergency traumatic injuries and an X-ray machine for urological examinations. All these machines are getting to old to use, but are still partially functioning due to good maintenance (although some of them are out of focus). The automatic processor is now out of order, so films are being developed manually. Although it is not expressly indicated by the data, the emergency unit is assisted by the radiology department of the hospital's main facilities so that they can better conduct necessary examinations.

Each of the two operating rooms is equipped with an operating table. One of the operating tables is Taiwan-made and is operated manually. Although outdated, the Taiwan-made operating table is used with great care. There is only one anesthetizing unit at the hospital and therefore the emergency unit must share this equipment with the hospital's main facilities. The unusable aspirators and sterilized hand washing devices must still be utilized.

All clinical tests are conducted at the central testing room of the hospital's main facilities. The emergency unit is equipped with a portable electrocardiograph.

As for the resuscicating equipment, the emergency unit is equipped with two resuscicators, a defibrillator and a vacuum pump. It should be stressed that there is a basic shortage of intertracheal sets and bronchotomy sets.

The 3 ambulances owned by the hospital, one leaves the hospital loaded with necessary emergency medical care equipment so that the patient may be given emergency medical care while being transported to the hospital by another ambulance. Thus, a very inefficient emergency transportation systems stands.

Thus, it is next to impossible for the emergency unit to provide satisfactory emergency transportation for the average 86 emergency patients that must be brought to it each day. At present, therefore, the emergency unit trys to make due with its emergency medical care services in close collaboration with the surgery, otorinolaryngology and obstetrics/gynecology departments of the hospital's main facilities.

2-5 The Present Condition of a Similar Facility

2-5-1 Jakarta RSCM Emergency Medical Care Center

(1) Outline of the Hospital

1) Name of Facility: RSCM Dr. Cipto Mangunkusumo Hospital
Location: Central Jakarta
Area Covered: Metropolitan Jakarta
Class: Class A
Total No. of Beds: 1,300

2) The RSCM Emergency Medical Care Center
Location: Central Jakarta
(On The Premises of RSCM Hospital)
Area Covered: Metropolitan of Jakarta
Total No. of Beds: 64
Total No. of Patients: 63,373 (1987)
Clinical Departments: Emergency Internal Medicine, Emergency Surgery, Emergency Obstetrics/gynecology, Emergency Pediatrics
Area: 1,972.2m^2
Floor space: 1,753.2m^2
Total Floor Space: 7,232.4m^2

(2) The Medical Care System of the RSCM Emergency Medical Care Center

The RSCM Emergency Medical Care Center is the expanded and improved version of the emergency unit of Dr. Cipto Mangunkusumo Hospital (hereafter referred to as the RSCM Hospital). It opened in August 1986 under a grant in aid from Japan.

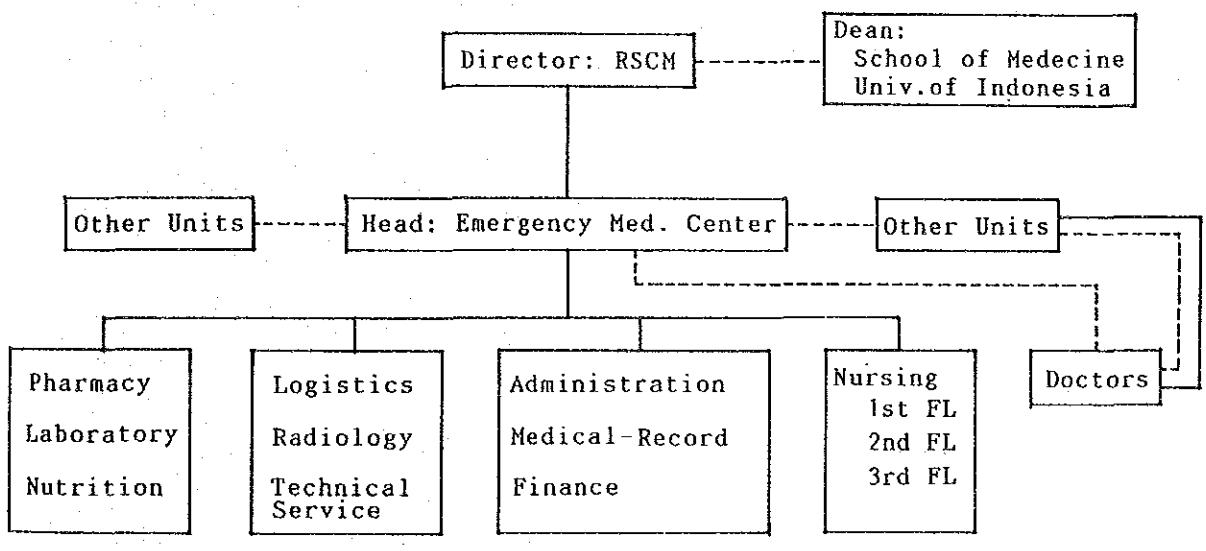
The RSCM Hospital is a state-run Class A hospital with 1,300 beds. It is the nation's largest and best-equipped general hospital. It also serves as the eduCT scannerional hospital of the University of Indonesia. Although established to meet the Jakarta metropolitan area's growing demand for emergency medical care, this center is also considered an

important part of the nation's expanded-area emergency medical care system, since it is the nation's central emergency medical care facility.

The center consists of an Emergency Internal Medicine Department, an Emergency Surgery Department, an Emergency Ostetrics/Gynecology Department and an Emergency Pediatrics Department. This center has 26 emergency HCUs, 8 ICUs and 2 CCUs in addition to 16 emergency obstetric/gynecological beds, 8 beds for newborns and 4 beds for premature babies (64 in total).

Patients donot go directly tospecificclinical departments, but first receive a medical examination in the primary medical examination room, and from there are referred to specific clinical departments. This arrangement is called the one-gate system. The primary medical examination of patients is carried out by residents, who may also conduct simple treatments. Specialists are only requested to diagnose and/or treat more serious cases.

Fig.- 6 Organizational Chart of RSCM Emergency Medical Center



(3) Activities

In the table below, the activities of the RSCM Emergency Medical Care Center during the year 1987 and August 1988 are given statistically in terms of the annual numbers of patients who received medical examinations, inpatients, patients who died, total examinations, total operations (by department), etc.

Table 55 Outline of RSCM Emergency medical care center

	1988	1987
1. Breakdown of Out- and In-patients		
Number of patients	4,955	
Outpatients	3,604 (72.7%)	
Inpatients	1,291 (26.1%)	
Death	60 (1.2%)	
2. Breakdown of surgical and non-surgical patients		
Number of patients		63,337
Surgical patients		25,590 (40.4%)
Non-surgical patients		37,747 (59.6%)
3. Breakdown of surgical patients		
Accidents		5,410 (21.1%)
Others		20,147 (78.9%)
4. Number of referrel		
Referred	420 (8.5%)	6,231 (9.8%)
Further referred	52	
5. Patients by department		
Internal medicine	1,373 (27.7%)	
Surgery	1,367 (27.6%)	
Obstetrics and gynecology	539 (10.9%)	
Neonatal	251 (5.1%)	
Pediatrics	1,149 (23.2%)	
Ophthalmology	128 (2.6%)	
Otorhinolaryngology	110 (2.2%)	
Psychiatry	38 (0.1%)	
Total	4,955(100.0%)	
6. In-patients		
Total number		63,337
In-patients		7,024 (11.1%)
Death (including D.O.A.)		625 (1.0%)

7. Case of laboratory

Hemoglobin	1,267
Leucocyte	1,185
Hematcrit	832
Urea and nitrogen	642
Creatinine	643
Glucose	653
Blood gas	232
Electrolyte	-
Qualitative of urine	525
Bleeding time	16
Coaglation time	17
Osmotic pressure	2,191
Coaglation time	6,013

8. Case of radiology

Total number of patients	1,576
Film	
35 × 35	561
30 × 40	591
24 × 30	920
18 × 24	439
15 × 40	275
Number of radiodiagnosis	1,801

9. Operation

(1) Operation by scale

Large	59 (19.7%)	1,089 (29.8%)
Medium	222 (74.2%)	2,331 (63.7%)
Small	8 (2.7%)	211 (5.8%)
Special	10 (3.3%)	36 (1.0%)
Total	299(100.0%)	3,657(100.0%)

(2) Operation by department

Surgery	117	1,230
Orthopedics	40	482
Pediatrics	37	482
Neuro surgery	11	291
Urology	2	60
Gyrecology	77	1,212
Ophthalmology	7	159
Otorhinolaryngology	8	82
Total	299	3,657

(3) Operation by time		
A.M. (8:00 ∿ 14:00)	71 (23.7%)	966 (26.4%)
P.M. (14:00 ∿ 21:00)	84 (28.1%)	1,042 (28.5%)
Night(21:00 ∿ 8:00)	149 (48.2%)	1,649 (45.1%)
Total number of cases	299	3,657

4) Obstatrics and gynecology

1. Equipment for diagnosis and treatment of obstetrics and gynecology
2. Endoscope and cold light unit for gynecology
3. Tokadynamometer
4. Fetus detector
5. Ultrasound diagnosis system
6. Delivery bed
7. Equipment for delivery
8. Neonatal incubator
9. Infant resuscitator
10. Incubator
11. Cardiopulmonary monitor

5) Operation

1. Operating table
2. Operating equipment
3. Electric knife
4. Portable X-ray unit
5. Anesthesia apparatus
6. Respirator
7. Defibrillator
8. ECG monitor
9. Autoclave

During 1983, the total annual number of patients accepted was 42,580, but in 1987 it sharply increased to 63,337. However, there was no significant difference in the total number of inpatients between 1983 (7,484) and 1987 (7,024). These figures indicate that many patients suffering from insignificant health problems still visit this center directly, while patients injured in traffic accidents are, in part, being sent to Class C or Class D hospitals for treatment. This utilization of the Class C or D hospital are a result of the improvements made in the emergency medical care services provided in metropolitan Jakarta.

A breakdown of the total number of patients shows that 34,777 are cases of internal illnesses and 25,590 cases of surgically treatable illnesses. A breakdown of the total number of inpatients indicates that 3,370 were cases of internal illenesses and 3,657 cases of surgically treatable illnesses. A majority of the patients suffering from surgically treatable illnesses are made up of serious cases. The total number of patients who died is 625, 1.7 a day on the average. The average bed utilization rate is approximately 90 percent, with 60 percent for ICUs and CCUs.

The total number of operations performed at the center in 1987 was 3,657, of which 1,230 were surgical operations, 1,212 obstetric or gynecological operations, 482 orthopedic operations, 291 pediatric operations, 159 ophthalmologic operations and 141 cerebral operations. Particularly noteworthy are the large number of obstetric and gynecological operations and the rapid increase in the number of cerebral operations. However, what is considered the center's Emergency Obstetrics/Gynecology Department would be considered an Obstetrics Department in Japan. The number of patients diagnosed and/or treated by the Emergency Obstetrics/Gynecology Department, which was established to cope with the problem of low level health education for mothers and children, is on the increase, compared to the 1,088 cases recorded in 1983. However, it appears very difficult to thoroughly resolve this problem of health education.

Most surgical operations are performed under general anesthesia. The average operating time is 1 to 3 hours for 55.2 percent of the total, and more than 3 hours for 38.8 percent. Operations are continuously performed all day, but 45 percent of the total number of operations appear to be performed at night, between the hours of 9:00 p.m. to 8:00 a.m.

The center hospitalizes an average of 19.3 cases a day and performs out-patient treatment on an average of 10 patients a day. Its services are mainly provided by 4 available General Practitioners. A total of 35 Residents are also working at the center on a 24 hour a day basis and under a simple rotation system. Senior residents who have worked here for more than a year have considerable experience in performing emergency operations, and are therefore very productive. It appears these Senior Residents' active efforts are the main supports of the center.

(4) Rotation System

The center employs the rotation system explained earlier in order to offset the critical shortage of General Practitioners. The rotation system is considered the cornerstone to the functioning and management of this center. Under this system, each of the clinical departments of the hospital send a number of General Practitioners or specialists to this center, whose staff consists of only 4 full-time medical doctors. These full-time doctors work only in the daytime and are mainly responsible for the management of services provided by the center. Consequently, the medical experts most active at this center are senior residents. They were dispatched to the center after two year internships in the clinical departments of the hospital, and therefore represent the respective clinical departments they interned at 2 to 3 junior Residents each work under a senior Resident. The number of junior Residents dispatched to the center varies from one clinical department to another, and Resident interns for a minimum period of 3 months.

In the daytime, patients suffering from less serious health problems are usually diagnosed and/or treated by available senior or junior Residents. On the other hand, patients suffering from serious illnesses are referred to diagnosed and treated by specialists. At night, a number of residents are required to be on duty, however, specialists working at general wards are also required to be or/all for emergency medical care at night.

It appears that, even under this system, almost all medical experts are so busy. There is a duty doctor' room on each floor of the center. Few doctors on duty can afford to sleep there, although they rest for some time there.

A similar system will be employed at the proposed new emergency medical care center of the RSUP Sanglah Hospital.

(5) Results a Survey of the Facilities and Equipment

As for the equipment to be used in diagnosis, the head CT scanner unit and the ultrasonic examination unit are being utilized fully. As the center accepts many patients with head injuries from traffic accidents, the CT scanner unit is used frequently even though the scanning procedure

usually takes a long time. This year, it was often the case that the unit remained out of order for a considerably long time. The hospital's main facility has full-body CT scanner equipment, which is used for the examination of the chest, abdomen and other parts of the body. On the other hand, unfortunately, the X-ray machine has not been in use due to incomplete repairs. The ECG and the probe for use in diagnosis have also been out of order. Although the unit has 3 ME technicians, most of the defective devices have to be repaired by the manufacturers of the equipment. Thus it is of vital importance to have the suppliers of these devices perform their obligations with regard the repairs provided for in the maintenance agreements. It was heartening to see, while the study team was visiting the center, that a technician representing a manufacturer of some broken equipment was engaged in the necessary repair of equipment.

Some of the aspirators and the monitors can not be used now. It appears that there are too many operating rooms for the present size of the staff. Some of the incubators for prema-ture babies are out of order. As a result, sometimes two premature babies are put in a single incubator at the same time.

Two types of communications radios are installed in the center, two units for the commercial band and one unit for the amateur band. They are small in size, covering only central Jakarta. The ambulances are all for transportation only and have no on-board medical equipment.

The center is equipped with automatic doors and some other features of less basic necessary need. It was pointed out by the Indonesians that the painted wall is so easily soiled that it has had to be repainted. Also, the western-style toilets were replaced by units more in keeping with local custom.

Table 56 List of principal equipment at RSCM emergency medical care center

1) Outpatients

1. Internal medicin equipment for diagnosis and treatment
2. Surgical equipment for minor operation
3. Equipment for diagnosis and treatment of otorhinolaryngology and ophthalmology
4. Endoscope and cold light source
5. ECG monitor
6.
7. Defibrillator
8. Respirator
9. Anesthesia apparatus
10. General X-ray unit
11. CT scanner for head
12. Mobil type X-ray unit
13. Automatic developing tank

2) Ward

1. Bed
2. Stretcher
3. ECG monitor
4. EEG
5. Defibrillator
6. Respirator
7. Transfusion pump
8. Dialyser
9. Ultrasound diagnostic system equipment
10. Perioneal dialyser

3) Clinic laboratory

1. Blood bank refrigerator
2. Coagro meter
3. Blood gas analyzer
4. Multifunctional hematology analyzer
5. Cross matching apparatus
6. Urinalysis apparatus

(4) Operation by anesthesia

General	Ordinary
Lumbar	Less than 1%
Local	Only minor operation

(5) Operation by hour

Less than 1 hour	297 (8.1%)
1 ∿ 3 hours	2,019 (55.2%)
More than 3 hours	1,341 (38.8%)
Total number of cases	3,657

2-5-2 The Present Condition of Other Similar Facilities

The study team investigated other similar medical facilities in Indonesia including a private hospital, four public hospitals under the direct control of the Ministry of Health, two Class B hospitals, a Class C hospital and a Class D hospital, and a health center. These places were viewed in addition to the RSCM Emergency Medical Care Center for the purpose of gaining a clear overview of the current state of the medical care in Indonesia. An outline of these investigations follows below.

(1) Fatmawati Hospital

1) An Outline of the Hospital

This is a Class B general hospital with 500 beds. It used to be the Mrs. Sukarno Memorial Hospital which operated with funds obtained from a foundation until 1983, when it became a national hospital. The hospital is responsible for providing medical services for southern metropolitan Jakarta.

Area Covered:	Southern Metropolitan Jakarta	
Class:	Class B Hospital Under The Direct Control of the Ministry of Health	
Total No. of Beds:	500	
Total No. of Outpatients:	800 - 1,000/Day	
Total No. of Medical Experts:	Medical Doctors:	100 - 120
	Nurses:	300 - 400
		(1,071 In Total)

2) The Emergency Unit

The hospital's emergency unit has a separate entrance from the hospital's main facilities. It is poorly equipped but functions as a part of the hospital's facilities for outpatients. Currently a new emergency unit is being added to the hospital by remodeling part the existing facilities.

The only devices presently installed in the existing emergency unit are operating tables, operating lights, central gas piping, inhaling pumps, irrigator stands, some anesthetizing equipment, treatment tables and internal examination tables.

Average No. of Emergency Patients:	80/Day (Outpatients: 70, Inpatients: 10)
Average No. of Patients Injured in Traffic Accidents:	10% of The Total Number of Emergency Outpatients (Slight Injury: 1, Medium Injury: 5 - 6, Serious injury: 1 - 2)
No. of CCUS:	12
No. of Operating Rooms: In Total:	4 (Large: 1, Medium: 1, Small: 2)
No. of Full-Time Doctors:	Approx. 10

(2) Pusat Pertamina Hospital

1) Outline of the Hospital

Location:	Jakarta
No. of Beds:	167
Clinical Departments:	Internal Medicine, Surgery, Orthopedics, Urology, Renal Disease, Hepatic Disease, Otorinolaryngology, mouth Membrane Surgery, Pediatrics, Anesthesiology, Brain Surgery, Testing, Radiology
Total No. of Outpatients:	5,270/Day
Total No. of Medical Experts:	Approx. 400 (500 Specialists, 20 General Practitioners and Approx. 300 Nurses)

This hospital used to be used exclusively by the personnel of the Oil Public Corporation and their families until 1983, when it became open to the general public. The high technical level of this hospital is widely recognized as being of a high level and many foreigners utilize its services.

At present, the hospital has a total of 267 beds, of which 30 are for patients suffering from infectious diseases.

One of the outstanding characteristics of this hospital is that it is equipped with a total of 7 ICUs for patients suffering from heat injuries

or burns. This hospital boasts of the highest technical level in treating heat injury (burn) patients.

At this hospital, there are three general categories of beds -- special (150,000 Rp./Day), Class A and Class B beds. The lowest charge is 40,000 Rp./Day. This hospital has continued funding from the Oil Public Corporation, so it can afford to provide non-profit medical services like national hospitals. It should also be noted that this hospital is required to spend 25 percent of its revenues on charitable programs.

Another noteworthy characteristics of this hospital is that it has a heliport on the roof, which makes it possible to accept patients referred to this hospital from Banang and Rampung (Sumatra) twice a month. Transportation of patients is by chartered helicopter, but naturally the cost of transportation alone is prohibitive -- 3 million Rp. per flight so it is not taken advantage of by the average patient.

The CT scanner unit installed in this hospital is functions smoothly, which proves to be a great help in providing a wide variety of medical services.

(3) Tarakan Hospital

1) An Outline of the Hospital

This is a Class B national hospital with 50 beds under the direct control of the Ministry of Health. It used to be simply a health center until 1987, when it was raised to hospital status. Its outpatient department is used by many.

Area Covered:	Jakarta
Class:	Class C Hospital Under The Direct Control of The Ministry of Health
Total No. of Beds:	50
Clinical Departments:	Internal Medicine, Surgery, Pediatrics, Obstetrics/Gynecology, Odontology, Ophthalmology
Total No. of Medical Experts:	13 Specialists, 16 General Practitioners, 3 Dentists, 41 Nurses and 3 Assistant Laboratory Technicians

This hospital does not have an emergency medical care cen-ter, so its clinical departments must accept emergency patients. It is only equipped with such basic devices as an X- ray machine, a fluoroscope, medical examination tables, delivery tables, a dental unit, an ophthalmologic unit and slit lamps. The Emergency Obstetrics/Gynecology Department of the hospital is equipped only with general beds and delivery tables. It has no labor tables. It seems that this hospital finds it very difficult to accept those pregnant women who may require a Caesarean section. The hospital is currently only performing small-scale operations.

2) Emergency Staff

The hospital's emergency staff belongs to the Department of Anesthesiology. They can accept an average of 50 outpatients a day. Most of the patients treated by the staff suffer from traumatic injuries. Only one operating room is available to the staff of this hospital. All operations under general anesthesia are performed at the Central Operating Department of the hospital.

Residents and other trained medical experts work in close collaboration with the Medical School of the University of Indonesia.

In light of the currently inadequate state of medical care in Indonesia, the hospital accepts patients, whether they come for primary, secondary or tertiary medical care. While the General Clinical Departments accept patients from 7:30 a.m. to 4:00 p.m., an emergency staff must be available around the clock.

The staff utilize the examination tables, internal examination tables, aspiration tables, electroencephalograph, patient surveillance unit, respirator, anesthetizing equipment and operating table as efficiently as possible.

Average No. of Outpatients:	50/Day
Total No. of Doctors:	2 Full-Time General Practitioners (Specialists Come On Call)
No. of Operating Rooms:	1

(4) Persahabatan Hospital

1) An Outline of the Hospital

This is a Class B national policlinic hospital with 480 beds. It has been designated as the educational hospital for the University of Indonesia.

Area Covered:	Eastern Metropolitan of Jakarta
Class:	Class B Hospital Under The Direct Control of The Ministry of Health
Total No. of Beds:	480
Average No. of Outpatients:	850/Day

2) Emergency Staff

The hospital's emergency staff accepts an average of 100 patients a day. Approximately 90 percent of the patients suffer from traumatic injuries caused by traffic accidents and other disasters (traffic accidents though, account for 30 percent of the total cases).

The number of patients who need to be hospitalized is 5 to 6 a day on the average. This hospital operates in close collaboration with the RSCM Hospital. The referral system between the two hospital seems to function smoothly.

The nation's health insurance system consists of a public health insurance plan for national public servants and their families and private health insurance plans. However, few of the general public are covered by a health insurance plan.

On the other hand, nearly half of the patients utilizing the medical services of this hospital are covered by the above-mentioned insurance plans.

(5) Gianyar Hospital

1) Outline of the Hospital

This is a Class D hospital under direct control by the Ministry of Health. It was established in 1984, and has a to-tal of 94 beds. 12

health centers operate in conjunction with this hospital, so many patients are referred from these health centers.

The training of the medical staff is administered by the provincial government. A specialist or two train the medical staff on the premises.

Area Covered:	Northwestern Metropolitan Denpasar, Bali Island
Class:	Currently Class D Hospital Under The Direct Control of The Ministry of Health (It is expected to be raised to Class C status by the upcoming 5th Five Year Plan.)
Total No. of Beds:	94
Total No. of Medical Experts:	20 Doctors (Including a Specialist, a General Practitioner and 2 Dentists) (Approx. 300 Total Medical Experts)

The type of patient this hospital finds difficult or impossible to treat are referred directly to Class B2 hospital, the Sanglah Hospital. At present, however, patients are taken directly to referral hospitals without any prior communications as to the possible referral of patients.

Ordinarily, when a doctor receives an emergency call by radio, the doctor in turn gives prepatory instructions to a nurse or some other available medical expert.

The annual bed occupancy rates for hospital were 97.3 percent for 1984, 93.3 percent for 1985, 93.6 percent for 1986 and 76.9 percent for 1987. The sharp decline in the annual bed occupancy rate for 1987 was also found at many other hospitals for the following reasons:

While the consultation fee for outpatients and the hospitalization charge for inpatients (see Table 57) remained unchanged from 1977 to September 1987, both the consultation fee and the hospital charge began to rise rapidly in October 1987, to 16 times the former charge amount for outpatients and approximately 10 times the charge for inpatients. As a result, many hospitals met drastic declines in the number of patients seen after October 1987.

Table 57 Diagnosis, treatment and admission expenses (tariff) in Indonesia

Outpatient	25 RP/time	400 RP/time
Inpatient	500 RP/day	4,800 RP/day

(6) Sanur Public Health Center

This health center, established in 1986 in the East Sanur District of Denpasar, has a number of sub-centers operating under it. In 1987, the hospital accepted a total of 4,028 patients, of which 22.8 percent were patients injured in traffic accidents, followed in number by cases of poisoning.

Approximately 10 percent of in the total number of patients were referred to the Sanglah Hospital (1 to 2 cases a day).

As no telephones are installed in this hospital, communication with the Sanglah Hospital is conducted by radio.

Location: Sanur District, Bali Island
Class: Health center
No. of patients: 4,208 (1987)(of which 959, or 22.8 percent, were injuries in traffic accidents)
No. of patients referred to the Sanglah Hospital: approx. 10 percent of total
No. of medical experts: 2 doctors, 5 nurses, 5 midwives and others

(7) Present Situation of Introduction of CT Scanner Equipment (nationwide)

As of the end of fiscal 1987, there were a total of 23 CT scanner installed in Indonesia. The basic design team conducted a survey of their operations. 17 out of the 23 medical facilities furnished with CT scanner returned the questionnaire. Of the 17 units with CT scanner, 13, or 76.4 percent, were Japanese-made equipments. Except for one unit, all the other Japanese-made CT scanners were operating smoothly. This indicates that many medical facilities in this country have sufficient experience

with Japanese-made CT scanners, and are therefore competent to make full use of them.

A Japanese-made CT scanner for head was not in use for the following reasons:

a. The equipment was not grounded satisfactorily and the room was not air-conditioned properly, which, combined with dew condensation and mold to damage the device CPU board.

b. No maintenance technicians from the manufacturer of the device are stationed in Indonesia. As a result, it took a very long time to get one to respond.

c. The responsibility for operation and maintenance of the room is not well defined, and therefore unskilled technicians have free access to it. Furthermore, the arrival of a maintenance technician from the manufacturer of the CT scanner device was delayed, which resulted in the worsening of the damage.

d. The device was not grounded properly.

Table 58 Present conditions of CT scanner in Indonesia

Number of CT scanner in Indonesia	
Whole body :	10
Head :	7
No answer :	6
Total	23
Number of CT scanner by maker in Indonesia	
Hitachi (Japan) :	6
Toshiba (Japan) :	6
Shimazu (Japan) :	1
Picca :	1
Phillips (Netherlands) :	1
Siemens (West Germany) :	1
Unknown :	7
Total	23
Working conditions of CT scanner	
Being operated :	16
Out of order :	1
Total	17

2-6 Rationale for and Contents of the Request

2-6-1 Rationale for the Request

The Government of Indonesia designated the region consisting of the four islands (provinces) of Bali, South West Nusa, South East Nusa, and East Timor as a medical care service area (medical care zone). It has been endeavoring to improve and expand the wide-area medial care system for the entire zone. The central part of this zone is Bali, the capital of which is Denpasar. Bali has the second largest population density in Indonesia after Java. Furthermore, Denpasar is suffering from a sharp increase in the number of traffic accidents which have resulted from the rapid increase in its population.

The medical care system in this region however is still insufficient. The medical facilities, equipment, medical experts and medical care services in this region all remain at low levels. In addition, the region's emergency transportation and communications system is underdeveloped and the referral system to cover this wide area is not functioning smoothly. All these factors, plus the budgetary constraints on the central government, are making it very difficult to provide medical care services, based on a wide-area medical care system, to residents of this region.

Under such circumstances, the Government of Indonesia has recognized the importance of its efforts to establish a wide-area referral system indispensable for improving the emergency medical care services and the quality of medical care services provided by lower hospitals. It has requested that the Government of Japan cooperate with it in improving and expanding the existing emergency unit of the Sanglah Hospital, which, while currently classified as a Class B1 hospital, is in actuality serving as the region's largest and best medical institution and is therefore expected to function as a Class A hospital.

On the basis of the above-mentioned rationale for the Indonesian request of Japanese cooperation, the study team inspected other similar medical facilities in the region, collected and analyzed necessary data and information, and consulted representatives of the Indonesian organizations concerned with the proposed project. The contents of the

request confirmed by the Japanese and Indonesian sides are as outlined below.

2-6-2 Contents of the Request

The contents of the original Indonesian request and the additional matters pointed out by the Indonesian side during our on-the-spot survey can be summarized as follows.

① Name of the facility: The Emergency Medical Care Center of the Sanglah Hospital

② Organization that made the request: The Ministry of Health, Directorate General of Medical Affairs

③ Projet site: Denpasar, Bali Island (a part of the premises of the sanglah Hospital.
Plottage: approx. 6,000m^2)

④ Objectives: To meet the region's demand for emergency medical care through the improvement and expansion of the existion emergency unit of the Sanglah Hospital, and to provide medical care services suited to the region, as well as to promote the NHS through the improvement of the medical care service network in the region.

⑥ Facility Emergency unit (emergency medical care center) of the Sanglah Hospital

a. Building: 3-story building with a total floor space of approx. 2,760m^2)

b. Departments: Emergency Medicalcare, Radiology, Suzgery, Emergency Obstetrics/Gynecology, wards and administration

c. Equipment: equipment for emergency medical care and examination, and equipment for radio communications

⑥ Vehicles: 4 mobile ICUs (to be used in the Denpasar, Nusadoa, Kuta, and Sanur districts not as vans for transportation purposes only, but as urban-type ambulances furnished with primary emergency medical care equipment)

⑦ Support programs

The following additional proposals were made by the Indonesian side as measures to improve the education and training functions of the proposed facility.

a. Lecture rooms, training rooms, and annexes to support facilities attached to these rooms for the use of medical doctors and nurses engaged in medical care services on Bali and the other islands located to the South of it.

b. Boarding facilities for trainees from remote places.

c. Microbuses for use in transport of trainees.

d. Education and training equipment, including emergency resuscicating equipment and the audio-visual equipment necessary for conducting education and training programs based on the curriculum of the Indonesian Association of Emergency Medical Care.

⑧ Training

The Indonesian side requested that 3 ME technicians and a radiographer be sent to Japan for inservice training.

The facilities and equipment to be provided for this project under a grant-in-aid from the Japanese Government, which are mentioned in the "Minutes of Discussion" dated September 23, 1988 are as listed below.

a. Facilities:
(i) Rooms for primary emergency treatment
(ii) Rooms for emergency examination
(iii) Rooms for emergency surgery and obstetrics
(iv) Rooms for emergency hospital treatment
(v) Rooms for education on emergency medical care service
(vi) Others

b. Equipment: Equipment to be used for the following purposes

(i) Primary emergency treatment

(ii) Emergency examination

(iii) Emergency surgery and obstetrics

(iv) Emergency hospital treatment

(v) Other

CHAPTER 3 CONTENTS OF THE PROJECT

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3-1 Objectives of the Project

This project is aimed at realizing the following items by establishing an emergency medical care center as a part of Sanglah Hospital and thereby improving and expanding the functions of the existing emergency unit.

① To build a network for the wide-area emergency referral system centered around this hospital through the improvement of the top referral organization of the projected emergency medical care center.

② To make it possible to provide proper emergency medical care services through the above-mentioned network and to establish a wide-area emergency medical care system in the Tengarra region which consists of the provinces of Bali, West Tengarra, East Tengarra and East Timor, and which designated as an integrated medical service area under the nation's sea link system.

③ To reinforce the backup mechanism for the wide-area referral system by raising the technical level of the lower level medical facilities and medical care experts in the region through educational and training programs provided by the above-mentioned center, and at the same time to spread the concept, as well as relevant knowledge and techniques, of emergency medical care among the residents of the region.

④ To improve the quality of medical services for the general public and to reduce the death rate in emergency cases through ①, ② and ③ above with the aim of promoting the National Health System of Indonesia, thereby contributing to the socioeconomic development of Indonesia.

3-2 Examination of the Contents of the Request

The rationale, background, and details of the Indonesian request relating to this project were confirmed through the study team's consultations with representatives of the Indonesian authorities concerned. These consultation's were conducted in accordance with a written request from the Government of Indonesia. The study team inspected other similar medical facilities in the region, collected necessary data and information, analyzed all data and information obtained in Indonesia, and examined in detail the contents of this project and the facilities and equipment requested. Shown below are the results of the study team's examination of the details of this project.

3-2-1 Examination of the Contents of the Project

(1) Examination of the Objectives of the Project

The objectives of the project, as itemized in 3-1, can be broadly divided into two categories.

(i) To build a network for the wide-area emergency referral system centered around the projected emergency medical care center in the medical service area (the Tengarra region) the second of its kind after that of Java Island. This will contribute to the promotion of the Indonesian Government's national emergency medical care policy of establishing a wide-area emergency medical care system on a nationwide scale.

(ii) To provide the residents of the medical service area with proper emergency medical care services through the above- mentioned network, and at the same time, to improve and expand the facilities of the existing emergency unit of Sanglah Hospital in accordance with the objectives of the local government's emergency medical care policy -- that is, to contribute greatly to the enhancement of the medical care services in the region through the projected emergency medical care center.

These objectives are closely related to the basic goals -- "primary health care, "community residents' participation" and "improvement and expansion of the referral system" -- of the National Health System, which is the cornerstone of the Indonesian Government's health and medical care policy. Furthermore, the implementation of this project is quite realistic in light of the central government's health and medical care policy. It is also aimed at attaining the goals of "provision of proper and equal opportunities for receiving medical care services for the people" and "reduction in the death rate in emergency cases." Thus the objectives of this project are considered reasonable and advisable.

(2) Examination of the Level of the Project's Goals

As it is essential for the projected center to be performed the functions required of a top referral hospital so that objective (1) above can be achieved, it is necessary to ensure the technical level of the center's functions and the scale of its facilities to meet the following requirements.

① Functions

In light of the nature of Sanglah Hospital as mentioned below and the objectives of this project, which include the improvement and expansion of the functions of the existing emergency unit in the hospital, the projected center should be furnished with capabilities and a technical level equal to those of the RSCM Emergency Medical Care Center in Jakarta.

a. Sanglah Hospital is a key hospital under the direct control of the Ministry of Health.

b. It is also the educational hospital for Udayana University.

c. In actuality it has to serve as a Class A hospital as the region's top-level medical institution, although it is in fact classified as a Class B1 hospital.

Furthermore, it is imperative that the quality of the medical care services provided by lower level medical facilities in the region be improved to aid in establishing a wide-area emergency referral system.

This will help significantly in overcoming the unfavorable geographical conditions of the integrated medical care area which consists of four islands. It is very important, therefore, to organize and implement proper programs for education and in-service training in emergency medical care for the medical doctors, nurses, and other medical experts working at these medical facilities.

In comparison with those in Jakarta, the medical experts working in this region do not have easy access to higher level medical facilities for education and training. Furthermore, most of the lower level medical facilities in this region are very low in technical level. In light of these facts, the projected center should be equipped to provide proper educational and training programs for the medical experts working at Class C and Class D hospitals, as well as these working in health centers and subcenters.

② Facilities

As there are wide differences in terms of population density and demand for emergency medical care between Jakarta and Bali, this center is going to be constructed as a reduced version of the RSCM Emergency Medical Care Center. It should, however, be large enough to include all the facilities and medical equipment requested by the Indonesian side, as are needed to fulfill its functions as described in ① above.

On the other hand, it is desirable that the size of each room and the organization of the center should reflect the nature of the demand for emergency medical care, the social structure, and the climate and customs of this region. Consequently, this center need not be mere copy of the RSCM Emergency Medical Care Center.

(3) Examination of the Structure of the Project

This project is to be implemented under grant aid from the Japanese Government for the purpose of attaining the goals mentioned earlier, namely, establishing a new emergency medical care center in Sanglah Hospital as a major step towards to improving and expanding the services of the existing emergency unit of the hospital. Therefore, it is not

going to be implemented in tandem with a technical cooperation project.

As will be mentioned later, efforts are well under way by the Indonesian Side to Secure the budget and personnel necessary to establish the system for implementation of this project; to prepare the site for the building; to implement the work to be done by the Indonesian side; as well as to maintain, operate and manage the facilities constructed. Therefore, it seems there is nothing in the structure of this project that may hinder the its progress.

(4) Examination of the Contents and Scale of the Prospective Services of the Center

The contents and scale of the services the projected center will provide are as described below. They are considered reasonable in light of the above description.

① Emergency Medical Care Services

a. As a national medical institution, this center will be required to provide emergency medical care services for low-income people mainly in the fields of internal medicine, surgery, obstetrics/gynecology and pediatrics. It will also provide medical care services as a tertiary emergency medical care center, since Sanglah Hospital is designated as a top referral hospital covering the entire medical service area.

b. In view of the fact that the current state of the referral system in the region is such that medical care services are provided irrespective of whether they are primary, secondary or tertiary, this center will have to accept any patients that visit it or are taken to it.

c. As there are always heavy traffic jams in the central part of Bali, it will be difficult to quickly transport emergency patients to this center, so efficient emergency medical care should be given while patients are in transit by mobile ICU. The mobile ICUs should also be used for transportation of patients referred to other hospitals.

② Educational and Training Services

a. As it is essential to improve and expand the medical care facilities, and at the same time enhance the technical level of the medical staff responsible for emergency medical care in order to establish a wide-area emergency medical care system, the medical experts (doctors and nurses) working at lower level medical facilities in the region should also be educated and trained in emergency medical care.

b. For the purpose of improving the technical level of not only emergency but also basic medical care services provided by health centers and subcenters in remote places, qualified doctors and nurses of this center and Sanglah Hospital should make lecture and demonstration tours of these places to spread concepts, as well as the relevant knowledge and techniques, of emergency care to the residents of such places. They should employ the teaching materials used at the center. They should also engage in traveling medical care and educational services.

(5) Examination of the System for Implementing the Project

Because Sanglah Hospital, which shares the same location as the Center and Serves to back it up, is under the direct control of the Indonesian Ministry of Health. The implementation of this project will be directly controlled by the Medical Affairs General Bureau of the Ministry of Health as was mentioned in 2-3-4, Chapter 2. It has, therefore, been assured that careful considieration will be given to the execution of the budget and the arrangements regarding personnel for the Center. There should be no particular problems regarding these matters as they relate to the implementation of the project.

The organization on the Indonesian side which will be concerned with project implementation is shown in Fig. 4, Chapter 2, and in, Fig. 28, Chapter 5.

(6) Examination of Technical Level

① Technical Level of Medical Care Services to Be Provided

The emergency medical care services of this center will be provided under the "one-gate system." In this system, patients will be diagnosed and/or treated at the center by medical doctors of the clinical departments of Sanglah Hospital, serving in their assigned back up role and using the center's own facilities and equipment.

Accordingly, the technical level of the emergency medical care services provided by this center will be judged on the same level as the clinical departments of Sanglah Hospital.

The Sanglah Hospital is a general hospital with all necessary clinical departments except for neurosurgery. At the same time it serves as the educational hospital for the medical school of Udayana University. The hospital has achieved excellent results as the region's top-level medical institution.

As for the prospective medical staff for this center, they will have to receive extra-intensive training in emergency medical care since this center is expected to provide better--in terms of technical level--emergency medical care services than those provided by the existing emergency unit of the hospital. For this reason, it is desirable that the prospective medical staff (doctors and nurses) of this center be educated and trained at regularly intervals at the RSCM Emergency Medical Care Center, which is already is providing emergency medical care services of the highest level in the Jakarta metropolitan area as the top referral hospital there.

② Skills Levels of the Skills Required for Operating, Maintaining and Managing the Medical Equipment

None of the medical equipment requested by the Indonesian Government requires specific advanced skills. If models are selected which the residents will be able to operate satisfactorily after receiving training by specialists of the clinical departments of the hospital, they will have no problem operating them.

On the other hand, it is difficult to evaluate the levels of skill required for maintaining and managing the medical equipment since the models, types, and grades installed in the existing emergency unit of the hospital are either outdated or very basic.

models, types, and grades installed in the existing emergency unit of the hospital are either outdated or very basic.

As the medical equipment of this center will be used by the medical experts of the clinical departments of the hospital on a rotationed basis, and as medical equipment for emergency use is usually handled roughly, the Indonesian side has already established the following procedures for utilizing. These procedures are considered satisfactory.

a. Definition of responsibility in the case of a certain type of equipment being used by more than one clinical department.

b. Establishment of methods of maintenance and management of the equipment by the five engineers expected to work at the center, and by the organizations responsible for periodic inspections of the equipment.

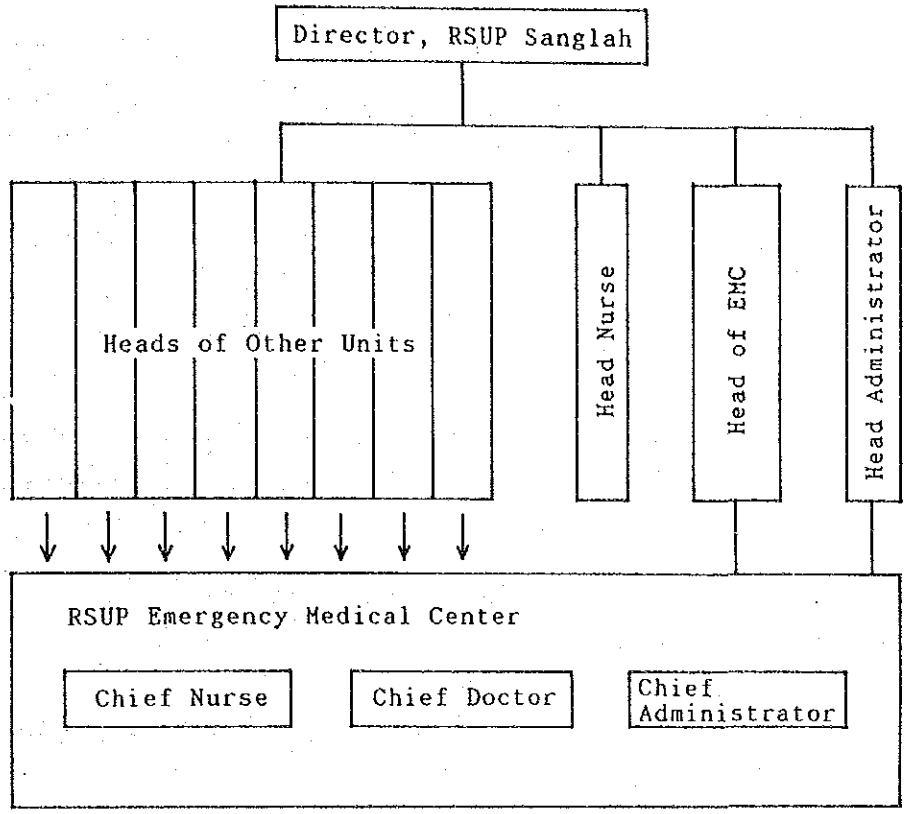
c. System for supply of spare parts and expendables.

(7) Examination of the System for Operating the Center

As this center is going to be established as part of Sanglah Hospital, the method for operating it will be an "independent operation type" and the method for managing it will be a "middle management type." In the case of the latter, the director of the center will be responsible for overall management of the hospital, while the heads of the clinical departments will be responsible for management of their respective departments.

This type of management system is called the "one-gate system." Such a management system is already employed at the RSCM Emergency Medical Care Center, and the Indonesian side is therefore quite familiar with this system. (see Fig. 7)

Fig.- 7 Operational Structure of the Center



Regarding the "middle management method," however, it is likely that clinical departments will make various demands not only in the area of operations but also in the area of management. Accordingly, it will be necessary to define clearly the director's powers and responsibilities for making decisions about important matters related to the operation and management of the center, while, at the same time, establishing procedures for adjusting clinical departments' demands.

In this context, it is desirable that a person with thorough knowledge of emergency medical care, and also competent in the area of hospital management, be appointed to the post of director of the center, although this is a matter to be examined and decided upon by the Indonesian side.

3-2-2 Examination of the Facilities and Equipment Requested

(1) Examination of the Facility Plan

The facilities which were examined by the Ministry of Health at the beginning are as outlined below.

Table 59 Outline of facilities initially proposed by Ministry of Health

Location	Sanglah Hospital
Site	About 6,000 m^2 (75 × 80 m)
Building composition	Departmental composition
Rooftop	Facilities and equipment
Third floor	Administration, wards, services
Second floor	Emergency obstetrics and gynecology, intensive care, operation
First floor	Emergency care, radiodiagnosis, central materials, management, services
Main facilities	Air conditioning equipment, emegency power generation equipment, fire alarm equipment, fire extinguisher, wireless equipment, telephone equipment
Outdoor facilities	Heliport, Parking zone
Others	Emergency educatior ant training (lectures, practices, accomodations etc.)

Based on the above outline, details of the facilities requested were examined closely with regards to the results of both the on-the-spot survey and the analysis doen in Japan, as well as taking into account the results of the examination mentioned in the previous section.

1) Outline of the Departments of the Projected Center and the Rooms Necessary for their Activities

The departments of the center requested by the Indonesian side are those required under the general concept of the emergency medical center in industrialized nations, except for the departments of emergency obstetrics/gynecology, education, and training in emergency medical care.

Inclusion of an emergency obstetrics/gynecology department in the organization of an emergency medical care center is unusual from the standpoint of emergency medical care as it is understood in industrialized nations. But the inclusion of such a department in the organization of the center was requested by the Indonesian side in view of the fact that there are so many cases of abnormal deliveries and premature birth due at least in part to insufficient education and guidance in health matters received by mothers and the frequent incidence of malnutrition among pregnant women. It is likely that this department will prove very useful. The facilities of this department should be separated from those of others because it accepts pregnant women only and it is necessary to protect these pregnant women against infectious diseases. In the Indonesian proposal, this department is located on the second floor separated from other wards. This arrangement will be good because it will isolate this department from other departments. If it is located on the second floor, far away from the entrance on the first floor, however, both the staff of the center, and the patients themselves will be inconvenienced in case of emergency. Thus, it is more desirable that this department be located on the first floor, and at the same time, still be separate from other departments.

As mentioned in the previous section, services of the department for education and training in emergency medical care are part of the basic services to be provided within the framework of this project. In order for this department to function effectively, it is desirable that it be set up within this center.

It is not necessary to build a lodging house for trainees on the premises of this center because the dormitory for students of the medical school of Udanaya University, which is situated near the site for this

center, will be able to accommodate trainees. For this reason, construction of a lodging house is not included in this project.

The results of the examination of the departments at the center and the rooms necessary for the activities of these departments are as shown below.

① Department of Emergency First Medical Examination

The emergency unit of the hospital conducts emergency medical examinations of patients suffering from both internal and surgical problems. The internal disease-related sections diagnose and treat patients suffering from diseases of the urinary and digestive organs and the surgical sections diagnose and treat patients suffering from orthopedic, ENT, and eye diseases.

The examinations room is responsible for clinical examinations related to emergency first medical examinations. Close and physiological examinations are carried out at Sanglah Hospital's main facility. It is desirable that these examination sections be located together in a single zone because they will be frequently required to conduct emergency examinations in close collaboration with clinical sections. They should be located around the emergency first medical examination rooms, not in isolation.

As is clear from the table below, the list of the rooms necessary for the activities of this department is characterized by shortages of basic rooms such as those for triage, resuscitation, and observation. The emergency first medical examination room needs to maintain close contact with the administration and emergency obstetrics/gynecology departments, however adequate consideration is not given to this by the Indonesian proposal.

An outline of the Indonesian proposal concerning the emergency first medical examination department and the results of the examination of the proposal are given in the table below.

Table 60 Study on rooms of first emergency treatment department

Design requested			Results of study	
Department	Rooms	Rooms disused	Rooms required	Remarks
First emergency treatment	Treatment room (Otorhinolary-ngology)		0	Use of partitions in rooms should be avoided for emergency measures as far as possible.
	Treatment room (Orthopedics)		0	
	Treatment room (Ophthalmology)		0	
	Examination room (1)		0	Should not be divided into two rooms
	Examination room (2)			
	Laboratory room		0	Used only for clinical laboratory
			Triage room	To classify patients carried for first emergency treatment
			Resasci-tation room	To perform the security of respiratory tract, resascitation of heart and transfusion
			Toilet for patients	For exclusive use of patients
			Washing room	To wash emergency patients when necessary
			Observa-tion room	To observe patients after treatment
	Corridor		0	

② Department of Radiology

Patients transported to the emergency first medical examination department will mostly be those suffering from traumatic injury or who are almost unconscious, and therefore require emergency medical examination. The Department of Radiology should therefore be equipped to conduct emergency examinations of these patients. As radiology requires equipment for the X-ray examination of injuries like bone fractures, and CT scanner (whole body) for the examination of internal organs and the brain, the department should be furnished with at least an X-ray room, a CT scanner room, an equipment operating room, and a dark room. In designing the equipment operating room in particular, it is necessary to pay careful attention to its layout so that the technician can operate and maintain the equipment efficiently.

The objective of radiology as part of emergency medical care is to conduct emergency radiological examinations to assist the emergency doctor in conducting efficient medical examination and treatment of patients. It need not be furnished with a consultation room or a waiting room.

The room wherein the equipment is operated should have space for an automatic film processor, an X-ray equipment/CT scanner operating table, and a microcomputer in addition to that used for operating the CT scanner and X-ray.

The administration department, the emergency first medical examination room, and the intensive care department should be connected with each other by passageways.

The facilities and equipment requested and the results of the examination of them are summarized in the table below.

Table 61 Study on rooms of radiology department

Design requested			Results of study	
Department	Rooms	Rooms disused	Rooms required	Remarks
Radiology	X-ray TV room		O	
	CT room		O	
	Locker room for patients	O		Patients cannot change their clothes by themselves
	Dark room		O	
	Examination room	O		This room is not used for consultation because the first medical examination room is provided for patients.
	Waiting room	O		
			Handling room	Indispensable
			Corridor	

③ Intensive Care Department

The Intensive Care Department is designed to conduct intensive control of the physiological functions of seriously injured patients who have just undergone treatment and/or surgery in the Surgery Department.

The rooms required for activities of this department should include an ICU, rooms for isolated patients, a nurse's station and a stockroom. Since the nurse's station will be closely related to management of the ICU and to the activities of the Emergency First Medical Examination Department, it should be located as near the emergency first medical examination room. It is also desirable that the ICU be located halfway between the emergency first medical examination room and the operating room in light of the natural flow of personnel.

In the Indonesian proposal, the recovery room is separated from the ICU, but these two facilities should be combined into one.

The recovery room is for observing how the patient is recovering. If the ICU is located adjacent to the operating room, it will be possible for the ICU to also serve as a recovery room. It will also help the staff of the nurse's station concentrate on their own jobs. It should be kept in

mind that an ICU in an emergency medical care facility is required to accommodate patients suffering from various diseases or external injuries in addition to emergency patients.

The number of beds in the ICU of an emergency medical care facility varies with the population covered by the facility and its regional conditions. It is said that the optimal number of beds per ICU is 6 to 10. If the number of beds in an ICU is smaller than the optimal number, it is likely that all the beds of the ICU will be occupied by patients suffering from external head injuries, cervical damage, and disorders of the internal organs. These are patients who need to stay in the ICU for a relatively long time, making it impossible to accommodate new emergency patients. On the other hand, If the number of beds in an ICU is larger than the optimal number, the flow of nurses and doctors will become too great, making it difficult to find space for the necessary equipment or to conduct observation at night. In this project, one in which the scale of each facility in each department should be minimal, the number of beds to be installed in the ICU should therefore be 6.

The rooms for isolated patients are designed to accommodate those suffering from infectious diseases or those who should be protected against infection. The department should be furnished with at least two single-bed rooms for isolated patients.

As the nurse's station will operate around the clock and nurses will work in three shifts, the nurse is station need not be equipped with a napping room. Although no machine room is required in the Indonesian proposal, this department should be equipped with at least one machine room.

The facilities should be provided with passageways to connect them to the Emergency First Medical Examination Department, the Radiology Department, the Operating Department, the Administration Department and the Service Department.

The Indonesian request concerning this department and the results of the examination of the request are summarized in the table below.

Table 62 Study on rooms of ICU department

Design requested		Results of study		
Department	Rooms	Rooms disused	Rooms required	Remarks
ICU	Recovery room (3 beds)	0	0	
	ICU room (3 beds)		0	
	Isolation room		0	
	Nurse station		0	
	Linen room		0	
			Equipment room	
	Corridor		0	

④ Operating Department

The Operating Department will be composed mainly of an operating room for emergency surgical operations and one for emergency internal operations. As it is expected that patients undergoing surgery in these operating rooms will include patients suffering from infectious diseases, it is necessary to divide the entire space for this department into a sterlile space and a semi-sterile space, as well as to separate the two operating rooms from each other. In the case of this center, therefore, the surgical operating room should be separated from the other operating room so that it may be used for performing operations on patients suffering from infectious diseases.

In addition to the above-mentioned facilities, the department should be equipped with a machine room for storing operating equipment, a recovery room, and an air-conditioning equipment room exclusive of the operating rooms.

The Indonesian request for the facilities of the Operating Department and the results of the examination of the request are summarized in the table below.

Table 63 Study on rooms of operation department

Design requested			Results of study	
Department	Rooms	Rooms disused	Rooms required	Remarks
Operation	Operation room (1)		0	
	Operation room (2)		0	
	Ante room		Locker room	Necessary for non-surgical operation
			Air conditioning machine room	Exclusive use for operation

⑤ Central Sterilizing Supply Department

The Central Sterilizing Supply Department will be responsible for sterilization of the medical equipment used in the Operating Department, the Intensive Care Department and the Emergency First Medical Examination Departments. This department will be composed mainly of a room for unsterilized equipment and materials and one for sterilized equipment and materials. The room for unsterilized equipment and materials will be used for sorting cleaning, and assembling used equipment and materials. These equipment and materials will then be stored in the room for sterilized equipment and materials.

The Indonesian request for the facilities of this department and the results of the examination of the request are summarized in the table below.

In the Indonesian proposal, the central equipment and materials room is separated from the cleaning room. It is desirable that the two rooms be located together in a single zone to maximize efficiency. Also, it is necessary to secure space for storing the sterilized equipment and materials.

The passageways attached to the facilities of this department must connect this department to the Operating Department, the intensive care

room, and to the emergency first medical examination room, all of which use equipment and materials requiring sterilization.

Table 64 Study on rooms of central sterilizing supply department

Design requested		Results of study		
Department	Rooms	Rooms disused	Rooms required	Remarks
Central sterilizing supply	Central sterilizing supply room		0	Assortment, cleaning, assembling, and sterilized equipment store etc.
	Washing room		0	
			Corridor	

⑥ Emergency Obstetrics/Gynecology Department

The Emergency Obstetrics/Gynecology Department will accept pregnant women who are in danger of abnormal delivery which requires emergency medical examination and treatment. The Obstetrics/Gynecology Department of the hospital is responsible for education and guidance concerned with the health of mothers and babies, diagnosis and treatment of general female disorders, and handling normal deliveries.

Accordingly, the scale of the facilities for this department, including a labor room, a delivery room, and sickrooms, should be minimal. Caesarean section and other similar operations should be performed in the delivery room. Operations which require more advanced techniques should be performed in the Operating Department.

In the Indonesian proposal, the facilities of this department are located on the second floor, isolated from other wards. This is a good idea, but this arrangement would require the addition of a sterilizing room and a toilet for the exclusive use of this department's staff. It is desirable that these additional facilities be shared with other departments to minimize the time and labor required for their maintenance and management. This problem can be resolved by locating the facilities of this department on the first floor, in a place isolated from other departments.

The number of sickbeds was calculated on the basis of the total number of operations (serious injuries) performed in the Obstetrics/ Gynecology Department of the existing emergency unit of the hospital (1,506), namely:

Required number of beds

= annual number of operation x raate of hospitalization (50%) - 365 (days) x period of hospitalization (4 - 5days) x rate of sikbed utilization (100%)

= 1,506 x 0.5 ÷ 655 x 4 ÷ 1

= 8

These facilities require a passage leading directly to the facilities of the Operating Department.

The Indonesian request for the facilities of this department and the results of the examination of the request are summarized in the table below.

Table 65 Study on rooms of department of emergency obstetrics and gynecology

Design requested		Results of study		
Department	Rooms	Rooms disused	Rooms required	Remarks
Emergency obstetrics and gynecology	Labor room		0	
	Delivery room		0	
	Newborn baby room		0	
	Ward (8 beds)		0	
	Toilet and shower room		0	for patients
	Toilet for staff	0		
	Sterilizing	0		
	Nurse station		0	Indispensable
	Physician room	0		
	Equipment room		0	
	Corridor		0	
			Sanitary room	Indispensable

⑦ Ward Department

The Ward Department will be composed of two types of wards-- wards for patients suffering from internal disease sent from the Operating Department and the ICUs, and wards for those patients suffering from surgical illness who are sent directly from the emergency first medical examination room.

The period of hospitalization will be 4 to 5 days for each ward. The ratio between the number of beds for patients suffering from internal diseases and that for patients suffering from surgical illness will be approximately 1:2.

As the wards of the Emergency First Medical Examination Department, in particular, will require special measures for patients suffering from infectious diseases and then separation from other recovering, it is desirable to prepare some single-bed sickrooms.

The number of beds for these facilities was calculated on the basis of the annual number of operations 5,928 (excluding that of operations on patients suffering from female diseases) as was done in the case of the Emergency Obstetrics/Gynecology Department,

$$\text{Required number of beds} = 5{,}928 \times 0.5 \div 365 \times 4.5 \div 1 = 36$$

In the Indonesian proposal, the number of beds ranged from 2 to 6, this plan was changed so that each room has 4 beds.

As for the nursing unit, the combined total number of beds of wards for patients suffering from internal diseases and those for patients suffering from surgical illness should constitute a nursing unit.

The Indonesian proposal for this department and the results of the examination of the request are summarized in the table below.

Table 66 · Study on rooms of ward department

Design requested			Results of study	
Department	Rooms	Rooms disused	Rooms required	Remarks
Ward	6-bed room (1 room)	0		Utility rate : low
	3-bed room (6 rooms)	0		
	2-bed room (7 rooms)	0		
	(Total 38 beds)		4-bed room (8 rooms)	
			1-bed room (4 rooms)	
			Total 36 beds	
	Nurse station		0	
	Linen room		0	
	Toilet and shower room for patients		0	
	Meeting room		0	
	Toilet for visitors		0	
	Ward corridor		0	
			Sanitary room	Indispensable
			Equip-ment room	Indispensable
			Corridor for staff	The corridor for staff should be separated from that for patients
			Treat-ment room	Indispensable

⑧ Administration Department

This department will consist of rooms for administration (reception, communications, and case history storage rooms; rooms for procedures involved with hospitalization and discharge, pharmacy, accounting, and so on).

Regarding the conference room included in the Indonesian proposal, the lecture room of the Education and Training Department can substitute for this. As for rooms for medical administration, it is necessary to establish a medical office, a case history storeroom, a night watchman's room and so on. The larger the number of residents on night duty, the better the medical services provided at night will be at the center. Judging from the projected scale of this center, four will suffice for both the Emergency First Medical Examination and Ward Departments.

The Indonesian proposal for this department and the results of the examination of the request are summarized in the table below.

Table 67 Study on rooms of administration department

Design requested			Results of study	
Department	Rooms	Rooms disused	Rooms required	Remarks
Administration	Superintendent		0	
	Conference room	0		Lecture rooms serve for the conference room
	Office		0	Including wireless and telephone rooms
	Dispensary		0	
			Night-duty room for physicians (4 rooms)	Resident physicians on duty of 24 hours (two persons/room total: 8 persons)
			Toilet & shower room	For night duty
			Patients record room	Indispensable for storage of patients' record
			Medical office	
			Staff room	
			ME room	Repair of medical equipment
			Equipment room	Common use for each department
			Toilet for staff	
			Guard house	
			Store room	
			Corridor	

◎ Service Department

The facilities of this department will include equipment for receiving electric power (including a transformer), an emergency independent power generator, air-conditioning equipment for use in the operating room,

gas equipment for medical use, a mortuary, and a cafeteria the for exclusive use of doctors and residents. Meals for inpatients will be prepared in the kitchen of the hospital. The center's kitchen will be used only as a service room.

This center requires no pathology room because pathelogy examination will be conducted in the hospital's facilities.

The Indonesian proposal for facilities of this department and the results of the examination of the request are summarized in the table below.

Table 68 Study on rooms of service department

Design requested		Results of study		
Department	Rooms	Rooms disused	Rooms required	Remarks
Service	Dissecting room	0		The autopsy is not performed in this center
	Preparation room	0		
	Mortuary		0	Need
	Air condition-ing machine room		0	Exclusive use for operation
	Kitchen		0	
	Dining hall		0	
	Electrical room		0	
			Power generator room	
			Medical gas room	
			Pantry	
			Corridor	

⑩ Department of Education and Training on Emergency Medical Care

This department will be responsible for organizing and implementing education and training programs on emergency medical care for classes of 20 to 30 students. The main facilities of this department include a lecture room, a training room, and an equipment and materials storeroom. The lecture room will be used mainly for basic education on emergency medical care, while the training room will be utilized mainly for training using an anatomical model, emergency resuscitating equipment, and so on. Since in emergency medical care education, basic education and clinical training are closely related to each other. Consequently, a large room should be divided into the lecture room and training rooms, with a mobile partition between them. When the mobile partition is removed, the entire room will serve as a small-scale auditorium. This room should also be used as a place for the presentation of new information in the field of emergency medical care. All the furniture and fittings to be installed in the lecture and training rooms should be movable.

No lodging facility is included in the facilities of this department in light of the order of priority for the rooms required by the center.

The Indonesian proposal concerning the facilities of this department and the results of the examination of the request are summarized in the table below.

Table 69 Study on rooms of department of education and training in emergency medical care

Design requested		Results of study		
Department	Rooms	Rooms disused	Rooms required	Remarks
Education and training in emergency medical care	Lecture room		0	Common use for the conference room of administration apartment
	Training room		0	
	Training equipment room		0	
	Accomodations for men	0		
	Accomodations for women	0		
			Corridor	

⑪ Common Facilities

The common facilities include rooms for common use, an entrance hall, staircases, toilets and passageways.

In the Indonesian proposal, this center is designed as a 3-story building, and therefore it needs to be equipped with elevators for any activities requiring movement between floors. Judging from the scale of the project site and the facilities of this center, a 2-story building would suffice for the center, and ramps, instead of elevators, will be installed within the building. This arrangement will be advantageous in terms of the cost of maintenance and will also prove helpful in transporting patients and equipment in an emergency.

The Indonesian proposal regarding the common facilities and the results of our examination of the request are summarized in the table below.

Table 70 Study on rooms for common use of department

Design requested		Results of study		
Department	Rooms	Rooms disused	Rooms required	Remarks
Dommon use	Entrance hall		0	
	Elevator hall (First floor - Third floor)	0		
	Meeting rooms for both emergency obstitrics & gynecology		0	
	Toilet for visitors		0	
	Stair and corridor etc.		0	

In a building with a relatively small number of staircases and a limited number of people to move on each floor, the presence of elevators is not desirable in terms of handling the paths of personnal and patient flow. Furthermore, overreliance on elevators for transportation of

patients and equipment can bring about many inconveniences when the power supply breaks down or when an elevator becomes out of order. For these reasons, ramps should be installed in the building instead of elevators.

2) Grouping of the Departments of the Center

The departments of the center will divided into the following groups from the standpoint of the flow of operations and functions of each department.

① Emergency First Medical Examination-Radiology-Intensive Care-Operation-Central Equipment and Materials
② Emergency Obstetrics/Gynecology
③ Ward
④ Administration - Service
⑤ Education and Training on Emergency Medical Care

The departments belonging to Group 1 should be located on the first floor since emergency medical care is the primary consideration in this project and the activities of all these departments are closely related to each other. In other words, it is necessary to reduce the paths of flow as much as possible for these departments. The other departments which should be located on the first floor are the Emergency Obstetrics/Gynecology Department (Group 2) and the Administration and Service Departments (Group 4). All the other departments should be located on the second floor as they are not required for providing emergency services, and since they require a quiet working environment.

A comparison of the Indonesian proposal which the Ministry of Health examined of the beginning and the study teams counterproposal as a result of the examination of the request from the above-mentioned standpoint concerning the location of each of the departments and the number of stories of this building is shown in the table below.

Table 71 Results of study on design requested

Design requested		Results of study
Third floor	Administration, ward, service	
Second floor	Emergency obstetrics & gynecology, ICU, operation	Ward, Education and training of emergency
First floor	First examination of emergency, radiodiagnosis, central sterilizing supply, administration, service	First examination of emergency, radiodiagnosis, ICU, operation, central sterilizing supply, emergency obstetrics & gynecology, administration, service

3) Main Facilities

In the Indonesian proposal, the air-conditioning equipment is designed to handle cover the entire building. It is desirable, however, that each room of this building also be designed to allow natural ventilation in consideration of maintenance cost reductions and the possible breakdown of the air-conditioning equipment. To this end, the external walls of the passageways must have openings. In the Indonesian proposal, only fire alarms and fire extinguishers are indicated as fire prevention equipment. As this center is designed as a medical facility where patients suffering from serious illnesses will be hospitalized, the installation of indoor hydrants is one of the minimum requirements.

4) Outdoor Facilities

Of the outdoor facilities proposed by the Indonesian side, the heliport should be excluded from this project.

(2) Examination of Medical Equipment Plan

As for the contents of the request, the rationale for , the details and order of priority for the equipment requested were discussed by the study team and representatives (managers and section chiefs) of the Ministry of Health and other Indonesian authorities concerned while the study team stayed in Indonesia.

After their return to Japan, the study team conducted a final examination of the contents of the request from the following standpoints.

i) Basic Policy

Details of the facilities and equipment requested were examined on the basis of the contents of the written request submitted by the Ministry of Health and the Sanglah Hospital of the Republic of Indonesia. Emphasis was placed on the technical level required of a tertiary emergency medical center of a top referral hospital in a region comprising four provinces, including the province of Bali (Bali Island).

The results of the above-mentioned survey of the present situation for medical care in the region revealed that the emergency unit of Sanglah Hospital is the most important for its activies in the area of medical care for patients suffering from serious diseases, when compared to all the other facilities of the hospital. The emergency unit should be responsible for primary care, which would requires high technical ability. Accordingly, the degree of necessity as well as frequency of use are the most important considerations in selecting the equipment to be installed in the emergency unit.

As for the equipments for use in emergency medical care, those which fall under categories ①, ② and ③ given below in descending order are important to emergency care and those which fall under category ④ should be excluded from this project.

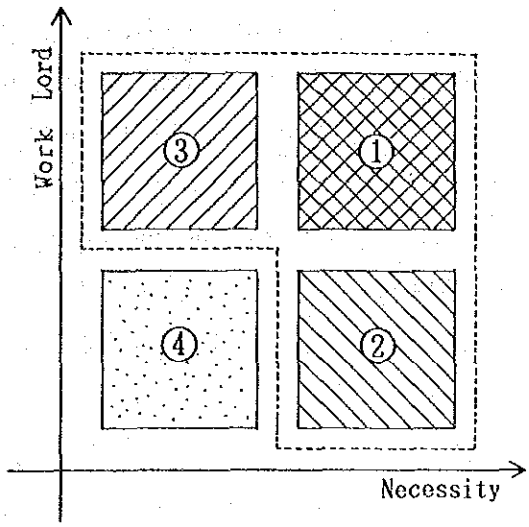
① High in both degree of emergency use and workload: manually operated equipment, incubator

② High in degree of emergency care: defibrillator, patient monitors, resuscicating equipment

③ High in workload: autoclaves, automatic developing equipment

④ Low in both degree of emergency care and workload: after loading, electron microscope

Fig.- 8 Degree of Necessity of Medical Equipment



As the medical staff of the emergency unit are required to respond quickly to the medical needs of patients suffering from the most difficult diseases and injuries, the activities to be carried out at the emergency unit will be most effective educationally by providing practical on-the-spot experiences. As Sanglah Hospital is serving also as an educational hospital, it is necessary to introduce medical equipment which can also be used for educational and training purposes at the emergency unit.

As the hospital is required to accept patients referred to it from other hospitals and also patients brought in after consultation hours, it is necessary to procure equipment necessary for diagnosing problems and treating such patients.

On the other hand, it is essential to select equipment of high serviceability in light of the present situation of medical care services provided by Sanglah Hospital as mentioned previously in 2-3 and the current state of the equipment installed at the RSCM Emergency Medical Care Center under grant aid from Japan. For these reasons, we checked the following aspects of the system for managing and operating the emergency unit with the Ministry of Health and Sanglah Hospital.

① Medical staff who have considerable experience using the equipment to be procured in this project are readily available.

② The way to maintain and operate the above-mentioned equipment (including the budget for maintenance and management of the equipment, employment of ME technicians, enforceability of the maintenance contract, and selection of manufacturers who have distributors in Indonesia), is already established.

Thus, the primary considerations in examining the equipment to be procured for this project can be summarized as follows.

① Equipment which is indispensable for carrying out emergency medical care and reducing the burden imposed on both the medical staff and patients

② Equipment consistent with the level and functions of the hospital relative to current public demand for emergency medical care

③ Equipment which can be utilized without causing substantial changes in the present system for maintaining, managing and operating the equipment.

ii) Condition of the Facilities

All pieces of equipment to be procured by this project will be installed in the new facilities to be constructed by the project, So there will be no problems in installing them. In principle, the Indonesian side has no obligation to share the cost of the equipment.

Judging from the contents of the Indonesian request, the work for installing part of the equipment, such as X-ray equipment and operating equipment, will be included in this project

iii) New Equipment's Consistency with Existing Equipment

As mentioned earlier in 2-4-4, equipments and instruments installed at the existing emergency unit have exposed to rough use for a long time and are now nearing the end of their service lives. Only some X-ray machines, some operating equipments, the portable electrocardiograph, the resuscicating equipment and the defibrillator remain in good shape.

However, the majority of the basic devices and instruments, except for the CT scanner unit, are installed in the hospital's main facilities.

The medical staff's experience using them can prove useful in operating the new equipment that will be procured under this project. In addition, as the hospital's main facilities and its emergency unit are not only essentially different from each other in terms of functions, but also in terms of operating system, working hours and location, the new emergency center requires equipment for its exclusive use.

The major equipment requested will be examined in the following department-by department basis and from the standpoint of the above-mentioned basic policy.

1) Pharmacy and Examination Department

As is exemplified by the RSCM Emergency Medical Care Center, basic examinations to be carried out at the emergency unit are examinations of blood gas, electrolyte, blood cells and urine. The equipment necessary for these examinations includes such auxiliary devices as a constant temperature tank and a low temperature refrigerator. These are all basic devices. The staff of the hospital's central examination room have experience in using the hemoglobin meter, the spectrophotometer, the electrophoresis equipment and so on.

Required equipment: Hemoglobin meter, defferential leucocyte counter, spectrophotometer, PH meter, multiple-function haematology analyzer counter, blood gas analyzer, eletrolyte analyzer, urine analyzer, etc.

2) Examination Rooms

Equipments and instruments to be installed in these rooms include basic equipments for diagnosing problems of patients suffering from circulatory, digestive and respiratory nature and who account for approximately 40 percent of the total number of emergency patients. Other equipment includes that for use in minor treatments and operations. Eletrocardiographs and endoscopes that assure reliable diagnosis, are basic equipments and indispensable for these rooms.

Required equipment: Equipment for use in diagnosis and treatment, equipment for use in physiological examination (diagnosis equipments, small operating instrument set, eletro-

cardiograph, electroencephalograph. gastrointestinal fiberscope, bronchofiberscope, etc.)

3) Resuscitating Room

The lifesaving equipment to be installed in this room includes that for preseving airway and artificial respiration, equipment for resuscitating the heart and equipment for transfusions. preseving airway is the first step taken for resuscitation. The equipment for preseving airway consists of an oral ventilation tube, a nose and throat ventilation tube and so on. Aspirators and catheters of various types are also indispensable for the medical care services provided in this room. The defibrillator is indispensable in treating arrhythmia and heart failure. For patients suffering from blood loss, the I.V. catheters to be used with IV drips as well as injections and transfusion and IV drip equipment will be used in close collaboration with the Red Cross blood bank within the hospital.

Required equipment: Emergency resuscitating equipment (resuscitator, defibrillator, various types of catheters, ventilators, oxygen masks, infusion equipments, syringe, etc.)

4) Ophthalmology Department

The equipment to be installed in the facilities of this department includes treatment equipment, a medical examination table, necessary equipment for emergency operations, and a microscope for use in operations. In addition, this department will require, a projection perimeter, an retinal camera unit, etc.

Required equipment: Equipment for diagnosis and the treatment of emergency outpatients (treatment equipment, projection perimeter, retinal camera unit, eye surgery instrument set,operating microscope, etc.)

5) ENT Department

The basic equipment necessary to this department includes a treatment unit, a nebulizer, and an aspirator. In addition, this department will require a microscope for use in operations, a tracheotomy set, an Ono-Jackson endoscopic instrument set, laryngeal instrument set for microsurgery and an operating equipment.

Required equipment: Equipment for use in diagnosis and the treatment of emergency outpatients (ENT treatment unit, nebulizer, operating microscope, Ono-Jackson endoscopic instrument set, and laryngeal instrument set for microsurgery, etc.)

6) Orthopedics

This department requires equipment for use in minor operations before full-scale operations and treatments with plaster casts for the most frequently seen problem of bone fractures.

Required equipment: Equipment for use in diagnosis and the treatment of emergency patients (examination couch, plaster bandage table, gypsum cutter, plaster spreader, etc.)

7) Obstetrics/Gynecology (Consultation Room)

Most of the patients examined and treated at this department, account for a little over one-fourth of the total number of surgical outpatients, and are taken to this department for delivery. Most of them are taken to this hospital for their first childbirth, and moreover they are usually in the last month of pregnancy, without having received any medical examinations until this point. Therefore, the most important equipment to be installed in this department should be basic equipment for determining the position and condition of the fetus and examining the mother's condition.

Required equipment: Equipment for examination and treatment of pregnant women (ultrasonic diagnosis equipment, fetal monitor, treatment unit, gynecology examination table, etc.)

8) Radiology

Few of the patients taken to the emergency unit are able to walk on their own or are conscious. In the case of a seriously injured patient, in particular, an attempt to change his or her position for taking X-ray photographs might cause his or her condition to take a turn for the worse. Meanwhile, it should be noted that installing too many types of equipment in this department would be wasteful in terms of both the space arrangement and disadvantageous in terms of cost. Accordingly, is requred to install such multipurpose equipments as a general purpose X-ray system, a mobile X-ray unit and a whole-body CT scanner unit. These three types of equipment can cover most cases of both surgical and internal diseases. Equipment and materials to protect the radiographer and the patient against radioactivity will also be necessary. Dated earlier in 2-4-1, the Radiology Department of Sanglah Hospital has considerable experience in using the above-mentioned types of equipment, except for the CT scanner. As it is obvious from the results of the survey conducted during the project for the construction of the RSCM Emergency Medical Care Center (see 2-5-1), the life of a CT scanner unit is greatly affected by the system for maintaining it. In Indonesia there are no problems with radiographers' experience in using the CT scanner unit, after-sales services by the distributors of the CT scanner manufacturers or the technical level of radiographers. However, if the system for controlling the temperature and humidity within the room where a CT scanner unit is installed and the ability of the person responsible for the control of the equipment is insufficient, as in the case of the RSCM Emergency Medical Care Center, it will be very difficult to make full use of the equipment. If, on the other hand, a CT scanner is installed and used giving due consideration to the above- mentioned points, the equipment will prove very helpful to both the medical staff and patients.

To be more specific, careful attention should be given to the necessity of installing a dehumidifier exclusivly for the CT scanner and to defining the responsibilities of the person to be in charge of control and maintenance of the unit. As regards the enforcement of the maintenance contract, the center has already decided on an increase in the budget for maintenance of the unit (see "Maintenance and Management Plan" in Chapter 6), and intends to conclude an annual maintenance contract with

the manufacturer of the unit or its local agents. There is no difference in the technical level between a head CT scanner unit and a whole-body CT scanner.

As for the selection of a whole-body CT scanner, it should be noted that, of the total number of operations on serious emergency cases of 1,053 in 1987, (See Table 46), 178 were surgical operations. This means that a whole-body CT scanner will be a great help in diagnosing these serious emergency cases. The CT scanner unit is very effective in examining in the brain stem area. At the new emergency unit, a CT scanner unit will be indispensable in examinig the chest and the abdomen. At present, cerebral surgical operations are not performed very often at the existing emergency center due to the shortage of personnel. But, it is expected that a Nero Surgery Department will be added to the emergency unit in 1990 or sometime after. When a new Nero Surgery Department is established within the emergency unit, a whole body CT scanner will certainly be used for examination in the brain stem area and there will be a substantial increase in the number of nerosurgical operations performed at the emergency center.

Ultrasound scanner is a indespensable equipment, that can be used without causing any pain or trauma to the patients.

Required equipment: Radiological equipment (general purpose X-ray system for general use, mobile X-ray unit, whole-body CT scanner, ultrasound scanner, etc.)

9) Dark room

The procedure for developing films of X-ray photographs must be quick, first of all. Therefore, it is necessary to procure an automatic film processor. But it is also necessary to procure a manual processing equipment so that the department can cope effectively with any breakdown of the automatic film processor. A manual equipment will also be necessary for special developing work.

Required equipment: X-ray film developing equipment (automatic film processor and manual processing equipment)

10) Central Sterilizing Supply Department

Facilities to be installed in this room include a pressurized sterilizing equipment capable of with standing saturation under a high-temperature, high-pressure or high-vapor environment, an ultrasonic cleaner for removing chemicals, blood and other substances attached to apparatuses, and an ethylene oxide gas sterilizer for sterilizing dry objects (injectors and rubber products) that cannot stand high temperatures. This room will also require equipments for use in assembling and storing sterilizing equipments, such as a work table and a closet. Linens and beds will be be washed and sterilized at the hospital's main facilities.

Required equipment: Sterilizing equipment (small steam sterilizer, ultrasonic cleaner, ethylene oxide gas sterilizer, working table, instrument cabinet, etc.)

11) Operating Rooms

An universal operating table for use in chest, abdominal, and urological operations will be installed in Operating Room No. 1 and an universal operating table to be compatible with even an orthopedics/ surgical X-ray unit in Operating Room No. 2 as main equipment. Other equipments and fittings include operating room light, anesthesia apparatus, electric suction unit, operating instrument set, orthopedic operating instrument set, electrocardiograph monitors (for monitoring electrocardiograms of patients undergoing operations), and suture sets. Also, a defibrillator is indispensable as a equipment in coping with patients' heart failures during operations.

The Indonesian side requested an video camera for monitoring operations mounted on operating light for use in educational and training programs. But this equipment is very difficult to maintain and operate and is therefore used only at university hospitals that have highly advanced functions even in Japan. Consequently, this equipment is not expected to contribute directly to the welfare of patients. In addition, it is rather expensive. In light of these factors, this equipment is not required by this project.

Required equipment: Operating equipment/apparatuses and equipment for monitoring the condition of patients undergoing (universal operating table, surgical X-ray unit, operating room light, anesthesia apparatus, electric suction unit, operating instruments set, electrocardiograph monitor)

12) Intensive Care Units

Equipment for providing complete rest for patients who have just undergone an operation, equipment for monitoring patients' physiological conditions and high-low stretchers will be installed in this room.

These units will require equipment for intensive care and maintenance for physiological monitoring of high-risk patients such as patients who have just undergone a large-scale operation and patients suffering from serious internal diseases.

Required equipment: Equipment for recovery of patients who have just undergone an operation, intensive care equipment for patients who are seriously ill or injured, and equipment for monitoring patients, such as a 2-crank gadge bed, IV hanger, examination lamps, high-low stretcher, ICU beds, equipment for monitoring patients who are seriously ill or injured, ventilator, defibrillator, electric suction unit, etc.)

13) Nurse Station (Maternity)

Designed to serve as a nurse station to manage the Obstetrics/Gynecology Department's ward, treatment room, labor room, delivery room and nursery room, this nurse station will be furnished with nursing equipment and equipment for treating pregnant women, mothers immediately after childbirth, and newborn babies. Carts to be used when doctors do their rounds will also be required.

Required equipment: Equipment for treating pregnant women and women after delivery, and newborn babies, in addition to nursing equipment, such as treatment equipment, film illuminator, medicine cupboard, ice maker, emergency

cart, dressing cart, suction unit, nursing bottle warmer, laryngoscope for pediatric, etc.

14) Labor Room

The equipment to be installed in this room will include equipment for giving transfusions to women in labour. This room will share the equipment to be installed in the delivery room for fetal monitor.

Required equipment: Labor equipment, including labor bed, irrigator stand, infusion pump

15) Delivery Room

This room will be equipped for performing Caesarean sections in addition to the handling of a normal deliveries.

Required equipment: Equipment for handling deliveries and performing Caesarean sections (delivery bed, vacuum extractor, infant warmer, Caesarean section set, fetal monitor, etc.)

16) Nursery Room

Whether or not a newborns' room is furnished with equipment for treating premature babies is directly related to the question of their survival. Therefore, this room will be furnished with two types of incubators, phototherapy unit for curing jaundice, CPAP equipment for assisting in breathing, resuscitating equipment, and infusion equipment. In 1987, the death rate for newborns at Sanglah Hospital was 2.54 percent, or 99 newborn deaths for the annual total number of 3,595 deliveries (see Table 35). This data implies that there may have been several times as many premature babies. The new equipment will prove very helpful in treating premature babies.

Required equipment: Equipment for treating premature babies, resuscitation equipment, equipment for monitoring neonatal (incubator, phototherapy unit, infusion pump, equipment for assisting in breathing, a resuscitating bag, phlebotomy instrument exchange transfusion, infant

respirator, neonatal monitor, etc.)

17) Obstetrics/Gynecology Ward

This department will require emergency resuscitating equipment for coping with emergency cases, in addition to an oxygen inhaler, an ultrasonic nebulizer and beds.

Required equipment: Emergency resuscitating equipment and treatment equipment (oxygen inhaler, a portable resuscitator, an ultrasonic nebulizer, an electric suction unit, a standard patient bed with mattress, wheelchair, etc.)

18) Nurse Station

This is a nurse station to cover the high care units (HCUs) and the intermediate ward (IMW) to be located on the second floor (Internal Ward and Surgical Ward) and will be furnished with equipment necessary for its nursing activities with a view toward functioning as a station for controling other wards.

Required equipment: Equipment for consulting, treating and nursing (consultation apparatus, desktop sphygmomanometer, medicine cupboard, washing basin stand, ice maker, infusion pump, etc.)

19) Emergency Wards (HCU and IMW)

These facilities to be located on the second floor (Internal Ward and Surgical Ward) will require treatment equipment.

Required equipment: Treatment equipment for use in wards (standard patient bed with mattress, bedside cabinet, irrigator stand, oxygen inhaler, portable resuscitator, ultrasonic nebulizer, wheelchair, etc.)

20) Emergency Radio Communications

In this project, radio communications will be maintained around the clock between the emergency medical care center of Sanglah Hospital to

function as the central emergency medical care institution in the Badoung region where, in 1987, 60 percent of the referral patients accounted for 80 percent of the total number of patients. Ambulances were regularly based near the police stations of Sanur, Nusadow and Kuta and contacted by tranceiver. Compared with the present radio communications through an commercial radio communications network, this system of radio communications will be far more efficient and effective. The repeater is planned to be installed at Sanglah Hospital. There will be no problem involved in installing and using the new system.

Required equipment: Radio communications equipment (base station, transceiver, repeater station)

21) Mobile ICUs

A total of four ambulances based near Sanur, Nusadoa and Kut police station will maintain close radio communications with the emergency medical care center of Sanglah Hospital so that these ambulances may provide prompt primary emergency medical care and transportation services. It is expected that 60 to 80 percent of the total number of 31,386 patients and the 8,635 referral patients (both figures are for 1987) will benefit from the introduction of this system.

Required equipment: ambulances (4)

22) Lecture Room

In order to improve the competency level of the personnel engaged in emergency medical care Sanglah Hospital is providing clinical training programs in clinical emergency medical care. Furthermore, the hospital is required to provide other programs for education and training in theory and practice in emergency medical care and resuscitation. It is a basic function of this center's operations to provide basic medical training for the medical experts and residents working at Class C and Class D hospitals and health centers.

For these reasons, this room will be equipped with an overhead projector, a slide projector, a screen and a video camera which will be used for tape-recording scenes of lectures on treatment and surgical operations. A TV monitor will be used later by trainees to study and

examine recorded tapes. These equipments are expected to greatly contribute to improving the educational level of the medical specialists working at Class C and Class D hospitals and health centers who have had few opportunities to receive education and training in their fields, as well as trainee medical students and paramedical students. When the abovementioned equipment is introduced, medical doctors and laboratory technicians to manage these educational and training programs will be selected based on the personnel allocation plan for this center.

Required equipment: Equipment for use in educational and training programs (OHP/screen, slide projector, video camera, TV monitor)

23) Training Room

In this room trainees mentioned above will be given in skill practice in emergency medical care using an anatomical model (phantom), emergency resuscitation equipment and so on. The primary objective of the training programs to be implemented in this room is to help trainees master the science of resuscitation in relation to primary emergency medical care. A TV monitor will be installed in this room to enhance the effectiveness of the training in these programs.

As is the case with the Training and Lecture Room, the equipment and devices to be installed in this room are expected to contribute to the aquisition of practical medical knowledge in indispensable emergency medical care and techniques and also to bring about considerable educational value to the part of trainees. However, with regards to the administration and operation of equipment, it is also essential to appoint a manager to manage this room and the educational and training programs to be implemented in this room. Since the equipment and devices to be installed in this room will be equivalent in quality and performance to those actually used at emergency medical care centers, they can be used for actual emergency medical care in the event a large-scale disaster occurs in the region.

Required equipment: Equipment and devices for use in training programs (TV monitor, anatomical model (phantom), resuscitator, ventilator, bandages, equipment for training in handling of plaster casts, laryngoscope

set, incubator, etc.)

The Indonesian side requested two microbuses as auxiliary equipment for use in training. But ordinary small buses can be used for this purpose and can be procured in Indonesia. Therefore, the two microbuses are excluded from this project.

3-3 Contents of the Project

3-3-1 Implementation of the Project

The Directorate General of Medical Care of the Ministry of Health of the Republic of Indonesia will be responsible for the formulation and implementation of this project. The Directorate of Hospital Affairs of the Directorate General of Medical Care will be responsible for managing this project (see Fig. 4). As the site for this project is located in the Province of Bali, it will be necessary to follow procedures for adjustment and coordination on legal and administrative matters with the Department of Health of the Government of the Province of Bali (which also serves as the branch of the Ministry of Health in the province). (see Fig. 5)

3-3-2 Plans for the Center's Activities

(1) The Center's Planned Activities

The planned activities of the center are as shown below.

1) Medical care services are to be provided by a tertiary emergency medial care center in the integrated medical service area.

2) Educational and Training Programs for the medical specialists atie in the integrated medial serbie area.

(2) Contents of the Planned Activities

1) Emergency Medial are Services

The center will be responsible for emergency medial care in the medical serbice area as the area's tertiary emergency medical care center. It will also probide primary and secondary emergency medical care services in the urban districts of Bali as a medical facility attacched to Sanglah Hospital. Furgthermore, it will provide promary emergaency medical care activities by the use of mobile ICUs whih will operate with the center acting as their base.

2) Educational and Training Programs

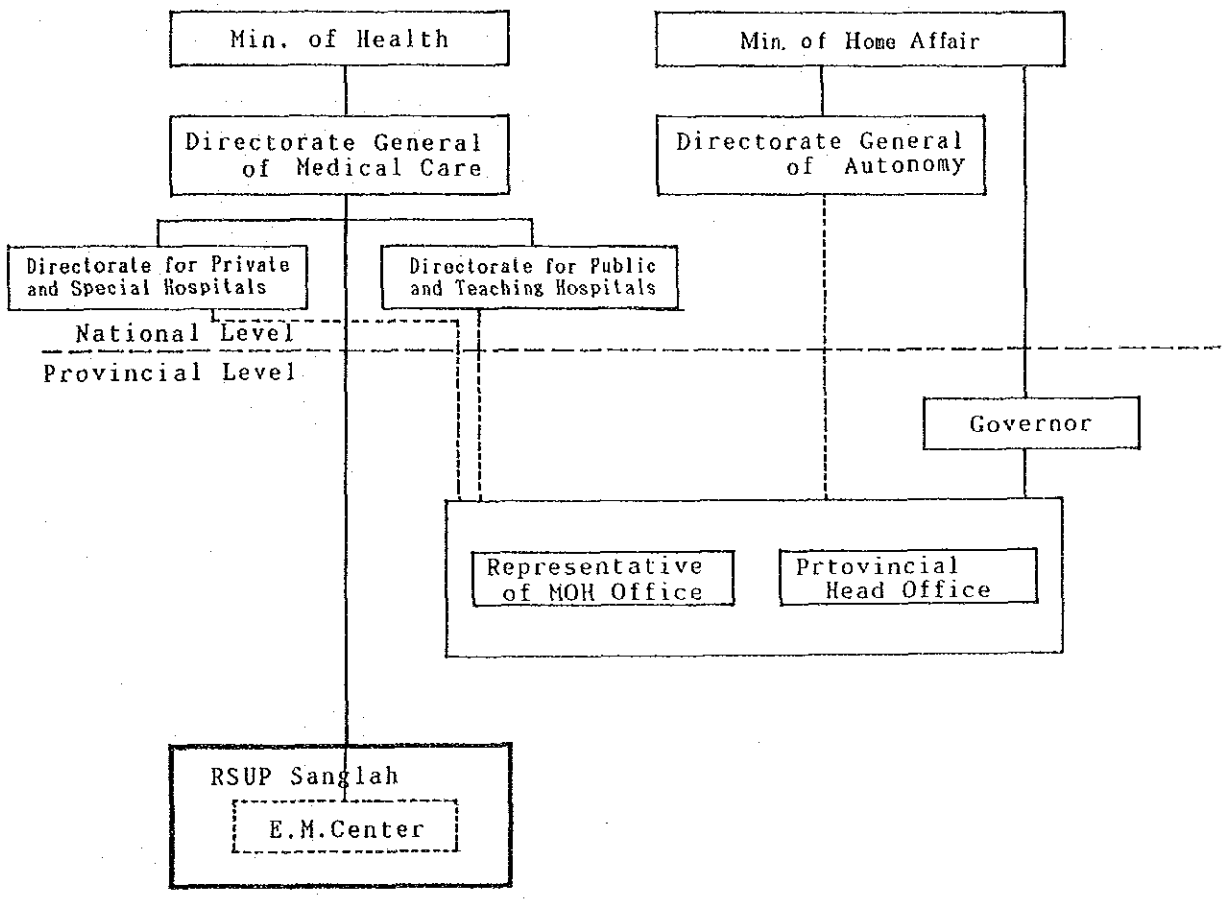
The educational and training programs to be provided by the center are shown on the attached documents, 1-5, and can be outlined as follows:

Class Scale:	30 trainees/class
Period of Training:	20 to 30 days
Frequency (Per Year):	5 to 6 classes
Contents of the Programs:	(1) For doctors: theory and pratice of emergeny medial are (eyes, poisoning, heat injury, diseases of irculatory organs, pediatrics, drug abuse, obstetris/gynecology, resusitation, bone fracture, transportation of patients, chest bleeding, myocardial infartion, neurology, etc.) (2) For nurses and paramedicals: Theory and practie of emergeny medial are (similar to above)
Lecturers:	Specialists from Udayana University, Sanglah Hospital and other hospitals
No. of Hours Per Class:	Doctors (17 subjects, 77 hours) Nurses (42 subjects, 120 hours)
Eligible Doctors and Nurses:	Those working at Sanglah Hospital (specialists and general practitioners), Class C and Class D hospitals, health centers, and medical offices
Residents:	Graduates of the medical school of Udayana University
Nurses and para-medicals:	Those working at Sanglah Hospital, Class C and Class D hospitals, health centers, and medical offices

(3) System for Implementing Planned Activities

Sanglah Hospital is categorized as a general hospital under the direct control of the Ministry of Health. The Directorate General of Medical Care will be responsible for the implementation of this project. The hospital is situated in the Province of Bali, so the projected center will come under the supervision of the Governor of the Province, concerned with its activities at the provincial level.

Fig.- 9 Organizational Structure of Project Implementation

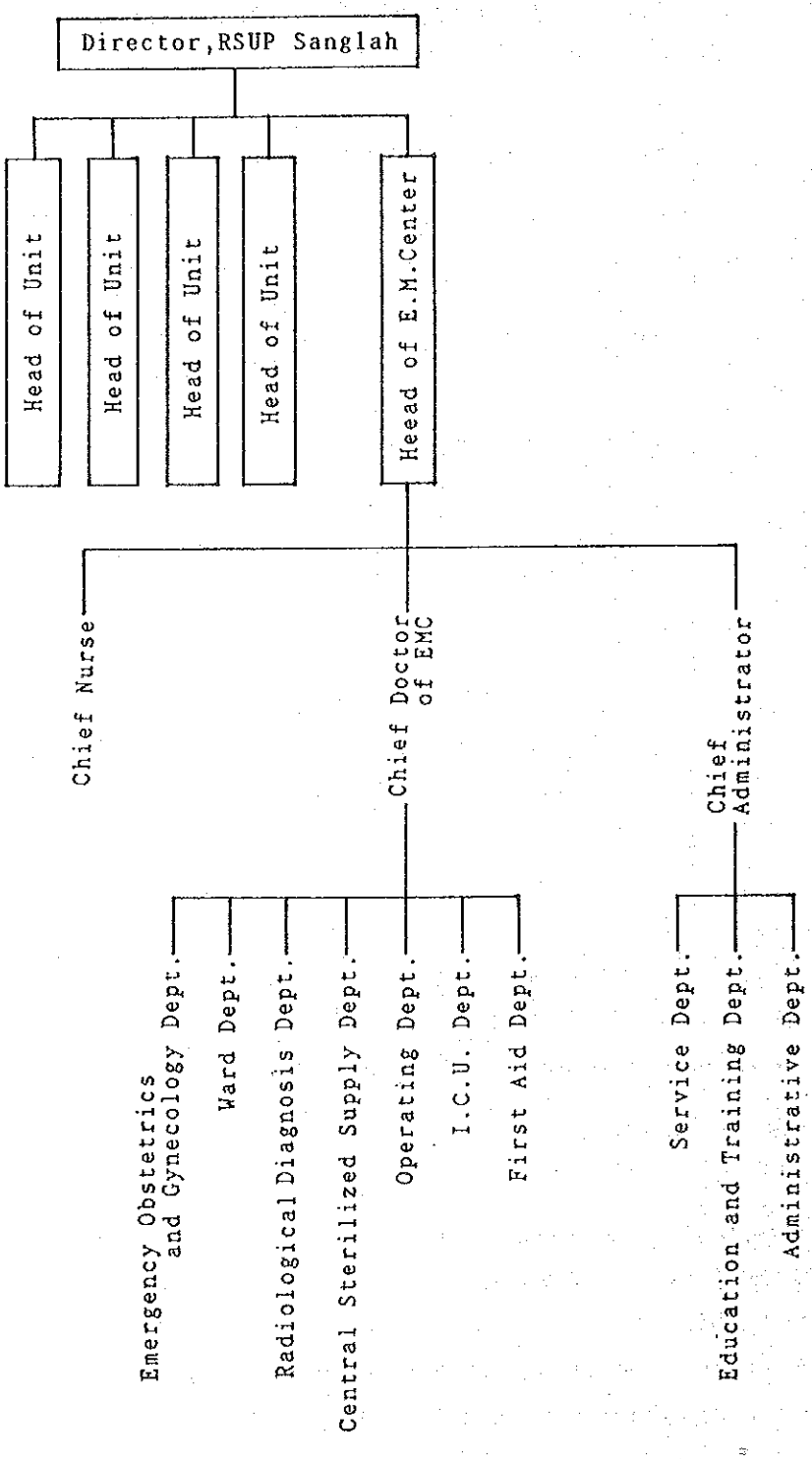


(4) Plans for Operating the Center

This center will operate under a one-gate system. It will receive all emergency patients, and the medical experts from the hospital's clinical departments will treat them using the center's facilities. In order for the center to operate smoothly under such a system, the director of the center must be given powers equal to those of the heads of the

hospital's clinical departments. An outline of the organization of the center taking the above factors into consideration is shown in the figure below.

Fig.-10 Administrative Structure of RSUP Sanglah



(5) Personnel Placement Plan

The work rotation for the medical staff of the existing emergency unit and the planned work rotation of this center are shown in the table below.

Table 72 Rotation plan for medical staff

				Remarks
Full-time physician (daily service)		7	24	on call system
Specialist	Surgery	5	10	on call system
	Obstetrics & gynecology	5	10	
	Internal medicine	5	10	
	Anesthesiology	3	6	
	Pediatrics	4	8	
Resident physician	Surgery	2	4	Three-month rotation system
	Obstetrics & gynecology	2	4	
	Internal medicine	2	4	
Nurse		48	126	Three-shift system (4 teams): 1 team 31 members
Medical technician		2	4	

The planned number of staff members to be on duty at the center in each department is shown in the table below.

Table 73 Number of staff members on call system

Department	Specialists	Resident physician	Nurses	Medical technicians	Clerks	Remarks
Emergency examination	4	6	6			
Operation			4			2 members/ room
Intensive care			6			
Central stirilizing supply			3			
Ward			10			3 patients/ staff member
Emergency obstetrics and gynecology	2	2	5			
Radio-diagnosis				3		Radiology technician
Administration				1	5	1 person/ department, director
Total	6	8	34	4	5	Total: 57 members

Regarding the technical skill level of the medical staff at the center, doctors, laboratory technicians, radiographers, and technicians to be responsible for the operation of equipment will include those who have studied in Japan and those who have experience working at Class A hospitals or in the medical school of a university. If the new equipment is equal in performance to that in use at the existing emergency unit, there will be no problem regarding its operation.

As for such new equipment as the whole-body CAT unit, it will be necessary to train personnel to operate it. It is clear however that the technical skill level of these staff members is sufficiently high.

(6) Budget

The planned budget for this center is shown in the table below.

Table 74 Budget of Sanglah Hospital

(Unit: RP)

Hospital (1987)		Existing emergency unit		New mergency medical care center	
Income					
Outpatients :	30,060,350.0	Surgery etc. :	19,132,200	Outpatients :	26,229,600
Inpatients :	307,846,763.5	Inter medicine etc.:	1,557,200	Minor operation :	187,500
Assist examination :	40,832,613.0	Outpatients :	5,771,200	Medium operation:	24,960,000
Examination :	70,959,665.0	Radiology :	5,576,245	Large operation :	90,825,000
Treatment :	38,721,100.0	Laboratory :	51,830	Radiology :	
		Despensary :	28,244,255	Laboratory :	
		Electrocardiograph:	30,000		
Total	488,420,491.5	Total	60,362,960	Total	142,202,100
Expenses					
Personnel	1,597,334,120	Existing emergency unit		Personnel	541,775,000
Material	1,244,809,086	is operated as one of		Material	111,488,600
Running cost	124,700,582	departments in Sanglah Hospital		·Medical material	98,361,000
				·Office supply	1,967,220
				·Patients record	9,828,900
				·Furniture and inventry	1,311,480
Total	2,966,343,582				
				Others	202,072,000
				·Medical equipment	200,000,000
				·Furniture and inventry	2,072,000
				Total	855,295,600

Note: The balance of both income and expenses is ajusted with the budget of the Ministry of Health because the Sanglah Hospital is operated under the Ministry.

Note: The maintenance cost of facilities is adjusted according to the budget of the Ministry of Health on the basis on the results of survey of the project.

(7) Utilization of the Facilities of the Existing Emergency Unit

After completion of the center, the facilities of the existing emergency unit will be used as a part of the Administration Department of the hospital. As most of the equipment in the existing emergency unit has been utilized by the medical staff of the clinical departments of the hospital, it should be designated as for the exclusive use of specific clinical departments of the hospital.

3-3-3 Outline of the Facilities and Equipment of the Center

(1) Outline of the Facilities

Based on the results of our examination of the facilities proposed by the Indonesian side and the results of our on-the- spot survey , the facilities of the center will be as outlined in the table below.

Table 75 Outline of facilities

Location	RSUP Sanglah Hospital	
Site	About 6,000 m^2 (75 × 80)	
Building	Division	Rooms
Second floor	Ward	Nurse station, linen room, toilet for patients, shower room, meeting room, toilet for visitors, ward corridor, sanitary room, equipment room, corridor for staff, treatment room
	Emergency education and training	Lecture room, practice room, training equipment room, corridor
First floor	Emergency examination	Treatment room, diagnosis and treatment room, laboratory, triage room, resuscitation room, toilet for patients, washing room, observation room, corridor
	Radiodiagnosis	X-ray TV room, CT room, rocker room for patients, dark room, operation room, corridor
	Intensive care	ICU room, isolation room, nurse station, linen room, corridor
	Operation	Operating room, ante room, rocker room, air conditioning room
	Central sterilizing	Central sterilizing room, washing room, corridor

	Emergency obstetrics and gynecology	Labor room, delivery room, newborn baby room, ward, toilet, shower room, nurse station, equipment room, corridor, sanitary
	Administration	Director's room, conference room, office, dispensary, night duty room for physician, toilet and shower room, patients record room, medical office, conference room, staff room, ME room, equipment room, toilet for staff, guard house, store room, corridor
	Service	Dissecting room, preparation room, mortuary, air conditioning machine room, kitchen, dining hall for staff, electrical room, power generator room, medical gas room, pantry, corridor
	Common use	Entrance hall, meeting room for emergency obstetrics & gynecology and ICU, toilet for visitors, stair, corridor etc.
Main facilities	Air conditionor (exclusive for medical rooms), emergency power generator, fire alarm equipment, in-building hydrant, telephone, water tank against fire, septic tank	
Outdoor facilities	Passway, parking zone	

(2) Outline of the Equipment

Listed in the table below are the devices, instruments and apparatus examined in "Examination of the Medical Equipment Plan" above.

Table 76 Outline of medical equipment

Department	Name of major equipment
1) Dispensary and laboratory	Medical refrigerator, Water still, Desk-top type autoclave, Hemoglobin meter, Differential leucocyte counter, PH meter, Blood gas analyzer, Multifunctional hematology analyzer, ISE electrolyte analyzer, Urine analyzer
2) Examination room	Examination couch with inclination of the backrest, Examination instrument set, Small operating instrument set, Instrument cabinet, Ultra-Electrocarodiograph with cart, Electroencephalograph, Gastrointestinal fiberscope, Bronco fiberscope
3) Resuscitation room	Respiratory support & accessories, Manual resuscitator, Defibrillator, Circulators warmer blancket, Low pressure continuous suction unit, Oropharyngeal airway, Endotracheal tube, Plastic oxygen mask, Infusion set, I.V.catheter set, Infusion pump
4) Ophthalmology	Examination couch, Eye treatment unit, Projection perimeter with table-top, Retinal camera unit, Retinoscope, Eye surgery instrument set, Operating microscope
5) Orthopedics	Examination couch with inclination of the backrest, Martine human body measuring kit, Plaster bandage table, Gypsum cutter, Plaster spreader, Folding wheel chair
6) Otorphinolaryngology	E.N.T. treatment unit single sided type, SN nebulizer unit for 3 patients with 3 glass nebu, SN powerful aspirator, Examining & operating microscope, One-Jackson Endoscopic instrument set, Laryngeal instrument for microsurgery
7) Obstetrics and gynecology	Ultrasound scanner, Fetal monitor, Treatment unit, Gynecology examination table

Department	Name of major equipment
8) Radiographic department	General purpose X-ray system with R/F table TV unit, Condenser discharge type mobile X-ray unit with stand, Computed tomographic sanner for whole body, Ultrasound scanner
9) Dark room	Automatic film processor, Manual processing tank, Film dryer - one dozen
10) C.S.S.D.	Small steam sterilizer, Cabinet type steam sterilizer, Surgical glove conditioner, Instrument washer (Ultrasonic cleaner), Working table, Instrument cabinet
11) Operating room	Universal operating table, Operating room light, Anesthesia apparatus, Electic suction unit, Electric-surgical unit, Operating instrument set, Movable indoor sterilizer, Circulating water blancket, Defibrilator, ECG monitor with recorder, Mayo instrument tray stand, Orthopedic operating instrument set, Surgical X-ray unit, surgical sutures, UV water sterilizer
12) I.C.U.	2-crank standard gatch bed with spring mattress, I.V.hanger rod, Low pressure continuous suction unit, Hi-Lo type stretcher, I.C.U. bed with spring mattress and I.V. pole, Patient monitoring system for 4-patient, Portable cardiac resuscitation system with car, Ventilator, Electric suction unit, Film illuminator, mobile type, Ultraviolet ray running water sterilizer
13) Nurse station (Maternity)	Examination instrument set, Sphygmomanometer, desk type, Medicine cupboard, Ice maker, Emergency cart, Dressing cart, Chart file cart, Instrument carriage, Suction pump with stand, Ultrasonic nebulizer with stand, Nursing bottle warmer, Treatment unit, Laryngoscope pediatric

Department	Name of major equipment
14) Labour room (Maternity)	Labour bed, Irrigator stand double hook, Infusion pump
15) Delivery (Maternity)	Delivery table, Vacuum extractor, Infant warmer, Sterilizing tray stand, Washing basin stand for one basin, Cesarean section set, Electro cardio tocograph (Fetal monitor)
16) Nursery room (Maternity)	Infant incubator, Phototherapy unit, Infant CPAP system, Infusion pump, Syringe infusion pump, Neonatal monitor, Neonatal patient stimulator, Transport incubator with power pack, Resusci bag, Phlebotomy instrument exchange transfusion, Infant bassinet stand, Infant respirator
17) Obstetrics gynecology ward	Standard bed, Bedside cabinet, Oxygen inhalar apparatus with empty cylinder, Portable resuscitator, Ultrasonic nebulizer with stand, Electric suction unit
18) Nurse station	Examination instrument set, Sphygomanometer, desk type, Instrument boiling sterilizer, Medicine cupboard, Irrigator stand, double hook, Instrument tray with lid, Ice maker, Infusion pump, Syringe pump
19) Emergency ward	Standard bed, Bedside cabinet, Irrigator stand, double hook, Oxygen inhalar apparatus with empty cylinder, Portable resucitator, Ultrasonic nebulizer with stand, Electric suction unit
20) Radio communication	Base station, Mobile unit(ransceiver), Repeater station
21) Mobil ICU	Mobile ICU (Anbalance)
22) Lecture room	Over-head piojector & screen, Video camera & TV monitor, Slide projector
23) Training room	TV-monitor, Phantom (Manekin), Resuscitator set, Ventilator, Bandaging & plaster-gypsum application training kit, Laryngoscope set, Infant incubator