DEVELOPING A HEALTH SERVICES SIMULATOR[1]

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Summary

The development of a health services simulation model is described below. The main subroutines comprising the model are designed to (1) predict system entry, (2) simulate care delivery, (3) determine costs and (4) portray status of health information. The status of model development and results of initial tests are discussed.

Introduction

The primary objective of this model is to provide a means to determine the effect of alternative resource allocations on the output of medical services. When this model is completed, it is anticipated to be of sufficient sensitivity for application to relatively large standard metropolitan statistical areas (population of 500,000 or more).

Health care organizations, medical staffs, private physicians, community and governmental agencies at all levels grapple the problem of delivering adequate health care to the population. The problem has been intensified by the sharp acceleration of the rise in costs of health care and also from the apparent lack of application of modern scientific techniques in the planning for and evaluation of public and private health expenditures.

In 1969, Henrik L. Blum[3] pointed out "A full range of technological skills is required to devise and carry out the necessary assessment of health status, resources, services, unmet and overmet needs." The synthesis of the Health Services Simulator under development is based upon several theories which have been practically applied to similar problems.[4-8]

Prediction of the demand for medical care in terms of initial visits* are based on current and projected statistics descriptive of the environment relating to population, public policy, medical supply, and simulated crises. The salient characteristics of the patient/health care system interactions are simulated using the following information: (1) initial visits, (2) current system occupancy, (3) existing system structure, (4) physical constraints, (5) medical prognosis, and (6) public policy. This simulation will describe the medical experience of the population and the allocated resources. These resources in terms of physical units will be analyzed using supply curves and production functions for specialized inputs. This analysis determines the costs of the medical services corresponding to the medical experience of the population and also determines the availability of medical resources. The demographic characteristics and the medical experience of the population will be used to furnish status of health information for the population under study.

The proposed computerized Health Services Simulator is comprised of six main subroutines:

RAPB. Regression Analysis Patient Builder will use the technique of multiple regression analysis to predict initial visits by nine age categories. Initial visits will be forecast in terms of demand rather than need because of the difficulty of accurately defining, measuring, and predicting need. The model will, however, deal with problems normally labeled need by employing the concept of potential demand. The Regression Analysis Patient Builder can, for example, be adjusted to reflect the increased demand for health care that would occur if a minimum income level were maintained. The Regression Analysis Patient Builder can also be adjusted to simulate the effects of changes in the pricing policy of the health care delivery system (e.g. prepaid, free to user, etc.).

MORAS. Medical Outcome/Resource Allocation Simulator is the subroutine that depicts the medical experience of inpatients and outpatients in the health

*Initial visit is defined as the initial visit for "this episode of this diagnosis."

care system. Simulation is the most practical mathematical method for describing the patient-system interactions, as the actual delivery of care depends on the patient's age and morbidity class and the availability of resources such as doctor/nurse/technician expertise, medical supplies and equipment, and medical care institutions.

CPA. Cost/Productivity Analyzer will use production functions to determine the number of required resources of various types as a function of the simulated medical care (an output of MORAS).

EEP. Economic Evaluation Program will process information from the Cost/Productivity Analyzer (required resources for medical care). The Economic Evaluation Program uses a set of supply curves to determine the cost/price structure for goods and services and the availability of those resources in terms of physical constraints.

CUES. Cost Utilization Experience Summarizer is a reporting mechanism. CUES records the simulation and summarizes the results in a readily comprehensible form useful to health planners and administrators.

SHI. Status of Health Indicator subroutine will provide (1) a series of matrices summarizing patient medical experience and costs at varying levels of aggregation, (2) the most appropriate health index available, and/or (3) a health index or measurement defined by the user provided the necessary data are available from the Health Services Simulator output. This flexibility is essential for health planners who must defend their choice among alternative programs in a political process.

The six simulation modules, by predicting inputs into the health care system, analyzing the medical experience of patients (taking into account personnel and material resources availability), predicting the costs, and measuring the effects of health plans and programs, collectively represent an invaluable decision-making tool. Other methods exist for achieving the output results of each subroutine. However, the subroutines are designed so that their inputs and outputs are integrally related in describing overall system dynamics. This description furnishes vital information of interaction among facets of the health systems, allowing evaluation of proposed changes in any or all subsystems with respect to the total system outputs.

The proposed Health Services Simulator is a closed-loop model from the standpoint of system dynamics but open loop from the standpoint of public policy, system structure, medical technology (medical prognoses), and crises. It is only partially closed loop from the standpoint of individual behavior. The variables with respect to which the system is open loop are of necessity those variables which fall in the general class of being influenced significantly by the dynamics of systems other than the health system. These variables are the control variables (some of which are input data) for the Health Services Simulator and allow the simulation of the various proposed alternatives and/or changes in technology and environment. The outputs in terms of medical experience and costs will furnish vital information to the comprehensive health planner/decision maker for the formulation of proposed alternatives (control variables). It is probable that the results of current research by others in the field of health indices will allow the formulation of cost-effects analysis including the direct cost of goods and services and the indirect cost of patient dysfunction.

Some Initial Results

The description of the health of a community divides into two components. One, that of the system for the delivery of health care, includes the patient-system interaction. The second is that of the population and environment. Therefore, the description becomes one of predicting initial entry into the system and simulating the patient-system interaction.

The prediction required is the number of initial physician contacts for "this episode of this diagnosis" per simulation increment. Since the evaluation of economic loss due to morbidity is desirable, these initial contacts must at least be stratified by age. Thus the prediction portion of the Health Services Simulator will consist of as many regression equations as age groups (currently nine).

The currently proposed utilization of the prediction scheme is depicted in Figure 1. Annual averages for pertinent historical data will be used to calculate prediction equation coefficients, which will be applied to projected data for the independent variables. This allows the prediction on an annual average basis of initial contacts or case load. Such predictions will be adjusted for seasonal, day of the week, and random variations to generate daily estimates. Hypothetical epidemic and disaster initial contacts can be added also.

Predicting Patient Loads

Based on a set of pilot studies in predicting patient loads initiated to test the feasibility of using multivariate regression analysis for the purposes outlined earlier, satisfactory results can be expected at least on a national basis, with indications that this prediction technique also is applicable on a statewide basis. The variables currently being analyzed are described below.

Nine dependent variables are described which indicate the number of initial contacts for each of the following age groups in the population under study. These age groups are: under 2 years, 2-5, 6-14, 15-29, 30-44, 45-64, 65-74, 75-84, 85 and older.

Data on the following independent variables are considered in each prediction equation for the above nine dependent variables.

Category of Independent Variables and Measure (Annual Data):

1. Population: Number of people in corresponding age groups and total population.

2. Income by Five Variables: Percent of households in each of the following income groups: \$3,999 and less; \$4,000-\$9,999; \$10,000-\$14,999; \$15,000 and more--median disposable income.

3. Public Expenditures for Health by Four Variables: Dollar expenditures by all levels of government and by foundations for (a) care, (b) public health, (c) research and construction, and (d) all else related to health.

4. Private Expenditures by Two Variables: (a) Private insurance benefits paid and (b) private consumer expenditures for health care.

5. Available Physicians: number of.

6. Available Hospital Beds: number of.

Initial selection of the above variables was determined by factors which relate to health under the general headings of need, economic status, culture, proximity to service, and patients' perceptions of the availability of care. While these variables cannot be claimed to measure accurately these five factors, they are related variables on which data are readily available. Some additional measures of private and governmental insurance coverage are currently being considered.

A regression analysis of private physician visits on a national basis have been presented earlier.[9] Results of a similar analysis of hospital admissions on a state basis are summarized in Tables I and II. The regression equations presented in Table I were developed from 1957-1966 admissions by state. They were then tested against 1967-1969 data (Table II).

An analysis of variance on the errors found Equation 2 to differ from the others. If the prediction of admissions is desired, then Equations 1, 3, and 4 seem equally suitable.

Predictive capability of any regression analysis is contingent upon the consistency of the measures of the independent variables. For example, if the role of the physician changes radically, one cannot expect predictive capability. However, even though the role of the physician, the admission policy for hospital beds, and the manner in which public expenditures for health were utilized may all have changed in the time period 1957-1967, the models have a surprising predictive capability.

Data on initial visits to physicians in private practice have been acquired by nine census regions from Lea, Incorporated, for the period 1960 through 1970. Nonprivate practice initial visits can be estimated from the outpatient statistics in the Guide Issue of Hospitals. These statistics are compatible with those from Lea when the emergency room visits in nongovernmental hospitals reported in Hospitals are compared to the private practice initial visits in hospitals. Emergency room visits will be used as a surrogate for initial visits to nonprivate practice hospital-based outpatient services.

The primary difficulty with constructing our demand prediction models for initial visits will be the reliability of physician visit statistics. However, estimates of total visits for particular states or Standard Metropolitan Statistical Areas can be checked by estimating visit cost and physician income.

Simulating Care Delivery

The present organizational concept of the personal health care delivery system (Figure 2) is based upon the functional aspects of care with the principal criteria being intensity of care and severity of medical condition.

The boxes represent types of functional care, the circle patients who will return to the outpatient care function for "this episode of this diagnosis," and the diamonds decisions regarding care; viewed collectively, these describe a sorting process. This organization is similar to the characterization of the emergency medical care subsystem by Webb[10] and the organization of health services described by O'Donahue.[11] During each simulation increment, patients within the system occupy appropriate functional care locations and the repeat patient pool. Definitions of the locations are mutually exclusive so that multiple state occupancy by individual patients is not permitted (Appendix).

This functional care organization and its associated definitions form the basis for the simulation subroutine model, Medical Outcome/Resource Allocation Simulator, reflecting the existing system structure and constraints. However, the organization and definitions (Appendix) are so structured that additional care functions can be added and presently considered functions can be subdivided and/or combined to allow analysis of any postulated organization of health care delivery, provided the associated data are available or can be estimated.

The outcome, or medical experience of the patients, is a function of medical prognoses and the availability of resources, both of which are functions of the medical classification of patients, their age, and level of care.

For use in the Medical Outcome/Resource Allocation Simulator, a morbidity classification of patients has been developed which is broader than a simple classification of morbidity in that it includes all other legitimate users of health services as well as the clearly sick (Table III). "System contacts" such as uncomplicated pregnancy, well children, job applicants, and correctable procedures are included. (For the theoretical development of the morbidity classification, see reference 12.)

The main effort in this area was to develop for input into a macro model of the personal health care delivery system a useful classification of morbidity which reflects the demands upon the system. This classification permits development of the patterns of movement of system contacts between treatment situations, patterns which are not necessarily accomplished by using diagnostic categories or qualifying characteristics.

Patients are classified according to resource demand based upon three axes for classification: (1) the institutional setting of a dichotomy of inpatient/outpatient care (which is capable of being expanded as desired to include more specificity, as clinic or private practice, or type of hospital); (2) the expected duration of treatment as it relates to the functional care level by frequency of visit or duration of episode; (3) the objective of treatment, whether to cure, to contain the condition, to reduce impairment, to screen, or for surveillance.

Classification of patients and the functional level of care are related. With respect to outpatient care, public health and preventive measures such as mass immunizations, screenings, and mass x-rays under the study definitions are public in scope rather than a part of the personal health care delivery system. Multiphasic screening is presently being considered as a public health or preventive measure. Other types of preventive measures are performed in the personal health care system and are included in the function of outpatient care. Examples are physical exams, immunizations, and screenings that are customarily performed for the individual by the practitioner.

The functional care level "Bed Care" represents the routine care provided by the short-term general hospital. Further qualification such as "Intensive" represents those beds found in hospitals for the purpose of surgical recovery, coronary care, premature infants, and possibly nursery, which are associated with higher capital outlay, skilled nursing and technical care, monitoring, etc., all of which result in considerably higher care costs. "Operating Room Care" represents a specialized function occurring in a hospital. The "Delivery Room Care" function relates to obstetrics and includes the labor, delivery, and recovery rooms--the obstetrical suite. "Bed Care," "Intensive Bed Care," and "Operating Room/Delivery Room Care" are restricted to hospitals.

"Extended Bed Care" represents long-term hospitalization where the daily care is more of maintenance and support than for acute illness. In conditions requiring prolonged recovery from acute illness, "Extended Bed Care" represents a phase when hospital nursing care is reduced to a minimum level and restorative measures become more active.

The "Nursing Bed Care" function represents a 24-hour nursing care requirement, whereas "Custodial Bed Care" may have a nursing requirement but not around the clock.

Existing data are being utilized as a basis for developing the initial input required for simulation. This initial data input is being developed by utilizing the best available professional knowledge, including that of selected faculty members of a nearby medical school, private practitioners, and institutional practitioners, all of whom have agreed to serve as consultants to make determinations as required. These panels of physicians have specialty interests such as obstetrics and psychiatry as well as areas of general interests such as ambulatory care, geriatrics, and trauma.

To gain experience in simulating the delivery of care, the following areas of medicine are currently under investigation separately: pediatrics, trauma, mental health, cardiovascular conditions, chronic respiratory conditions, and pregnancy. After data on these areas have been completed, data for the simulation of the aggregation of all medical care will be developed.

It is recognized that professional judgments elicited from experts may have a bias related to their professional experience and activities. Accordingly, a method somewhat similar to the Delphi technique for discounting such bias is being employed. This is exemplified by the plan for developing input for the care of pediatric patients. One panelist, a faculty member of a local medical school, may have a bias towards university hospital care including the emergency room pediatric clientele; another represents a large non-profit hospital-based clinical group; others include several private practitioners with a middle class residential clientele and a large military dependent population. Agreement as to the balance of pediatric care is expected to evolve and guide the preparation of input data.

The initial investigation of the previously mentioned medical areas has caused two revisions in the categorization of patients. The output classes have been subdivided on the basis of number of visits (Table IV) and the difference in care requirements between newborns and others in the under-two age group patients necessitates the addition of a newborn patient group. Tables IV and V are questionnaires used in data collection for the simulation of patient flow through the system.

Currently, personnel utilization information is being collected and collated for use. Nursing consultation has been utilized in this endeavor and the staff has collated the nurse resource requirement for pregnancy. Medical and surgical nursing usage is available from the Shared Management System studies of the Texas Hospital Association.

Confidence in the ability to utilize the classification system has been reinforced by its acceptability by consultants.

Particularly useful data have been acquired from Lea, Incorporated, on private physician visits; from the Commission on Professional and Hospital Activities on hospital stay and transferral statistics; from the Hospital Administrative Services on hospital costs; and the Basic Utilization Review Program and the National Center for Health Statistics. Hospital discharge abstract data are expected to become available. Local studies by students on visits and admissions, records from private practices, commercial services for private physicians, samples of local data on hospital-based outpatient visits, neighborhood health clinics, and nursing home records also have been accumulated.

Economic Analysis

At its current stage of development formal economic analysis has been a part of the development of three facets of the simulation model. First a micro model of maximizing behavior was used to explain the demand for health care. The individual was viewed as attempting to maximize his welfare while faced with a sick time and an income function. Conditions for welfare maximization were derived and the reduced-form demand function was obtained. The demand curve was aggregated to the economy as a whole and converted into an expenditure function. National time series data were then used to test the assigned relations. In no case did the regression coefficient signs of the test results deviate from the expected signs when the variable in question was statistically significant.[13]

The theoretical foundations developed in the formulation of the demand curve for medical care formed the basic Regression Analysis Patient Builder used in the prediction of initial entrants into the health care system.

The second and third facets of the simulation model that incorporate explicit economic analysis are the Cost/Productivity Analyzer and the Economic Evaluation Program. In these phases of the simulation model, health care units required to provide the simulated health care usage are converted by production functions into resource requirements which are converted into cost figures by supply curves for each input category.

Several production functions have been estimated on the macro level and the results appear promising. Comprehensive production functions for hospitals are to be estimated using American Hospital Association data when the existing data **are** adapted to our requirements. Supply curves for some 20 hospital care inputs have been estimated, and supply curves will be estimated on national and subregional data as collected.

Programming

The calling sequence of the main subroutines is shown in the flow chart in Figure 3. After initial input data are read, the Regression Analysis Patient Builder (RAPB) is called. Before the Medical Outcome/Resource Allocation Simulator (MORAS) is called, the RAPB calculates the statistical characteristics of the initial visits for one year. The MORAS then simulates the patient-system interaction for one year. The Cost/Productivity Analyzer (CPA) and the Economic Evaluation Program (EEP) are called consecutively to determine the amounts, availability, and costs of all medical care resources for the same year. The Cost Utilization Experience Summarizer (CUES) is called and pertinent information stored for output. If the end of the simulation run has not been reached and no new inputs are to be read, the RAPB is recalled and the same sequence of events ensues with new availability limitations defined by the previous sequence. The same chain of events takes place unless new inputs are required during the simulation run, in which case the inputs are read at the appropriate time. This sequence proceeds to the end of the simulation run, a maximum of ten years. When the end of a simulation is reached, the CUES is called for updating purposes; the Status of Health Indicator (SHI) is called, and the CUES is updated with the SHI information.

The procedure is repeated as necessary for requested alternatives. The CUES is then called for output purposes.

Discussion

The significance of developing the Health Services Simulator is apparent in the contributions to be made to basic and applied research and to health education. For example, the Health Services Simulator could be used to gauge the impact of the several proposed methods of national health insurance. The ultimate goal of these studies would be a projection of the costs, required resources, and medical experience of national health insurance. In addition, effects of the recently proposed Health Maintenance Organizations for the provision of health services can be derived from the model after estimations have been made of the impact of HMO's on the economic inputs.

Two common suggestions for improving medical services at all levels are: (1) increase the use of paramedical personnel, and (2) encourage group practice. The model allows examination of the implications of these suggestions in terms of changes in hospital utilization rates, total outpatient productivity, hospital average lengths of stay, patient fees, nursing home average lengths of stay, etc. For instance, once the assessment of effectiveness and of patient acceptance of physician support personnel (physician substitutes) have been delineated, the model will be able to predict the effects of substituting such personnel throughout the system.

Further, regional planners are taking a more active role in deciding how many hospital beds are needed to meet the demands of a community. The simulation model will assist them in measuring current demands and forecasting future admissions under competing proposed public policies. This feature will be of considerable interest to metropolitan areas.

The versatility of the medical classification scheme allows the use of the Health Services Simulator to investigate the totality of medical conditions of a community and/or the investigation of any particular diagnosis or diagnosis group. The application to a particular diagnosis or diagnosis group requires appropriate data with at least one classification group retained for the inclusion of all other health care system patients. This type of application readily furnishes the basic information required for evaluating preventive programs.

Additionally, the successful development of the Health Services Simulator will allow the inclusion of the most currently developed micro models of the health systems as subroutines so that their suggested improvements in certain health subsystems can be evaluated in the context of the health system's operations as a whole. The development of the Health Services Simulator also will provide important insights into the development of evolving health information systems.

Among educational activities, the

model will be an effective teaching aid in public health and health care administration curricula. Students as well as decision-makers will have the capability to manipulate various "what if" situations. Short-term continuing education courses can be developed for public health officials, hospital staffs, and other health care planners.

The most significant gain is a perspective on the system, a long view and an overall view from which better decisions can be made. This perspective will be gained through the application of systems analysis methods to health. The existing health care systems as well as plans for new or revised systems can be analyzed for their adequacy to meet the health care demands of the American people.

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Appendix: Definitions for The Health Services Simulator

Population

1. population--all persons who live within the geographical boundary of an area.

2. patient--a population member healthy or not who makes a demand for care on the personal health care system.

Health Systems

1. health care system--the whole of all related but not necessarily coordinated parts (facilities, services, and resources) which afford the means for the prevention and detection of disease as well as for the treatment of patients.

2. public health system--those elements of the health care system directed to prevention and detection of disease among the population and education methods of those programs. Distinguished from personal health care system.

3. personal health care system--all functional services, and the required resources and facilities, performed by physicians and their associates in a professional capacity in treating individual patients. It does not include those health care services considered as public or mass preventive efforts. It does include what the physician would do in his office for patients as a preventive measure; e.g. immunization, screening, etc.

Functional Types of Care

Outpatient:

1. outpatient care--personal health services for a patient not

formally admitted to an inpatient care function. It includes any or all of the physician's services, special services (x-ray, laboratory, physical therapy, etc.), diagnostic capability, and necessary therapy including prescription service. It may include special diagnostic and therapeutic procedures performed by the attending physician (or under his direction) but not considered part of the usual work operation or follow-up clinic visit; such procedures are often those for which extra equipment, space, or assistants are needed and for which a separate charge may be made.

2. initial visit--patient's first system contact for this episode of this diagnosis, patient's first outpatient visit.

3. subsequent outpatient visit--ensuing outpatient visit or visits for diagnosis, treatment, or disposition.

4. repeat patient pool--a mechanism used for keeping track of outpatients between visits.

Inpatient:

1. inpatient care--all types of bed care (including operating room/delivery room care) for a patient who is lodged, fed, and attended as well as medically treated; distinguished from outpatient.

2. bed care--that care rendered in an acute, short-term hospital environment which includes continual nursing and personal service with regular physician contact.

3. intensive bed care--that hospital care consisting of highly sophisticated monitoring techniques requiring additional as well as costly equipment and a comparatively high proportion of skilled nursing time and physician contact.

4. operating room/delivery room care--that hospital care performed in an operating room/delivery room suite including labor and recovery rooms.

5. extended bed care--that care consisting of continuing nursing and personal service with physician supervision and significant rehabilitative services.

6. nursing bed care--that care consisting of continuing nursing and personal services.

7. custodial bed care--that care consisting of continuing personal service.

FIGURE 1

REGRESSION ANALYSIS PATIENT BUILDER FLOW CHART

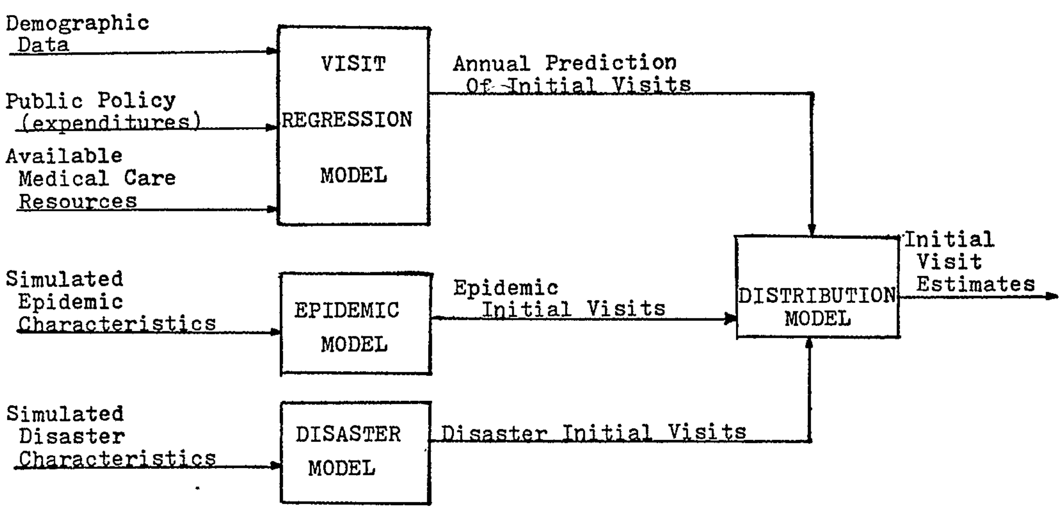
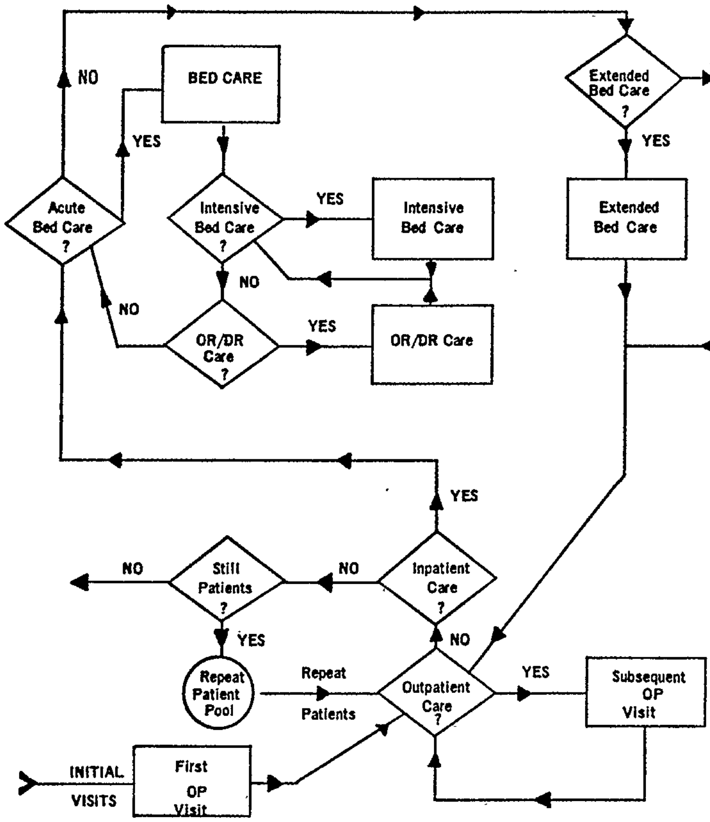


FIGURE 2

PERSONAL HEALTH CARE SYSTEM ORGANIZATION FOR THE MEDICAL OUTCOME/RESOURCE ALLOCATION SIMULATOR



Inputs - A. Structural
1. Existing Structure
2. Proposed Alternative System Revisions

B. Data
1. Current System Occupancy
2. Medical Prognoses
3. Initial Visits from RAPB
4. Availability of Resources from CPA and EEP

Outputs - A. Medical Experience

B. Allocated Resources

FIGURE 3

HEALTH SERVICES SIMULATOR PROGRAMMING CHART

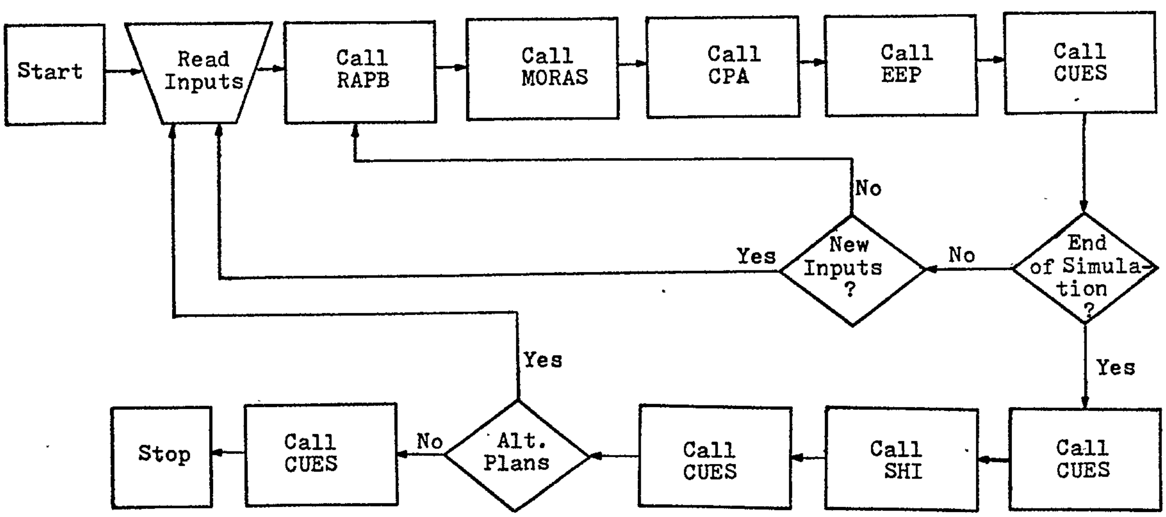


TABLE I

Regression Equations Statistics

Total Admissions Independent Variables	Equation 1 Coefficient (Std. Error)	Equation 2 Coefficient (Std. Error)	Per Capita Admissions Independent Variables	Equation 3 Coefficient (Std. Error)	Equation 4 Coefficient (Std. Error)
Population *	.0718 (.00310)				
Physicians		-.0086 (.00238)	Physicians Per Capita		
Population ---- 0-17 *		.1950 (.01733)	Percentage of Population 0-17	.1785 (.01853)	.1569 (.02015)
Population ---- 18-44 *		-.0707 (.02082)	Percentage of Population 18-44		
Population ---- 45-64 *		-.0714 (.02037)	Percentage of Population 45-64		
Households* With Annual Income Less than $7,000		.00104 (.00018)	Percentage of Households With Annual Income Less than $7,000		
Households* With Annual Income More than $10,000		.0007 (.00033)	Percentage of Households With Annual Income More than $10,000		-.00076 (.00012)
Short-term General and Other Special Beds	.0158 (.00081)	.0218 (.00086)	Beds Per Thousand Population	.02566 (.00072)	.0458 (.00838)
Public Expenditures for Health*		.00027 (.00007)	Public Expenditures for Health Per Capita		
Time Series Variable		2.328 (.54833)	Time Series Variable		.00160 (.00022)
			$[\text{Beds Per Capita}]^2$		-.00277 (.00108)
			$[\text{Public Expenditures for Health Per Capita}]^2$		.00000475 (.0000014)
Constant Term	8.01	-144.27		-.026	-.145

Overall Regression Equation Statistics	Equation 1	Equation 2		Equation 3	Equation 4
F - Value	22,426.	9,272.		641	261
Standard Error	34,400.	25,300.		.0087	.0080
Coefficient of Determination	.9913	.9954		.77	.80
Mean, Dependent Variable	422,300.	422,300.		.134	.134
Standard Deviation, Dependent Variable	368,400	368,400.		.018	.018

* in thousands

TABLE II - AVERAGE ABSOLUTE ERRORS

Regression Equation	1967	1968	1969
1	4.16%	4.56%	4.79%
2	7.11%	9.67%	8.25%
3	4.46%	5.42%	4.80%
4	5.29%	5.99%	5.51%

TABLE III

MORBIDITY CLASSIFICATION OF PATIENTS

Class 1. Those patients who have a transitory condition of short duration and will recover with outpatient care. Included are people who present themselves for physical exams, preventive procedures, preadmission workup, and consideration of symptoms of short duration.

Class 2. Those patients who are hospitalized and are expected to be cured; care in this case is definitive. Examples: patients requiring herniorrhaphy, fracture reduction, or treatment of acute lobar pneumonia. These cases remain as Class 2 after discharge from the hospital and while undergoing outpatient care. They are similar to Class 1 except that they are specifically post-hospitalization care.

Class 3. Those patients who have a chronic condition, but whose impairments are expected to be contained on an outpatient basis. Treatment is usually extended. Included are patients with multiple complaints and diagnoses as well as those with symptoms of long standing.

Class 4. Those patients who are hospitalized and are not expected to be cured, but their condition is expected to be contained. They may be multiple diagnosis cases suffering from conditions such as cardiovascular, respiratory, or arthritic. These cases remain as Class 4 after discharge from the hospital and while undergoing outpatient care. They are similar to Class 3 except they are specifically post-hospitalization care.

Class 5. Those patients who are hospitalized but whose care is of a lesser extent than Class 2 or 4. Examples: bedridden tuberculars, hospitalized psychiatric patients and those cases expected to recover following extended care. These cases remain as Class 5 after discharge from the hospital and while undergoing outpatient care. They are similar to Class 3 except they specifically require post-hospitalization care.

Class 6. Those patients who are impaired but not hospitalized and do require nursing or custodial care. These cases remain as Class 6 after discharge from an institution and while undergoing outpatient care. They are similar to Class 3 except they specifically require post-institutional care.

Pregnancy: Those patients who are pregnant and make a demand on resources.

CLASS ________

AGE GROUP _____

TABLE IV

OUTPATIENT CARE CHART

1	2	3	4	5	6	7	8	9	10	11	12
Duration* (In Weeks)	Avg. # of Visits	Percent**	Number of Visits for this Episode***		Recovery****	Hospital	Ext. Care	Nurs. Care	Cust. Care	Die	Total %
			Group A	1							100%
			Group B	2 3							100%
			Group C	4 5 6 7							100%
			Group D	8 9 10 11							100%
			Group E	12+							100%
			Group F	Indef.							

*Average length of time as an outpatient

**Column must total 100%

***Before Disposition

****Recovery or loss to the system

Class ______

Age Group ______

TABLE V

INPATIENT CARE CHART

Average Length of Stay and Disposition Distribution

Patients Who Move From: ↓ To: →		Repeat Pool	Bed Care	Intensive Bed Care	OR/DR	Extended Care	Nursing Care	Custodial Care	Die		Total
Bed Care Prior to IC and/or OR/DR	LOS		XXXXXXXX								XXXXXXXX
	%		XXXXXXXX								100%
Intensive Bed Care	LOS	XXXXXXXX		XXXXXXXX		XXXXXXXX	XXXXXXXX	XXXXXXXX			XXXXXXXX
	%	XXXXXXXX		XXXXXXXX		XXXXXXXX	XXXXXXXX	XXXXXXXX			100%
OR/DR	LOS	XXXXXXXX			XXXXXXXX	XXXXXXXX	XXXXXXXX	XXXXXXXX			XXXXXXXX
	%	XXXXXXXX			XXXXXXXX	XXXXXXXX	XXXXXXXX	XXXXXXXX			100%
Bed Care Subsequent to IC and/or OR/DR	LOS		XXXXXXXX								XXXXXXXX
	%		XXXXXXXX								100%
Extended Care	LOS			XXXXXXXX	XXXXXXXX	XXXXXXXX					XXXXXXXX
	%			XXXXXXXX	XXXXXXXX	XXXXXXXX					100%
Nursing Care	LOS			XXXXXXXX	XXXXXXXX		XXXXXXXX				XXXXXXXX
	%			XXXXXXXX	XXXXXXXX		XXXXXXXX				100%
Custodial Care	LOS			XXXXXXXX	XXXXXXXX			XXXXXXXX			XXXXXXXX
	%			XXXXXXXX	XXXXXXXX			XXXXXXXX			100%

LOS--Average Length of Stay in Days (except OR/DR in Hours) Prior to Moving to Disposition

%--Percent of Patients Moving to Another Disposition. Must Equal 100%.