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HEALTH SECTOR FINANCING PROJECT

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**CONSULTANT'S REPORT ON ASSISTING THE
PREPARATION
IMPLEMENTATION AND DATA ANALYSIS OF THE
IN DEPTH ASSESSMENT OF HOSPITAL OPERATIONS
IN INDONESIA**

#17

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1. SUMMARY

During a two months period beginning in February 1989, Dr. Paul Zukin and Mr. W. Blaine Rasmussen provided consulting services to the Project Implementation Office-Hospitals (PIO-H) of the Ministry of Health (MOH) in Indonesia. Under the supervision of a Project Management Unit, The PIO-H is responsible for carrying out a six year project consisting of three phases to improve efficiency, effectiveness and cost recovery in government hospitals. The first phase is to diagnose hospital problems. Next is to specify and design interventions to deal with the problems identified, and, finally to implement the interventions.

This project is a component of the larger Health Sector Financing Study which is being conducted by the International Science and Technology Institute Inc.(ISTI) under a contract with USAID/Indonesia.

The first task of the consultancy was to provide technical guidance in refining and strengthening the methodology and instruments to be used by two local contractors who are conducting diagnostic studies of hospital operations in three provinces and to assist the Director PIO-H to supervise data collection in the three study areas. Productivity and Quality Management Consultants (PQM) is dealing with one Class B, a Class C, and a Class D government hospital and one private hospital, each, in East Java and Bali, and Binaman Utama Management Consultants (Binaman) is conducting similar studies in four comparable hospitals in Bukit Tinggi in West Sumatra.

With the finalization of the methodology and instruments, the contractors began data collection in the three provinces on 29 March 1989 and anticipate completing this phase of the project in early May, on schedule. As per discussions with the PIO-H and the Project Management Unit, continued supervision and support of the contractor teams will be provided until the data collection phase is completed.

Following data collection the next step is the analysis and interpretation of data. This will take the contractors approximately six weeks. Dr. Zukin and Mr. Rasmussen are scheduled to return to Indonesia for two to three weeks beginning 23 June to participate in this phase of the project. They also will be involved in the commencement of the project follow-on which is to specify and design interventions to improve effectiveness, efficiency and cost recovery in government hospitals. Hopefully this should permit the government to reduce its subsidy to government hospitals and to

improve the quality and availability of health services provided. The overall objective of the project is to direct funds generated by cost savings or from increased revenues toward expanding the program of child survival services throughout Indonesia.

During this consultancy we visited close to twenty hospitals of various size at all levels, government and private. Many doctors and other health workers, as well as officials in the public and the private sectors, were interviewed so that we might gain a broad understanding of hospital operations. One conclusion we reached is that the level of hospital care in Indonesia is not consistent with the level of socio-economic development evident in many other sectors. The complex issues and problems involved in government hospitals in this vast and diverse country are many and easy solutions are not expected. We believe that it is premature to prescribe "treatment" before the diagnosis is complete, otherwise one may be trying to solve the wrong problem. Nevertheless, we have made some observations and have highlighted some problem areas for priority attention. The following areas focus mainly on issues to be considered and steps that might be taken in preparation for the intervention design phase of the project.

1.1 Set standards for the level and quality of care that are appropriate at various levels.

While the intent of the project is clear—effect efficiency and cost reduction in government hospitals—there is nothing said regarding the quality or level of care that should be maintained after the cost reduction program has been undertaken. Is the present quality of hospitals satisfactory or are improvements required?

We believe that discussion is needed at various levels of government to develop standards for the quality of care. Whatever the outcome of this discussion, there will be cost consequences. These must be weighed and dealt with before consideration can be given to the transfer of funds and resources from the hospitals to the child survival program.

1.2. Determine the interrelationship between hospital operations and the child survival program.

Presumably the expanded child survival program will be carried out using both the facilities of the primary and secondary care systems. Have additional manpower,

pharmaceuticals, medical supplies and other resource requirements been identified for the expanded program? A clear understanding of the interrelationship between hospital operations and the expanded child survival program is needed. This will directly impact recommendations to be made regarding hospital reforms and other interventions.

1.3. Determine the interrelationships between the primary care system, the hospitals and health sector financing.

Referral arrangements and the scope and adequacy of health services provided at the primary care level are directly related to the morbidity and mortality patterns in the hospitals. These in turn impact the level and kinds of services demanded from the hospitals and ultimately affect both quality of care and costs.

The health sector financing (insurance) project is dependent upon the hospital project for unit cost information which will be essential for the development of health insurance rates and premiums. The hospital project ultimately will be dependent upon receiving a predictable and reliable source of funding which only can be provided by the health insurance scheme, public and/or private.

The needs of each of the three systems should be kept in mind when specifying and designing interventions.

1.4 Determine elasticity of demand

The relationship between hospital utilization, quality of care (primarily as perceived by the consumer) and price (tariffs) needs to be determined. These relationships will have an important bearing on the ability of hospitals to provide needed services at an affordable cost. History in other countries has shown that an improvement in quality in a heavily subsidized system can substantially increase the demand for hospital services. This may be particularly pertinent to Indonesia which has one of the lowest hospital utilization rates of any country.

Because utilization rates are extremely low, there is a potential for much higher demand for hospital services should quality of care improve and prices remain low. In this instance, the government may be hard-pressed to meet a soaring demand. Further,

if the government continues to subsidize hospital costs, there could be increasing losses rather than the surplus which is contemplated when reforms are instituted.

In any case, much more study is needed to determine the elasticity of demand and the impact that change in price, quality of care and other factors will have on the public demand for hospital services.

1.5 Determine the effect government regulations and policies have on hospital operations.

It is difficult to overemphasize the importance of this subject and particularly its impact on hospital operations. The study contractors will be investigating this subject, but because of its perceived importance, we believe that it should have special attention.

It was observed that government regulations and policies severely constrain and limit the the ability of administrators to manage their hospitals. To research this subject and make recommendations a person who is knowledgeable about Indonesian law and regulations both at the provincial and national level is required. An understanding of the legislative and regulatory processes also is important. Additionally, the researcher should have a good grasp of the management problems facing hospitals and how legislative change can help resolve these.

1.6 Begin a goal setting dialogue as a first step in developing a marketing strategy.

Effecting structural change as called for by the project paper may be an arduous process taking years to accomplish. Goal setting as a marketing strategy can expedite this process. As noted earlier, few explicit goals currently exist. For example, there are no quality of care standards and no indication as to what the costs or benefits from a beneficial change in quality might be.

Goal setting and attaching to these estimated costs and benefits would add materially to this project. This would allow the progress of the hospitals project to be measured by establishing milestones along the way. Also, and perhaps more important, the project participants and the people of Indonesia are more likely to maintain enthusiasm for the project during its development and implementation by having in mind

goals designed to improve the quality of their lives. Government officials also would benefit. They must constantly be in a position to explain and defend the programs for which they have responsibility and clearly defined goals would greatly assist them.

We are convinced that a marketing strategy is essential to effecting structural changes in governmental hospitals. The place to begin this strategy is with a clear definition of its goals and objectives.

1.7 Improve hospital equipment maintenance

Many Indonesian hospitals have significant numbers of pieces of critically needed hospital equipment that are not working. In some instances this is because of lack of spare parts. In others it is due to lack of reagents or lack of the technical expertise to make simple repairs or perhaps even to properly operate the equipment. All of these failures result in limitations of patient care, unnecessarily long patient stays and the serious wastage of resources. Additionally, these deficiencies contribute to low staff morale and a sense of futility in caring for patients.

Many of the structural reforms or other advocated interventions may result in significant change in the roles, authority and decision making power of some employees. Thus these reforms and structural changes may be seen as a threat to the status quo and be resisted either overtly or covertly. Improving equipment maintenance, on the other hand, generally threatens no one and is widely accepted as a positive and valuable contribution to hospital operations.

1.8 Emphasize the systems approach in achieving structural changes.

There is general agreement that the greatest potential for large scale savings and increased efficiencies lie in structural or system changes rather than incremental savings in individual hospitals. Examples of structural changes are:

Doctors salaries. Restructuring doctors salaries to reflect their true value to society would reduce the need for their having both a government and private practice. Having two practices is frequently incompatible causing inefficiency and conflicting values.

Accounting and management information systems. Installing a double entry - accrual accounting system capable of providing financial and unit cost information on a monthly basis is an essential structural change. Until this structural intervention can be accomplished, developing accurate unit costs and meaningful and timely management information will not be possible.

Sharing expensive services. Sharing laboratory, radiology, equipment maintenance and other costly services with hospitals within the same geographical area is an important way to achieve lower costs and at the same time afford better, more reliable equipment with better trained technicians to operate that equipment. Such a structural change should be explored.

Resource Allocation. Hospitals are negatively impacted by scarce and frequently inadequate resources. It is therefore important that the resources that are available are judiciously allocated. It was observed that this was not always the case. A number of instances were noted where unneeded equipment and pharmaceuticals were delivered to hospitals. Also, there appears to be little relationship between resource allocation and need. A number of much smaller Class C hospitals with fewer specialty services had more and newer equipment than the Class B hospitals.

Structural changes are needed on a system wide basis to assure that scarce resources are economically distributed and utilized within the hospital system.

Hospital Management. Assuming that structural changes can be achieved, changes in hospital management would be necessary for hospitals to be efficiently operated. Interventions to educate and train a new generation of hospital administrators in the practice of management and finance, perhaps in overseas schools, may be desirable.

1.9 Rationalize the relationship between the staff of government hospitals and the medical faculties that teach in these hospitals.

Conflicting roles and authority between these groups reportedly interferes with the orderly process of patient care.

This problem certainly is not limited to Indonesia but is seen world wide.
Establishing a matrix organization where relationships of the hospital staff and medical faculties are carefully spelled out generally resolves the difficulties.

In summary, despite the number of issues and problems noted and work yet to be done, the Hospitals Project is off to a good start. The contractors and Ministry of Health project management have tackled their jobs with enthusiasm and all seem committed to improving hospital functioning and patient care, at the same time, however, recognizing that change will not be easy nor occur rapidly.

2. INTRODUCTION AND CONSULTING ASSIGNMENT

From 20 February to 15 April 1989, Dr. Paul Zukin, an internist and health planning specialist, and W. Blaine Rasmussen, a health facilities and health services financial expert, served as consultants to the Project Implementation Office—Hospitals (PIO-H) of the Ministry of Health in Indonesia. Our task was to assist the PIO-H in preparation, implementation and data analysis of the in depth assessment and diagnosis of hospital operations in three provinces, as the first step in a long term effort to increase the operating efficiency and effectiveness of hospitals and to increase the recovery of costs. The specific scope of work in our terms of reference was to:

- 2.1 Provide technical guidance to the contractors who will conduct the hospital assessment in each province. Technical guidance will be provided in the following areas:
 - study methodology;
 - data collection instruments; and
 - pretesting.
- 2.2 Participate in preparatory workshops and training of study implementors in the three study areas.
- 2.3 Assist the Director, PIO-H to supervise data collection in the three study areas.
- 2.4 Assist the three contractors to analyze and interpret data collected during the hospital diagnosis in the three provinces.
- 2.5 Participate in final workshop to review results of the hospital diagnosis..
- 2.6 Recommend potential interventions for three hospital study sites which will improve efficiency, cost recovery, and ultimately allow the government to reduce its subsidy to government hospitals without reducing service availability to the population served.

Since the data collection in the three provinces had only begun during our consultancy period, our activities were confined to the first three tasks of the work -

scope. However, it is anticipated that we will return to Indonesia for approximately three weeks at the end of the data collection in late June, 1989. At that time we will participate in the analysis and interpretation of data and the remaining tasks specified in the scope of work.

In the initial month of this consultancy our activities were to:

- Meet with project personnel and management and relevant officials and staff of the Ministry of Health;
- Collaborate with the two local contractor teams conducting the work in the provinces to thoroughly review and revise the methodology and data collection instruments to be used;
- Visit a variety of public and private hospitals in and around Jakarta.

The first two weeks of the first month of the consultancy were spent in Bukit Tinggi in Padang Province and in Bali Province. Here we participated in work shops and training and made visits to all of the health facilities involved in the project. We inspected health centers and met with relevant individuals and officials knowledgeable about hospital issues and problems and health services in general. Because of time constraints we did not visit the hospitals in Malang in East Java. However, Professor Rukmono, the long term Indonesian consultant to the project carried out the above noted activities in Malang.

This report first will comment on some aspects of the study methodology, and data collection instruments. Next it will note our observations and impressions in respect of the hospital system in Indonesia and comment on some of the many issues and problems. Finally, we suggest an approach to develop remedial intervention after the data gathering and analysis have been completed.

3. STUDY METHODOLOGY AND DATA COLLECTION INSTRUMENTS

The Hospitals study basically involves a diagnostic process to make management decisions with respect to future operations.

In this process we move from a situation where the relevant problems or information are not known, to the point where the problems and the reasons for these are known.

The first task in this process is to describe and analyze the present hospital system so that we gain a thorough understanding of that system and how it got the way it is. A necessary condition for decision making is the awareness that something is wrong, i.e., that something is happening that should not be happening or that is undesired. In the process of diagnostic decision making the defects and deficiencies are made explicit so that remedial interventions can be designed and undertaken.

As initially conceived, the Hospitals study was to be conducted by three separate local contractors, one each for each province to be studied. Three suitable contractors could not be found and it was decided to have the Binaman Utama Management Consultants (Binaman) undertake the Bukit Tinggi study and Productivity and Quality Management Consultants (PQM) conduct the studies in East Java and Bali.

In proposing to conduct the studies, each firm had prepared protocols including study instruments. Each firm independently pretested these instruments in a different Class C hospital near Jakarta. Following the pretest both contractor groups met as a team with the three consultants, Rasmussen, Rukmono and Zukin. Over a period of several weeks, the methodology and instruments were discussed and revised, ending with a common methodological approach which is being used by both contractor teams.

The terms of reference for the Hospitals Study divide the investigation into four subject areas: Quality of Care, Managerial Performance, Cost Accounting of Hospital Services and Social Marketing/Ability to Pay. Each subject area is examined in terms of structure, process or function, and output—and where possible, outcome.

To some extent this division of subject areas is artificial since there is considerable overlap and interaction between these areas. For example, the quality of

care study involves looking at demographic and other parameters in addition to assessing the hospitals' physical facilities, operational characteristics, availability and use of resources, process of care, etc. Many of these topics are also addressed in the analysis of managerial performance and to some extent in the study of hospitals' cost accounting. Social marketing (ability to pay) is related to consumers concept of the content and quality of services and their cost. The above, notwithstanding, on completion of the study the analysis and interpretation of data collected from the four subject areas will be synthesized into a cohesive whole.

We realize that an operational research activity such as this one can only succeed when it is highly focused so as to provide specific information for management decision making. None the less, we have great concern that the interrelationships between the hospital and primary care, chiefly at the puskesmas level, are not addressed. Many of the most frequent causes for patients to seek hospital care are directly attributable to inadequacies of the primary care system. Put another way, there should be a parallel effort to improve the efficiency and effectiveness of the primary care system as the country is doing with secondary care.

3.1 Quality of Care

After discussion with the PIO-H and the contractors responsible for carrying out the studies the quality of care component was revised and broadened. This revision which was jointly undertaken by Drs. Joedo Prihartono, the Binaman health consultant, and Zukin is detailed in Appendix I. As revised, the study now begins with a description of the community in which the hospital is located, noting significant demographic and health status characteristics. Next it details the health-related infrastructure and where the specific hospital fits in the system. Then, environmental factors which impact the hospital are identified. Finally we deal with the hospital, its structure, processes, outputs and outcomes.

Included in the revision in study methodology, a significant change was made in the examination of medical records. As originally designed, a hundred or more medical records from each facility covering the first quarter of 1988 were to be examined in terms of completeness. This was to be done by the contractor non-medical staff. It was found that the definition of completeness was not clear and was therefore made explicit.

Further, the review of the record is to be carried out by a physician rather than contractor non-medical staff and records from the last quarter of 1988 also will be reviewed..

Analysis of the medical record is a critical element in any quality assurance program of health services. To strengthen this part of the study we prepared a brief monograph on quality assurance which describes and recommends the use of a micro-sampling technique of medical records (see Appendix II). This technique involves setting up a team of physicians, an internist, a surgeon, a pediatrician and an Ob/Gyn specialist in each project province to sample ten to fifteen records on a periodic basis. The objective is to show whether or not there is reasonable evidence that the diagnosis made is based upon the anamnesis, examination and diagnostic tests and that the treatment prescribed was rational and carried out properly. Those elements of care that are performed sub-optimally are identified so that measures to improve performance can be instituted. The focus is on records of patients discharged from the hospital or who were seen in the outpatient department six to eight weeks previously. This gives adequate time for all reports of tests, etc., to get in the patient's record and gives an indication of the current quality of care, rather than at some time in the past when conditions may not have been the same as at present.

This micro-sampling of medical records has now been incorporated into the study. To facilitate the micro sampling process we prepared a form to rate medical records. This was reviewed and revised with Dr. Joedo (see Appendix III). In the workshops and training, the revised quality of care protocol was presented and physician teams to carry out the micro-sampling of records were set up and given a several hours orientation into the process.

3.2 Managerial Performance

As with other study components , the first task of the study of managerial performance is to gain an understanding of the existing management systems and practices in hospitals. To do this it is necessary to describe and analyze the present management systems. For example, these include but are not limited to:

- a. Policy formulation and its implementation;

b. Human resources—various aspects such as needs assessment, staffing, staff training and development, hiring and firing, rewards and incentives, conditions of service, etc.

c. The production of services. Producing services requires facility development and use; maintenance of plant and equipment; patient and work flow management; utilities and infrastructure such as communications and transport; logistics; etc., all that needs to be done at the right time, place and with the appropriate force and pace. Particularly important is employee productivity, its measurement and control;

d. Security measures;

e. Revenue collection and control;

f. Budget preparation-development (capital) and operating (recurrent)

g. Budgetary and cost control systems;

This information will be organized in terms of structure, process and outputs and outcomes, according to the terms of reference for the project..

Next, is to identify and specify problems and deficiencies of the existing hospital management system which impair the effectiveness and efficiency of present hospital operations and which severely limit the ability to develop a social financing system that will provide increased cost recovery from hospital operations.

Finally, alternative solutions (where appropriate) for identified problems and recommend remedial actions and interventions will be developed.

The protocol for this aspect of the Hospitals study as prepared by the contractors was reviewed at length. It was felt that there could be improvements particularly as relates to the production of services. Maintenance of plant and equipment and logistics were singled out for more in depth study.

3.3 Cost Accounting of Hospital Services

At the present time there is no satisfactory cost accounting system on which to base hospital costs. The first task, therefore, is to gain an understanding of the existing hospital financial system by describing and analyzing the present accounting system, the source and application of funds, unit costs (such as may exist) and cost recovery. In addition, regulations and policies, both from the MOH and local governments, that affect or complicate the hospital's self management and self utilization of funds it receives from the public must be examined.

The next step is to identify and specify problems and deficiencies of the existing hospital financial system which impair the effectiveness and effectiveness of present hospital operations and which severely limit the ability to develop a social financing system which will provide increased cost recovery from hospital operations. For example, some apparent problem areas are:

- a. The existing chart of accounts is that which is used for a wide range of government departments and which does not adequately relate to hospital expense categories.
- b. The hospitals currently operate on a cash basis accounting system.
- c. There is no system to determine "real costs" in hospitals. Real costs include (1) all direct and indirect costs at the hospital level, (2) the "imputed costs", that is, the value of items received without charge from various sources, (3) depreciation, and (4) estimated overhead expenses at various levels of government.
- d. There currently exists no system to develop unit costs in hospitals.

Finally, alternative solutions (where appropriate) are to be developed for identified problems with recommendations for remedial actions and interventions to be undertaken. For Example:

- a. Establish an accrual accounting system

- b. Establish revenue (direct) and non revenue (indirect) departments.
- c. Establish uniform units of measure to be used throughout public hospitals in Indonesia.
- d. Establish unit costs.

A detailed discussion of unit costing of hospital services with recommendation for the required chart of accounts and the required data to be collected is provided in Appendix IV.

3.4 Social Marketing/Ability to Pay

This aspect of the study concerns the capacity and the willingness of the society to carry the costs of hospital services. In the initial terms of reference for the contractors the methodological approach to this study called for surveying patients and those in the community regarding their willingness to purchase health insurance. Since health insurance in Indonesia generally is not available nor well understood by most Indonesians and since the costs and benefit package are unknown, it was decided not to undertake this line of inquiry. That topic will be pursued by the Social Insurance study where it rightfully belongs. The main thrust of social marketing/ability to pay study will be on sampling patients' and health professionals' opinions concerning their likes and dislikes regarding hospital based care, issues and problems, suggestions for improvement, etc. Secondary data will be used to establish demographic characteristics, socio-economic status, out of pocket expenditures on health care, etc.

4. PRELIMINARY IMPRESSIONS, ISSUES AND PROBLEMS

There is a serious danger in reaching conclusions before all data from a study have been collected, analyzed and interpreted. What follows, therefore, are not conclusions but some of our observations and impressions.

4.1 The Status of Hospitals

During the course of our assignment we visited and spent from three hours to several days each, in all four of the hospitals included in the study, in Bukit Tinggi and Bali. In each hospital we toured the facility; examined wards; the X-ray and laboratories; the kitchen; laundry; apotiks; store rooms; medical records; and even some patients. Hospital directors, ward physicians, nursing supervisors and other personnel were interviewed.

Our general impression is that the class C hospitals in Bukit Tinggi and Denpasar, the private Ibnu Sina Hospital in Bukit Tinggi and the class D+ hospital in Gianyar in Bali appeared to be better managed than the larger class B facilities. The nurses stations in the smaller units generally had protocols detailing standard procedures for dealing with the more frequent conditions such as pre-partum and post-partum care, post-operative surgical care and dehydration in infants. The Ibnu Sina hospital even posted job descriptions of the nursing staff in each ward.

Equipment maintenance was badly flawed in all facilities but particularly so in the class B hospitals. Although both class B facilities had automatic X-ray film processors, none of the machines were operative. In Bali the necessary reagents were on hand, but both machines were broken. In Bukit Tinggi the machine worked but there were no reagents.

The most equipment failures were found in the class B hospital in Bali. Of 15 X-ray units, only five were useable. One very large, sophisticated, new angiography unit in an air conditioned room had never functioned. There are several significant problems related to this piece of equipment. First, reportedly it had not been requested by the hospital but "had just appeared". Second, there was no staff trained to operate the unit. Third, the hospital has no neuro surgeon or medical specialists who can profitably use the potential information the machine could provide. And fourth, including the cost and

probable financing charges, the funds involved would have been far better spent to provide drugs and sheets, which are in terribly short supply or for better food for the patients.

Medical records of both inpatient and outpatients were examined in all hospitals. Many totally inadequate records were found. On the other hand, very good records were found in each facility indicating that the level of medical practice in Indonesia can be most satisfactory. One record of a child with nephrosis (in the Tangerang class C hospital) demonstrates a level of care that would have been highly acceptable in even the most sophisticated country. The point is that good quality care can be provided in at least some of the hospitals we visited. Unfortunately this seems to be the exception not the rule.

One hospital included in the study, the private facility in Denpasar, has very low occupancy and limited capability to care for sick patients. As such, there is a question as to the value of its inclusion in the study.

4.2 Morbidity and Mortality Data

To gain some understanding of the disease pattern seen in the hospitals studied, we looked at the ten most frequent inpatient and outpatient diagnoses in three hospitals each, in Bukit Tinggi and Bali, as well as the ten most frequent causes of death.

The hospital data examined were that contained in the official statistical report of each hospital covering one or more years, 1986, 1987 and 1988. Not all hospitals reported complete data or had data available for all of the three years.

The Bukit Tinggi hospitals included the class B Dr. Achmad Mochtar 439 bed hospital which is operated by Padang Province, the class C Bukit Tinggi 60 bed hospital, a former religious mission facility, now owned and operated by the National Ministry of Health (Depkes) and the 140 bed private Moslem Ibnu Sina Hospital.

In Bali, we had data from the class B 664 bed general hospital in Sanglah (Denpasar), owned and operated by the National Ministry of Health, and two hospitals owned and operated by the provinces, the class C in Tabanan and the class D+ in Gianyar. The class B hospital is staffed by doctors, some of whom work for Depkes and others who

are on the faculty of the medical school in Denpasar and are employed by the Ministry of Education.

The class B hospital in Bali ranked morbidity and mortality by diseases name and frequency but did not report the number of cases or percent of cases.

Appendix V contains a series of tables showing the different ranking of mortality in various hospitals as well as the causes of admission and for outpatient visits.

In almost all hospitals, the most frequent cause of death is cirrhosis/hepatitis, generally followed by cardiac decompensation. In the class B Hospital in Bukit Tinggi, tuberculosis is the second commonest cause of death, followed by rheumatic heart disease and typhoid. None of these three diseases are represented in ten most frequent causes of death in the class B hospital in Bali.

It is generally assumed that most hepatitis in Indonesia is caused by the type B hepatitis virus and that it is transmitted primarily by contaminated injection needles. With the shortage of disposable syringes it is common both in puskesmas and even in some hospitals that more than one patient receives injections from the same syringe. Unfortunately, frequently the syringes are not autoclaved or even boiled. Parenthetically, in at least one hospital the only autoclave was broken.

Another frequent cause of death is head injury due to motorcycle accidents. These cases are predicted to rise in frequency as the number of cyclists grow and traffic congestion increases.

Causes for admission to the hospitals vary between provinces and hospitals. Gastroenteritis generally ranks number one. In Bali, head injury from motor accidents ranks very high but is much less frequent in rural Bukit Tinggi. In Bukit Tinggi the preventable disease rate seems to be higher than in Bali and this probably reflects a less well functioning primary care system. One problem in comparing disease rates is the lack of consistency and criteria for making diagnoses. For example, the term gastritis, gastroenteritis, enteritis and diarrhea were found in the list of diagnoses in one hospital. It was not clear how all of these conditions were differentiated.

In the class B hospitals with many specialists, such conditions as cataract rank fairly high but are rarely found in the smaller hospitals.

The predominant cause for visits to the outpatient departments in small hospitals are gastrointestinal and respiratory infections, fever of unknown cause and dental problems. In the larger hospitals, specialty clinics such as eye, skin, hypertension, etc., also see many patients.

In the typical outpatient clinic, a physician sees approximately 30-40 patients per hour. This hardly gives the doctor a chance to do more than greet the patient, do a cursory examination and prescribe one or two drugs.

In the past physicians often prescribed enough medication for five days treatment. Because of shortages in drugs, they now prescribe drugs only for three days, making the patient return for additional drugs. The ratio of first visits to repeat visits for the same condition recently has gone up in Indonesia, possibly related to the change in prescription practice.

4.3 System Problems/Observations

The data gathering-diagnostic phase of the project is now well underway. It is now appropriate to step back and look beyond this phase and begin considering the broader issues and changes that will be necessary to accomplish the objectives of the project. This will help to focus the data gathering and diagnostic effort to ensure that the data being collected is adequate and can be organized in a way to document the need for the interventions that will be proposed.

The Health Sector Financing Project Paper indicates: The diagnosis will concentrate upon a "secondary care system rather than individual hospitals because of the interdependence and referral linkages among hospitals in the same geographical area. Inefficiencies in a single hospital may only be apparent when viewed in the context of that hospital's role in the system."

However, from the experience with the study thus far it would seem that there really are two aspects involved. There are significant differences between the various

hospitals and this requires case studies to look at each hospital and an overarching study of the system as a whole.

The above notwithstanding, it is believed that the greatest potential for large scale savings and increased efficiencies lies in structural changes to the health care system rather than incremental changes to individual hospitals. Examples of structural changes in the system include:

4.3.1 Government Regulations and Policies

It is difficult to overemphasize the importance of thoroughly researching this subject to gain an understanding of how it affects hospital operations. It is widely believed that present regulations and policies are a road-block and severely reduce the hospitals' abilities to effectively manage their operations. The present requirement that all funds collected from patients be returned to government rather than being available for hospitals to use for their own benefit is an example of such a regulation.

Needed changes could include redefining and reshaping the roles the various levels of government play in the ownership, control and management of hospitals. Also, the role of the government and private sector should be re-examined. Finally, identifying the changes in legislation that must take place to support the structural changes will be an important part of the project.

Controllable Vs Non-Controllable Expenses is a method of demonstrating the extent to which hospital management has control over the resources for which they presumably have responsibility. This would be an objective way of showing the impact of government regulations and policies on the ability to effectively govern hospital operations.

4.3.2 Doctors' Salaries

Restructuring doctor's salaries to reflect their true value to society would reduce the need for their having both a government and private practice. Having two practices is frequently incompatible causing inefficiency and conflicting values.

4.3.3 Accounting and Management Information System

Installing a double entry-accrual accounting system capable of providing financial and unit cost information on a monthly basis is an essential change . Until this structural intervention can be accomplished, developing accurate unit costs and meaningful and timely management information will not be possible.

4.3.4 Sharing Expensive Services

Sharing lab, radiology and other costly services with other hospitals within the same geographical area is an important way to achieve lower costs and at the same time afford better equipment with more highly trained technicians to operate the equipment. Such a structural change should be explored.

4.3.5 Resource Allocation

Hospitals are negatively impacted by scarce and frequently inadequate resources. It is therefore important that the resources that are available are judiciously allocated. It was observed that this was not always the case. A number of instances were noted where unneeded equipment and pharmaceuticals were delivered to hospitals. Also, there appears to be little relationship between resources allocation and need. A number of much smaller class C hospitals with fewer specialty services had more and newer equipment than class B hospitals.

Appropriate interventions should be developed and implemented to assure that scarce resources are economically utilized within the hospital system.

4.3.6 Purchasing Arrangements and Distribution

Combining with other hospitals in purchasing arrangements and logistical support—storage and distribution for materials and supplies—should result in lower costs. The structural changes that would be necessary to achieve this should be explored.

4.3.7 Hospital Management

Assuming that structural reforms changes can be achieved, changes in hospital management would also be necessary for hospitals to be efficiently operated. Interventions to educate and train a new generation of hospital administrators in the practice of management and finance, perhaps in overseas schools, may be necessary.

4.3.8 Intervention Relationships

There are a number of important relationships to consider when designing structural interventions as follows:

- Primary and secondary care relationships must be considered. Relationships and protocols between these two systems will affect management, quality of care and unit costs in the hospital study.
- Hospital utilization/quality of care/price(tariff) relationships will have an important bearing on the ability of hospitals to provide needed services at an affordable cost. History in other countries has shown that an improvement in quality in a heavily subsidized hospital system can substantially increase the demand for hospital services. This may be particularly pertinent to Indonesia since it has one of the lowest number of hospital beds per capita as well as hospital utilization rates of any country. The utilization of outpatient clinics in hospitals is also low. Currently there are somewhat more than half as many return visits for each first visit for the same medical problem. This compares with an average of three or more return visits in most countries. Several factors can be operative here. These include distance from hospitals, availability of transport, convenience of clinic hours, costs per visit, value of the visit as viewed by the patient, etc.

Because hospital utilization rates are very low, there is a potential for much higher demand for hospital services should quality of care improve and prices remain low. In this instance, the government may be hard-pressed to meet the soaring demand.

In any case, much more study is needed to determine the elasticity of demand and the impact that changes in price, quality of care and other factors will have on the public demand for hospital services.

- Health insurance and hospitals project are inter-related. The health insurance project is dependent upon the hospital project for unit cost information which will be essential to the development of health insurance rates and premiums. The hospital project will ultimately be dependent on receiving a predictable and reliable source of funding which can only be provided by health insurance schemes, public and/or private. The needs of both projects should be kept in mind when designing interventions.

4.4 Maintenance of Hospital Equipment

A serious problem in almost all of the Indonesian hospitals we visited is the wastage of resources and constraints on the delivery of health services due to lack of proper use and maintenance of health care-related equipment. As determined by WHO, the common factors contributing to the wastage are: underutilized sophisticated equipment; inexperience of operators and lack of maintenance and repair; lack of needed accessories and spare parts; excessive down time; inadequate foreign exchange causing unfavorable purchasing contracts; and failure to secure maintenance and repair agreements from contractors and suppliers at the time of purchase. All of these factors appear to exist in the Indonesian hospital system, certainly in public facilities. Collectively these seriously reduce the availability of functioning health care equipment. Additionally, they contribute to the dissatisfaction of professional staff in caring for patients.

There are many facets to be dealt with contributing to this problem. These include among others: lack of policy and commitment at the top levels of the health establishment and government; legal, institutional and cultural factors; lack of adequate skills and knowledge to operate and maintain equipment, i.e., inadequate technical infrastructure; an insufficient pool of appropriately trained staff; and insufficient financial resources.

Appendix V describes a computerized program which has been designed to assist the management of hospital equipment maintenance. The purpose of including this appendix is to detail the various activities and areas that need to be addressed. It is not necessarily a recommendation for its adoption in Indonesia. Nonetheless, this, or a similar approach could be very helpful in dealing with the hospital maintenance problem.

Many of the structural reforms and changes which will be necessary to deal effectively with the hospitals problems will undoubtedly threaten some individuals. On the other hand, aggressively attacking the equipment maintenance problem would not be threatening and probably should have priority as an early intervention that could result in significant benefit.

5. PROJECT STATUS

Last fall when Dr. Zukin was here, he expressed concern that with the several layers of project management, the use of contractors to collect and process the data, and the many hospitals involved, there was opportunity for confusion and difficulty. In fact this has not occurred and almost all project elements are proceeding on course.

The contractors are about half way through collecting data. The last contact we had with the Binamin group in Bukit Tinggi was March 30th. All survey instruments to be processed by the hospitals had been distributed and the contractor was gearing up for the community surveys. Selection of medical record samples for quality of care review had not begun. An intensive "training program" with respect to unit costing in hospitals was conducted by Mr. Rasmussen with Jako, the Binaman accountant, during the period March 22-29. Dr. Tom D'Agnes visited Bukit Tinggi on March 28th and received a detailed status report from the Binaman staff and Mr. Rasmussen.

On April 8th Dr. Sonny Irawan and Mr. Kristanto Santosa of PQM met with Drs. Rukmono, Soedibjo, Zukin and Mr. Rasmussen and gave a status up-date on Bali and East Java. The only reported problem was in gaining information in some hospitals in East Java. Dr. Soedibjo indicated that he would resolve this issue with the officials in the province.

At a meeting with Dr. D'Agnes and the PIO-H staff on April 11th, we addressed potential gaps in the data to be collected, analyzed and interpreted. It was agreed that gaps undoubtedly would surface as project progress was monitored. In that meeting a number of areas of investigation were mentioned where there was some question whether there had been adequate inquiry. A number of these areas get at the broad issues as described in the Project Paper, for example:

- The whole matter of referrals within the hospitals and health care system—policies, regulations, guide lines; relationship of different levels of government. What is working and not working and why.
- Government regulations, policies and laws relating to all aspects of hospital funding, functioning, etc. at all levels and what is the process of making changes.

- The relationship between the hospital staff and the medical faculty in university related hospitals. What are the roles and authority of the medical staff and the medical faculty.

To monitor and supervise the remainder of the project, both PIO-H senior staff and USAID health personnel independently will visit the test sites.

A follow-up visit of Mr. Rasmussen and Dr. Zukin has been tentatively scheduled from June 23rd to July 9th, 1989. The purpose of that visit is:

- to participate in the final review of the data, their analysis and interpretation and,
- to examine conclusions reached to see if they are supported by the data gathered, their analysis and interpretation.

6. NEXT STEPS

The intended output of the current phase of the Hospital Study is a problem oriented and action oriented diagnosis of the hospital system in Indonesia. This information will then be used to design remedial interventions to resolve or ameliorate the problems identified.

It does no good to identify problems which are non-controllable. A good diagnosis is one that analyzes causes, is as mission oriented as possible and controllable as possible. This requires active participation of those who have some control over any of the problems that can be identified.

How can this be accomplished?

- First, appropriate staff in the Ministry of Health set up a working group to review the Hospitals Study findings and make recommendations for suitable remedial interventions.
- Next, it is necessary to identify a small group with authority, that is, who have some legal right to make decisions with respect to health and hospitals in Indonesia. These need not only be Ministry of Health staff or Ministry of Home Affairs staff, i.e., they could be members of parliament (e.g., those in the Commission for Health and Social Affairs), Chief of Legislation, Ministry of State, Ministry of Finance, etc. The aim is to get the widest group with the highest possible status, but they must become involved.
- Then, identify people with power over the health and hospital system. Power means the capability to punish and or reward. For example, those in the Ministry of Finance who could withhold funds from the Ministry of Health, or who can reinforce the health and hospital system with rewards.

Some of those named might be on the previous list. If so these should be specially noted.

- Finally a third group is identified. These are people with influence over the health and hospital system or over the people listed as having authority or power. Influence is the ability to make someone do something by using power and authority. Those influenced believe in the message given them. The message becomes their own message and they become co-opted. Influence comes from knowledge, e.g. those from the university, social leaders, social theoreticians, popular figures, etc. In essence the "thinkers".

Going back over the lists we look for those with authority who may also have influence or power.

- By now, the list will contain some twenty or thirty names. The aim is to get an "action group" or "steering committee" of about seven to ten persons, with maximum authority, power and influence to start dealing with the problems. This action group would come from multiple systems, including the Ministry of Health, but also would be multi-departmental and multi-disciplinary. The members should be multi-faceted individuals who have information are outspoken and are sophisticated. This group will then examine, review and prioritize the problems that have been identified, analyzed and interpreted by the study contractors and Ministry of Health staff. Very likely, they may add additional problems and concerns.
- Problems are then allocated into logical categories for resolution. These could involve new policies, make legal and regulatory change, changes in the hospital facilities and services provided, improving compensation of health professional, rationalizing logistics and supplies, etc., etc.
- Interventions are then proposed and are then planned out in terms of specific goals and objectives, policies, strategies, tactics and tasks.
- The action group, after its initial meetings, should convene at regular intervals with appropriate health and hospital-related personnel to monitor and guide the progress of the interventions.



APPENDIX I

REVISED OUTLINE FOR QUALITY OF CARE STUDY

I. Describe the health status of the community served by the specific hospital being studied (all collected from secondary data)

A. Identify the community

1. Name of Community
2. Demographic trends, age/sex distribution, population shifts
3. Socio-economic situation, changing economic activities, ways to pay, etc.
4. Other

B. Obtain health status indicators

1. 10 main diagnoses of patients seen in the outpatient department (OPD), by rank order and %, for each of the past 3 years.
2. 10 main causes (diagnoses) for hospital admission, by rank order and % for each of the past 3 years. If possible, the same for hospital discharges.
3. 10 leading causes of death, by rank order and %, for each of the past 3 years.
4. Other indicators such as infant and maternal mortality, etc.

II. Describe the infrastructure of the health care system and where this hospital fits in the system

A. Ownership and policies in respect of management, access, tariffs, incentives, etc.

B. Level served, catchment area

C. Referral pattern—up and down; any special disease focus; cross referrals between public and private facilities; cooperative relations to other facilities, universities, etc.

D. Health care development. Planned growth, strengthening services at national, provincial and local levels, and for the specific hospital itself (e.g., 5 year plan)

E. Other

III. The Hospital

A. Environmental Factors

1. Physical—location, transportation, etc.
2. Socio-cultural—health and disease-related behavior
3. Economic
4. Technical level of facility, equipment, sophistication of care
5. Legal/regulatory
6. Institutional relationships

B. Hospital Facilities—Inpatient, outpatient attached to hospital and in satellites

1. Outpatient Department (OPD)

- Physical Facility

- Number of examination rooms and number meeting MOH standards for equipment, etc.
- Any special equipment for certain diseases
- Supporting services-in OPD or hospital
- Supplies, drugs (pharmacy in OPD or hospital?)
- Maintenance of plant and equipment

- Services Available and Utilization

- What promotive, preventive and curative services, what specialities and subspecialities
- Days and hours of service, by type of service
- Average number of patients seen by each clinic session

- Average time per visit by category of service
 - Examination and treatment
 - Pharmacy renewals
 - Completing employment or other routine forms
 - Other
- Sources of patients
- Tariffs charged for various services
- Other

Process of Patient Care

Medical records

What does it include and not include? MOH standard form or designed by hospital?

How many records for each patient?

Same or separate record for outpatient and inpatient?

Does patient keep record?

How long is the wait for the record to be obtained when the patient appears in the OPD?

Is the record reviewed?, for what, when, by whom?

Patient Flow in the OPD—Registration; triage; examination; patient care; disposition such as referrals, instructions to the patient

Ratio of repeat visits to initial visit for the same medical problem

- Output of Services and Outcome of Care
- Costs of Care

2. Inpatient

- Same subjects as above but focusing on inpatient care.

APPENDIX II

QUALITY ASSURANCE AND EVALUATION

PURPOSE

The basic aim of this element of the Hospitals component of the Health Sector Financing Study is to assess the quality of care and to assure improvement in those areas that are found to be deficient. It is not easy to define quality of care because there are many elements involved. Quality of care is not a fixed quantity or level of care but rather should be thought of as being open ended. A good operational definition of quality might be "That level of care for specific health problems or types of facilities that are agreed to by the great majority of the health professionals involved and by the people to be served, and that can be afforded by the society. The general objectives of the study of quality of care are to:

1. Identify elements of care that are performed sub-optimally,
2. Improve performance of those elements,
3. Measure and document changes in performance after improvement activities are instituted.
4. Contain costs since unnecessarily expensive care diverts resources from more pressing health needs, i.e., interferes with proper utilization of resources.
5. Satisfy legislative, regulatory and accreditation requirements.

To do all of this requires:

1. Setting performance standards.
2. Establishing rules and codes of professional practice, both what should be done and what should not done.
3. Identifying educational needs of health professionals and assessing the effectiveness of educational programs as well as the health education needs of the general population.

Analysis of medical records plays a very important part of any quality assurance program. In reviewing the record the search is for what is wrong, not who is wrong.

The emphasis should be on good care, not a good record. The aim is to improve the care, not the record. In reviewing the record one notes anything which reveals poor care or will lead to poor care and which no one will defend. Poor care resulting from patient error should be addressed as vigorously as that caused by physicians or other provider error. After review of the initial record (this is called the index record), follow-up records should be reviewed for inconsistencies, improper use of medications and for drug allergies, inappropriate orders, lack of adequate examination pre-operatively, failure to note significant lab or X-ray findings, etc.

Put another way, the aim of review of medical records is to get reasonable evidence that:

1. The diagnosis is a rational one, consistent with the medical history (anemnesis), physical examination and the laboratory, radiological or other diagnostic studies.
2. The physician knew of highly significant diseases that had been previously diagnosed in the patient.
3. The physician knew of significant medications patient was taking including allergy thereto, or significant evidence that he did not know.
4. The medical record is adequate for the problem presented.
5. The therapy prescribed is rational and consistent with the diagnosis.
6. There was not over or under utilized services and/or facilities.
7. The disposition of the patient was appropriate, including, including arrangement for follow up, advice to the patient, etc.

Although clerical personnel may be involved in the initial screening process, physicians should be responsible for the final review. A reasonable approach to screening the medical records is to:

1. Have trained clerical personnel first screen records in accordance with written standards.
2. Have screening results reviewed and endorsed by peers of the professionals involved in any activity in which there is a question as to the appropriateness of the diagnosis, treatment or disposition of a case.
3. Document that there is a feed back loop to certify implementation of necessary corrective action.
4. Periodically review the appropriateness of standards and compliance.

STANDARDS

It is usually easy to agree on what is wrong, but harder to agree on what is right. A realistic solution is to accept as a standard the most stringent requirement that all of those concerned will agree to. Standards should be written and reviewed periodically. Standards of care, etc., should cover what should be done and when, and what should not be done. For example, "all patients with diastolic blood pressure of 115 will be followed up within 2 months" or, "no patient with tuberculosis will be given cortisone type drugs except under the most pressing need".

Authority for Setting Standards Generally, this should be by agreement of those responsible for the performance of given element of care, eg., a given hospital department, the MOH, other authority, etc.

Desirable Characteristic of Standards include:

1. Simplicity—Standards are best expressed as simple statements for ease of measurement and compliance and instituting action directed toward improvement.

2. Clarity—Standards must be readily and easily interpreted by professional and non professional personnel. The aim is that those taking part in quality control will be able to select records or observe other activities related to the standards and can search for desired elements being rated in an objective manner, repetitively and without variation. Their search must not involve use of judgmental decisions.
3. Statements of Performance — Generally a simple statement describing desired behavior under a given set of circumstances.
4. Problem Directed — Standards should involve elements of care that can give some evidence that performance is acceptable or sub-optimal.
5. Dynamic — Standards should be reviewed and changed as necessary.

ELEMENTS OF CARE

The question is, "can we define quality of care with a single concept of valuation"? Since the quality of care is multi-faceted, the answer probably is no. Deficiencies in one element of care may or may not be compensated by superior performance of another element. If the objective of quality control is improvement and not judgmental, definition is easier. Quality is thus made up of many elements and should be open ended. To measure quality improvement and determine if a problem still exists, we need before and after measurements. Problems found should be prioritized for corrective action. The point is that problem identification should be the first step in a quality assurance program.

Can a standard, predetermined minimum basic data set designed for application to many institutions be applied generally? While this frequently is done, it has serious drawbacks. Standard data sets have the defect of trying to collect data to satisfy the needs of all participants in varying situations. This is expensive, time consuming and may miss some critical elements as well as gaining unnecessary information.

This Raises the Question of the Selection of Elements of Care to be studied in a quality assurance program.

Since the primary objective of quality assurance is to improve quality of care, the first essential is to identify those elements of care that are in need of improvement, i.e. are problem-related.

A priori selection of subjects may miss the worst case, for example, a missed diagnosis of a serious medical problem. Selecting all cases of myocardial infarction guarantees that all missed diagnoses will not be reviewed. Selection of medical records on the basis of the use specific drugs also guarantees that cases where the drug should have been used but were not used will be missed. This points up the deficiencies in selecting records or cases for review that are based on diagnosis.

A second step in the a priori procedure is prior selection of factors thought to be of importance in respect of the area to be assessed. This involves much professional time in producing laundry lists of elements of care which may not be related to the actual problems encountered.

Another approach in quality assurance is to identify problems using "Micro Sampling" both of inpatient and outpatient records. In a medical center with inpatients and outpatients, it is important to review records both of patients, in and out of the hospital, for continuity of care.

In the micro-sampling process, medical records are selected from all providers, regardless of the diagnosis made or not made, medications giving or not giving, i.e., without medical bias. For ambulatory settings, records are selected from patients seen at certain hours of the day or days of the week. We also review records of patients seen 4-6 weeks previously to see if ordered tests have been completed and filed correctly. Interval checks permit assessment of many elements related to quality care—i.e., proper and effective instructions to patient, patient compliance, some measure of flow of work through lab and X-ray, proper filing, proper follow up in cases of significant abnormality.

Selecting medical records on randomly selected numbers, etc. has disadvantages—for example, the record may be old. This addresses old problems, not current problems;

old problems may have been solved by known and unknown means; providers cannot recall standards of care or details of a case in the past. Focussing on recent visits identifies patients still at risk who can benefit from timely help. However, we can randomize case selection say by examining the first and last hospital discharge of each day, by specific service, starting 4-6 weeks previously. Experts suggest that not more than 10-15 records need to be seen. Can change periodically to review the 3rd or 4th or whatever record during the day. Waiting 4-6 weeks after discharge gets at the completeness of records and makes complications of care more readily recognized. Selection of outpatient records can be the first case seen, the last case seen, cases in-between, etc. In situations where the doctors tend to leave before they are supposed to, cases seen late in the day usually will be found to have received sub-optimal care. Some additional points:

1. Records of patients who do not keep appointments should be kept.
2. There is need to sample records of "drop ins", the casualty or emergency room, etc.
3. There is no need to identify more problems than can be addressed but we do have to identify all significant problems.

ROUTINE CONFERENCES AND PATIENT CARE COMMITTEES

Are there any routine meetings of the medical staff such as clinical conferences, "grand rounds", specialty department conferences, etc? If so, specify the subject matter of these and indicate how often they take place and who generally attends.

Are there any committees that monitor various elements of patient care by the medical staff, nursing personnel or other hospital departments such as tissue committee, utilization committee?

OPEN ENDED QUESTIONS

It would be highly desirable to have those interviewed complete a simple questionnaire listing say the five main problems they have identified as interfering with or limiting the appropriate care of patients. Preferably these should be in order of

importance. A second list of five suggestions as to how these problems may be addressed would also be valuable. Those respondents who are employed in the health care facility need not give his or her name but should note the department in which they work. These questionnaires can best be completed after the interview when the interviewee has gained some idea of what the quality assessment is all about.

SOME THOUGHTS ON EVALUATION

The ultimate justification of a public service such as a health care program in seeking public support must rest with the proof of its effectiveness in alleviating the problem being attacked.

There are many definitions of evaluation. These generally include such concepts as assessment, appraisal, judgement, value, the worthwhileness of an activity, etc. A good, comprehensive definition of evaluation is: "the determination of the results, and the factors related thereto, attained by some activity designed to accomplish a valued goal or objective". This may be based upon opinions, records, subjective or objective data. We want to know whether these results are desirable or undesirable; transient or permanent; immediate or delayed. And the activity can be a major plan, a program, part of a program, a drug or therapy, an on-going or one shot approach, whether ultimate, intermediate, or immediate, an effort or performance, long or short range.

There are many ways to approach evaluations, but I suggest that in any approach it is most important to distinguish between effort and effect.

Effort measures the quantity, and hopefully the quality, of the activity that takes place. This, the lowest of levels, is the evaluation which predominates in many health programs. Examples of measurement of effort would include the number of immunizations given to a specific population or the number of health workers graduated from a training institution in a given time period, the number of patients seen in a clinic in a given period. Measurement of effort looks at what was done and how well it was done, but not the effect of the activity.

Performance measures the result of effort. In order to do this, a clear statement of the goal of the activity must be stated so that how much of what was desired was

actually accomplished can be determined. If any change occurred, was it the one intended?

Adequacy of Performance refers to the degree to which effective performance is adequate to the total need.

Efficiency is concerned with the evaluation of alternative methods in terms of the ratio of resource use (costs) and output (effort and performance). In the steadily increasing competition among the several socio-economic sectors, the criteria of efficiency are more important than ever; few programs can be justified at all costs.

Process deals with how the evaluation is conducted. In evaluating a program a great deal can be learned about how the program does or does not work and why. This can have both administrative and scientific significance. There are many dimensions that can be dealt with in the process of evaluation. Among the most important are the attributes of the program that make it more or less successful, the characteristics of the target recipients, the conditions under which the program is more or less successful, and the precise specification of the effect produced by the program.

It is clear from the above that evaluation of a health facility, program or project can be a demanding and complex undertaking. Different organizations and institutions approach the task in various ways, hence there is little consensus on how best to carry out the activity. There is consensus, however, on the need for evaluation and in general on the scientific methodology to be used.

One evaluation protocol that has stood the test of time and which has the advantage of being both comprehensive and yet not having a particular country or other bias is that suggested by WHO and abstracted here:

1. First, one needs to gain an understanding of the structure, functioning and resources of various levels of the health-related services being evaluated; and also, any changes etc. contemplated or planned.

2. Next, obtain a clear picture of the health status, problems, and constraints in meeting health care needs.
3. Evaluate the program/facility/project according to the following five criteria:

Relevance: The degree to which the project meets or contributes to the meeting of basic health needs of the target population and is consistent with national health policies and health priorities.

Progress: Make a comparison of actual accomplishments against scheduled targets and identify issues, problems and constraints and suggest how these problems can be overcome.

Efficiency: Compare results in relation to the expenditures.

Effectiveness: Assess the degree to which the program/facility/project is reducing or contributing to the reduction of health problems and improving health status, i.e., the attainment of objectives.

Impact: Ascertain or estimate the effect of the program/facility/project on overall health development and related socio-economic development.

3. Is Record Legible and Readable? YES ___ NO ___

4. Is Record Adequate and Complete? YES ___ NO ___

5. Is Diagnosis/Impression, etc. rational and relevant? YES ___ NO ___

If No, Explain _____

6. Is Treatment, Medication, Etc., Rational and Adequate? YES ___ NO ___

If No, Explain _____

7. Were Lab/X-ray Procedures Appropriately Ordered and Done? YES ___ NO ___

8. Is There Adequate Follow-up Plan? YES ___ NO ___

If No, Explain _____

9. Has There Been Adequate Utilization of Doctor, Hospital, Clinic, or Lab/X-ray? YES ___ NO ___

If No, Explain _____

10. Are There Any Important Deviations From Reasonable Standards of Patient Care? YES ___ NO ___

If Yes, Explain _____

Condition of Patient After Treatment

Healthy _____

Asked to Return _____

Reason for Return _____

Died _____

Other _____

Comments/Remarks on Quality of Medical Care and Medical Record _____

Signature of Record Reviewer

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APPENDIX IV

CALCULATION OF UNIT COSTS

The two contractors are presently in the process of collecting cost data for 12 hospitals in three provinces. This process is complicated by the fact that Bukit Tinggi is geographically separate from the data gathering effort of the other two provinces with little opportunity for communication.

The objective is to collect and organize the cost data from each of the 12 hospitals in such a way that it can be compared and analyzed. There are a number of principles and steps to follow that can facilitate this process and help ensure that valid comparison and analysis of the 12 hospitals is possible.

The focus of this section is on calculating unit costs. Most of the factors discussed have been reviewed with the two contractors in Jakarta and later while working with them in Bukit Tinggi and Bali.

1. Uniformity in Data Collection

It should be borne in mind that this is a first-cut in developing unit costs. Lacking an appropriate accounting system a high degree of accuracy is simply not possible. Knowing this, it is all the more important that the data for each of the 12 hospitals be collected as uniformly as possible using simple, easy to understand

allocation methods. Having uniform and consistent data will greatly facilitate the ability to compare and analyze data in later stages of the project.

2. Use of the Data Collected

Keeping in mind how the data will be used should determine which data is collected and how it should be organized. The following are among the major uses of the data.

- Management information to enable hospitals to become more efficient allowing money to be diverted to the child survival program.
- A basis for developing full cost pricing or tariff strategies.
- A basis for determining full cost health insurance rates on premiums.

3. Terminology

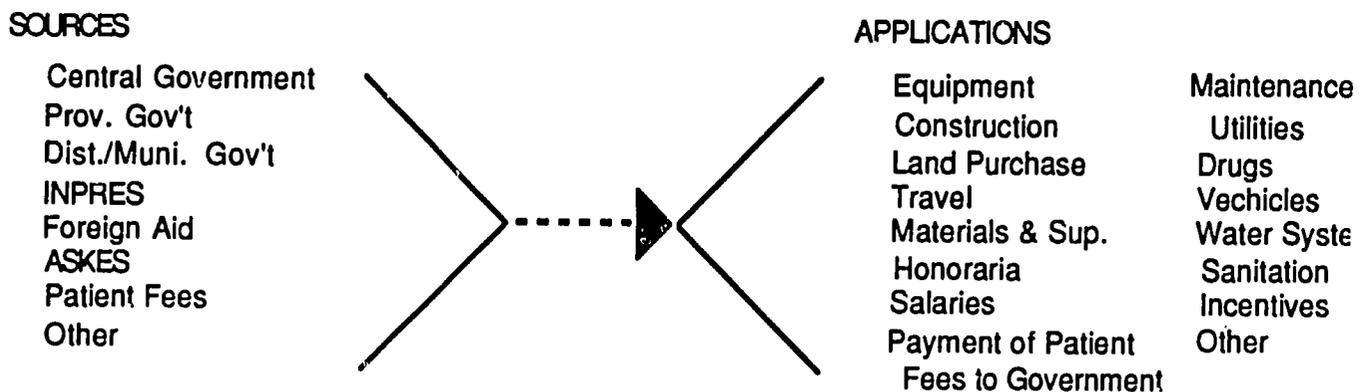
The terms Revenue and Non-Revenue are now used to describe hospital departments. The presumption being that certain departments should generate revenue and some should not. Such a definition lends itself to controversy depending on one person's view of which departments should be the revenue producers.

The terms Direct and Indirect should be substituted for Revenue and Non-Revenue since they are more widely used and can be defined more objectively as follows. Indirect departments, sometimes called overhead departments, are those that support the work of the direct service departments which directly serve the

patients. The costs of indirect departments are separated so that they can be allocated to the direct service department to find total costs and unit costs of the latter. The indirect departments include standard overhead functions such as Administration and Maintenance, as well as support departments such as Laundry and Housekeeping (Cleaning Services). Pharmacy should also be listed here as an indirect department because the cost of pharmaceuticals is assigned directly to the direct service departments. The Pharmacy, as defined for purposes of cost analysis, therefore does not include pharmaceuticals themselves, but only the personnel, supplies, etc. used to distribute the pharmaceuticals.

4. Source and Application of Funds.

A complete accounting should be made of the present source and application of funds. This should be compared to 5 below which will reveal the total or "real" revenue and costs for each hospital. Below is a diagram to illustrate the items included in a source and application of funds as well as an example of the use of the "step down" method to calculate the total cost (per diem) to treat a patient in the hospital for one day.



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Measurement of Costs, Step Down Method, Examples of Outputs:

<u>Per Diem Statement (Total Cost Per Patient Day)</u>		<u>Unit Cost Statement</u> <u>Rupiah</u>	
Direct Operating Expense	Rupiah	Pediatric Unit Cost PerPt.	
Day			
Nursing Departments (Wards)	23,125	Direct	23,000
Operating Theater		Overhead	<u>18,125</u>
(Central Sterile Supply)	8,000		TOTAL
<u>41,125</u>			
Delivery Room	<u>4,750</u>		
Total Nursing	<u>35,825</u>		
Housekeeping & Maintenance	5,250		
Administration	4,250		
Dietary	1,625		
Medications	4,000		
Ancillary Services (X-ray-lab. etc.)	10,625		
Outpatient Department	<u>5,000</u>		
Total Direct Operating Expense	65,925		
Property Expense	4,250		
Overheads	<u>10,625</u>		
TOTAL	<u>80,800</u>		

5. Total or "Real Costs"

The project specifies that total or "real" costs should be determined. To accomplish this it is necessary to define total or "real" costs. This can best be done by identifying the several levels of cost that constitute total cost as follows:

<u>Level</u>	<u>Category</u>	<u>Inpatient</u>	<u>Outpatient</u>
A	Direct Operating Expense All costs incurred at the hospital level, both direct and indirect.	xx	xx
B	Depreciation/ Amortization Calculations which recognize the cost of capital and the costs involved in the use of assets.	xx	xx
C.	Overheads, Municipal, Provincial and National. These costs include a pro-rata share of administrative services provided by the various levels of government.	xx	xx
D.	TOTAL OR REAL COST	xxx	xxx

Note: There is another level of cost commonly referred to as Social Cost. This estimates the cost impact on a patient and family from being ill or injured and travelling to and from and spending time in a hospital. However, estimating the impact of this cost is beyond the scope of this project.

6. Unrecognized Costs.

Currently a significant portion of expense incurred by the hospital is not recognized and thus the total or real cost is understated. Examples are:

- No charge is recorded by the hospitals for drugs received from INPRES or other agencies.
- No charge is recorded by the hospital for required drugs purchased by inpatients in outside apotiks.
- No charge for depreciation is made for equipment delivered to a hospital by the MOH for which the government incurred a cost.

It is believed that costs (as above) incurred by the hospital but not reported are significant. Extra effort should be made to estimate these costs so that the total cost of hospital operations is known.

7. Overheads

At the MOH level an estimate should be made of personnel and other expenses being devoted to hospital research projects and administration. This total expense should then be allocated to the 640 government and 816 private hospitals in Indonesia. Perhaps the amount of the allocation to each hospital should be weighted according to the size or number of beds. Preliminary investigation indicated that Rp2.7 Billion was expended by the Directorate General of Medical Care during the 1988-89 fiscal year. To this amount should be added an estimate for the support given to the Directorate General by other offices in the MOH. A similar method of estimation should be used for provisional or other governmental overheads.

8. Depreciation

This non-cash cost reflects the cost of wear and tear and obsolescence, which occur over time to equipment and buildings. For this cost determination, the government depreciation schedule (straight line) should be used.

Land is a non-depreciable asset and yet it has real value. Thus a cost must be assessed to it for being the site of the hospital buildings and grounds. One method that could be used is to assign a current market value to the land and annuitizing the cost over 20 years using a 10% cost of capital.

Any method that is used to estimate depreciation and the cost for using the land is likely to be controversial. With this in mind, two recommendations are made:

- Whatever the method, it should be uniformly applied to all 12 hospitals so that a basis for comparison will exist.
- There should be two (2) step down calculations, one with building depreciation and land annuitization and one without. In this way the user of the information can clearly see the effect of depreciation and land annuitization.

In addition to calculating depreciation, an inventory should be taken of all equipment. This will provide the factual information needed to show the magnitude of broken or idle equipment in the various hospitals. A sample format for this inventory is shown below.

<u>Equipment</u>	<u>Age</u>	<u>Value</u>	<u>In Operation</u>		<u>Not Operating</u>		
			<u>Good Condition</u>	<u>Needs Repair</u>	<u>Needs Skilled Operator</u>	<u>Good Repair Not Needed</u>	<u>Junk</u>
X-ray Unit	1978	35 Mil.		x			
Ultra Sound	1986	35 Mil.		x			
Centrifuge	1962	0					x
Wash. Mach	1985	25 Mil.	x				
Refrig.	1960	0			x		
Computer	1987	17 Mil.		x			

9. Line Item Expense Report

There was agreement that a format based on common usage should be used to capture the various elements for hospital expenses charged to each department. Although this may be an efficient and convenient way to collect the information, it is suggested that for the future a different format be used. An example of a format that more closely reflects hospital operations is shown below:

DESCRIPTION

Personnel

Salaries and Wages

Honorariums

Employee Benefits¹

Travel

Adjustments²

Office and General

Materials and Supplies

50'

Maintenance

Small Tools and Instruments (non-capital)

Utilities

Electricity

Gas

Water

Diesel Fuel

General/Social

Depreciation—Equipment

10. Direct and Indirect Departments.

In the example given below, twenty-six departments were identified for purposes of cost allocation and unit costs. These departments are separated into indirect (overhead) departments and direct service departments. The costs of the indirect departments would be allocated to the direct service department through a "stepdown" procedure. This procedure is an excellent way of assessing true costs. The allocation of costs by the stepdown method should be performed in two ways: first excluding depreciation/annuitization and government overhead expense and second, including these expenses. The reader would then be exposed to the significance of depreciation/annuitization and government overhead.

<u>INDIRECT</u>		<u>DIRECT</u>	
<u>Department</u>	<u>Unit of Measure</u>	<u>Department</u>	<u>Unit of Measure</u>
Administration	Personnel	<u>Adult Wards</u>	Patient Days
Maintenance	Area	VIP	Patient Days
Housekeeping	Area	Class 1	Patient Days
Storeroom	Pat.Days/Visits	Class 2	Patient Days
Pharmacy	Usage	Class 3	Patient Days
Nursing Admin.	Pat. Days/Visits	Class 4	Patient Days
Laundry	Pat. Days/Visits	<u>Pediatrics Ward</u>	Patient Days
Dietary (Kitchen)	Patient Days	Class 1	Patient Days
Medical Records	Admission	Class 2	Patient Days
		Class 3	Patient Days
Depreciation 3	Area	ICU	Patient Days
Overhead 4	Personnel	OB/GYN	Patient Days
		Operating Theatre	Table Minutes
		Lab	Tests
		Radiology	Procedures
		Physiotherapy	Patients
		Outpatient Clinic	Visits
		Emergency Dept.	Patients

In the case of adult wards and pediatric wards the initial stepdown will allocate costs to only the two categories, adult and pediatric wards. Later, in a "mini" stepdown, costs will be re-allocated to the various classes of wards.

It is suggested that there is no important reason to allocate costs to each outpatient department. Therefore costs should be allocated to only Outpatient Clinics and Emergency

Department. A possible exception is the Dentistry Department where separate costs may be useful.

-
- 1 Pensions, memberships, insurance, cars, housing, etc.
 - 2 Employees performing hospital services but whose salaries are not reported in hospital budget or expense reports.
 - 3 Depreciation/annuitization of buildings and land.
 - 4 Local, provincial and MOH overheads.

APPENDIX V

MORBIDITY AND MORTALITY DATA

THE TEN MOST FREQUENT DIAGNOSES IN THE OUTPATIENT DEPARTMENT OF THREE HOSPITALS IN BUKIT TINNGI PROVINCE												
DIAGNOSIS	CLASS B-43s Beds			CLASS C 60 Beds			PRIVATE 140 Beds					
	RSU ACHMAD MOCHTAR			RSU BUKIT TINNGI			IBNU SINA					
	1988			1987			1988			1987		
	Rank	%	Cases	Rank	%	Cases	Rank	%	Cases	Rank	%	Cases
Common Cold	1	7	6210	1	14	1414	1	24	2881			
Dermatitis	2	7	6060									
Tonsillitis/Pharyngitis	3	6	5997	9	1	105	9	2	995	4	8	1773
Arthritis	4	6	5875							5	6	1255
Enteritis	5	5	4988	3	6	675	3	11	1277	6	5	1127
Hypertension	6	4	4078	3	1	116				7	5	1107
Amenorrhia	7	4	4000									
Skin Laceration	8	4	3991									
Vision Check	9	4	3975									
Gastritis	10	3	2879									
Influenza				2	9	969				2	16	3566
Fever Undertermined Origin				4	6	616	4	7	827	1	23	5249
Scabies				6	3	275	5	4	542			
Upper Resp. Infection				7	2	190	7	3	391			
Food Poisoning				10	1	72						
Gum Disease							2	11	1420			
Tetnus Immunization							6	3	421			
Asthma										3	9	1984
Bronchitis										8	4	915
Cardiac Decomp./Shock										9	3	739
Rheumatic Fever				5	3	276	8	2	297			
Anemia										10	3	635
Other Causes			48 45165			54 5649			31 3790			18 4149
Total			93218			100 10362			100 12141			100 22499

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TEN MOST FREQUENT DIAGNOSIS IN THE OUTPATIENT DEPARTMENTS OF TWO HOSPITALS IN BALI						
	CLASS B 664 BEDS			CLASS D+ 94 BEDS		
	RSUP Sanglah			RSU Gianyar		
	1988			1988		
DIAGNOSIS	Rank	%	Cases	Rank	%	Cases
Upper Resp. Infection	3	Numbers		1	9	4324
Gum & Peridental Disease	7	Not		2	4	1713
Disease of Unknown Cause		Available		3	3	1484
Care of Teeth				4	3	1437
Fever of Unknown Origin				5	3	1432
Gastroenteritis	4			6	3	1404
Dermatitis	6			7	3	1273
Bronchitis/Asthma				8	2	1090
Skin Infection				9	1	677
Pharyngitits/Sinusites				10	1	521
Body Wound	1					
Conjuntivitis	2					
Mastoiditis	5					
Tonsillitis/Adenoiditis	9					
Neoplasm	8					
Heart Disease	10					
Other					66%	15355
Total Cases			208379		100%	45649
1st visit for new problem		63%	132101			
Reapeat visit for same problem		36%	76278			

DIAGNOSIS ON ADMISSION IN THREE HOSPITALS IN BUKIT TINNGI PROVINCE FROM THE TEN COMMONEST DIAGNOSES															
DIAGNOSIS	CLASS B-439 Beds			CLASS C-60 Beds						PRIVATE-148 Beds					
	ACMAD MOCHTAR			BUKIT TINNGI						IBNU SINA					
	1988			1986			1987			1988		1986		1987	
	Rank	%	Cases	Rank	%	Cases	Rank	%	Cases	Rank	%	Cases	Rank	%	Cases
Cirrhosis & Hepatitis				1	13	42	3	6	30	5		38	6	3	67
Pulmonary Tuberculosis													6	3	66
Cardiac Decomp./Shock	7	5	425	6	5	16	4	5	24	7		22	3	3	75
Rheumatic Heart Disease													5	3	79
Typhoid, + - Complications				2	11	35	1	15	72	3		69	2	4	82
Hypertensive Disease				3	10	33									2
Carcinoma													7	2	48
Bronchopneumonia							7	3	16						
Diabetes Mellitus				7	3	10	6	4	18						
Bronchial Asthma							10	2	11						
Encephalitis														3	3
Gastroenteritis	1	26	2317	4	9	26	2	10	50	1		108	1	9	210
Appendicitis	4	10	865							2		73	8	2	46
Fractures													4	3	3
Tonsillitis	2	11	988										9	2	40
Cataract	3	11	942												
Fever & Convulsions	5	9	825												
Head Injury	6	8	711												
Abortion, Incomplete	8	5	410												
Bronchitis				5	6	20	5	4	20	6		25			
Urinary Tract Infection				8	2	6	8	3	15	8		20			
Fever, Cause Unkown							9	2	11	4		44			
Other Causes		15	1311		10	127		45	219		?			68	1522
															63
TOTAL CASES		8,794		315			486			?			2,229		2,959
NUMBER OF DEATHS		518		19			19						162		213
HOSPITAL DEATH RATE		5.89%		6.03%			3.90%						7.27%		7.20%

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THE TEN MOST FREQUENT CAUSES OF DEATH IN THREE HOSPITALS IN BUKIT TINNGI PROVINCE

DIAGNOSIS	CLASS B-439 Beds			CLASS C-60 Beds						PRIVATE-140Beds								
	ACMAD MOCHTAR			BUKIT TINNGI						IBNU SINA								
	1988			1986		1987		1988		1986			1987					
	Rank	%	Cases	Rank	%	Cases	Rank	%	Cases	Rank	%	Cases	Rank	%	Cases			
Cirrhosis & Hepatitis	1	10	50	1	32	6	1	16	3	3	3	2	3	8	13	3	4	9
Pulmonary Tuberculosis	2	7	35													7	3	6
Cardiac Decomp./Shock	3	7	35	2	9	4			1	10	6		2	9	15	1	6	14
Rheumatic Heart Disease	4	6	26						3	3	2							
Typhoid, + - Complications	5	4	20	3	5	1	2	11	2	4	1	1						
Hyperetensive Disease	6	4	19	3	5	1	2	11	2				8	2	1	4	4	8
Acidosis	7	4	19															
Hemiparesis/CVA	8	3	15				2	11	2	1	10	1	1	14	22	2	5	10
Rabies	9	3	13															
Carcinoma	10	2	9							2	5	3						
Bronchopneumonia							3	5	1				4	4	6			
Intestinal Obstruction													5	3	5			
Anemia							3	5	1				6	2	4			
Diabetes Mellitus				3	5	1				4	1	1	6	2	4	5	3	7
Bronchial Asthma				3	5	1							7	2	3	6	3	7
Encephalitis																8	2	6
Gastroenteritis																9	2	5
Tetanus																10	2	5
G.I or G.U. Bleeding				3	5	1	3	5	1									
Sepsis Incl. Peritonitis				3	5	1	3	5	1									
Appendicitis										2	5	3						
Renal Failure							3	5	1									
Other Causes		52	288		16	3		21	4		59	35		54	87		65	138
TOTAL DEATHS		518		19			19			59			162			213		
REPORTED ADMISSIONS		8,794		315			486			?			2,229			2,959		
HOSPITAL DEATH RATE		5.89%		6.03%			3.90%			?			7.27%			7.20%		
BOR/LOS		53.8%/19		43.5%/17														53.8%/6

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APPENDIX VI

**A HEALTH CARE EQUIPMENT MANAGEMENT
AND
MAINTENANCE SYSTEM**

A HEALTH CARE EQUIPMENT MANAGEMENT AND MAINTENANCE SYSTEM (HMMS) FOR LESS DEVELOPED COUNTRIES

Gerald N. Siegel, MBA
&
Paul Zukin, MD, MPH

THE PROBLEM

A serious and pervasive problem in most less developed countries is the wastage of resources and constraints on the delivery of health services due to lack of proper use and maintenance of health care-related equipment. As determined by WHO, the common factors contributing to the wastage are: underutilized sophisticated equipment; inexperience of operators and lack of maintenance and repair; lack of needed accessories and spare parts; excessive down time; inadequate foreign exchange causing unfavorable purchasing contracts; and failure to secure maintenance and repair agreements from contractors and suppliers at the time of purchase. Collectively, at any one time, these may reduce the availability of functioning health care equipment by as much as forty percent.

There are many facets to be dealt with in addressing this problem. These include among others: lack of policy and commitment at the top levels of the health establishment and government; legal, institutional and cultural factors; lack of adequate skills and knowledge to operate and maintain equipment, i.e., inadequate technical infrastructure; an insufficient pool of appropriately trained staff; and insufficient financial resources. It is to deal with many of these aspects of the overall problem that HMMS has been designed.

ADDRESSING THE PROBLEM

The HMMS is a personal computer (IBM compatible), based system for improving maintenance and management of health care-related equipment. Although originally developed for use by sophisticated health care facilities composed of multiple facilities of different size and levels the system is highly flexible and thoroughly adaptable to one or more institutions of any degree of complexity.

HMMS addresses four key areas:

- Regulatory Compliance and Preventive Maintenance--The specific activities needed to comply with regulatory and insurance requirements as well as to satisfy sound engineering and maintenance procedures and priorities.
- Capital Budget Forecasting
- Human Resource Planning and Productivity Analysis
- Networking

1. Regulatory Compliance and Preventive Maintenance:

- Defines preventive maintenance activities of health care-related facilities or their equipment to any degree or level desired.

- Specifies the tasks or activities to be undertaken, when, where, by whom and at what cost.
- Includes pertinent references to regulations, codes and manufacturer's specifications for each equipment item.
- Permits specification of exact parts and tools required for each equipment maintenance activity.
- Can provide printed messages or specifications tailored to enhance safety precautions or operating requirements in respect of each piece of equipment and each preventive maintenance activity, scheduled or unscheduled.
- Facilitates tracking of acquisition of any or all pieces of equipment or hazardous material or reagent as well as its usage and disposition.
- Permits cross-referencing of data on each piece of equipment's history records and maintenance work orders.

2. Capital Budget Forecasting

- For the many pieces of equipment and maintenance activities performed each year, HMMS factors in varying lengths of expected use life and individual histories of repair, so as to enhance planning for orderly replacement of capital items over a budgeting horizon, generally, one to ten years.
- The HMMS data base has defined fields for purchase and useful life information on each specific equipment unit, as well as life-to-date maintenance costs, including parts requirements, for each work order, thus facilitating analysis and decision making and for setting standards in respect of contracting with manufacturers for service and spares at the time of purchase.
- The HMMS has standard reports which, for example:
 - allows users to select pieces of equipment whose ratio of purchase cost to maintenance cost exceed a user prescribed ratio.
 - indicates when the useful life of individual pieces or groups of equipment can be expected to expire and will need to be replaced, at various points of time in the future.

3. Human Resource Planning and Productivity Analysis

- Cost containment in health facilities is an increasingly important imperative worldwide. Maintenance and management of health care equipment impacts the operating budgets of most hospital departments and itself is impacted directly by these budgets. In engineering and maintenance this has resulted in the need to place exacting controls on expenditures both for labor and energy. Constrained labor budgets means that the same work has to be done with less staff, or that more responsibilities have to be placed upon existing staff. Engineering and maintenance directorates need to know what skills are required at specific points in time to perform work of varying degrees of priority--from scheduled preventive maintenance to urgent repairs and renovation. Using this type of information

facilitates human resources planning for training, staff development and posting. It permits comparing the demand for labor against the available pool of skills and the making of informed decisions on where and when to deploy staff. Related to all of this is the need to be able to measure staff productivity on an ongoing basis in order to achieve if not the highest, at least an acceptable level of labor "yield".

- Standard reports in the HMMS allow one to generate manpower planning schedules for various maintenance activities using a variety of selection criteria. Specific staff or skills can be assigned to individual pieces of equipment so that planning reports in respect of specific individual or skill productivity can then be generated.
- Other standard reports allows one to charge labor time and cost to work orders, scheduled or unscheduled, either for individuals or skills. These reports then allow one to account for the time spent by staff for different selection criteria, such as by time period or activity. Additional reports permit one to measure labor efficiency by comparing actual job time to predetermined job standards.

4. NETWORKING

The HMMS has the capability of accessing the data base from one generating source, or "hub", by another hub, or at headquarters level. This capability requires that the computer program (software) can support remote communication between PCs over telephone lines or local area networks (LANs) and, of course, generate printed reports to be sent by post or other means.

17 November 1988