COMPUTER SIMULATION OF A FAMILY PRACTICE CLINIC

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NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

COMPUTER SIMULATION OF A

FAMILY PRACTICE CLINIC

by

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June 1973

T154912

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Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN OPERATIONS RESEARCH

from the

NAVAL POSTGRADUATE SCHOOL
June 1973

ABSTRACT

A simulation model of the Family Practice Clinic at Silas B. Hays Army Hospital, Fort Ord, California, is presented. The inputs to the model are the number of doctors, number and type of support personnel, number of waiting and examination rooms assigned and available to the clinic, and the population of potential patients assigned to each doctor, categorized by sex and age. The outputs of the model are the percentage utilization of doctors, support personnel, waiting and examination rooms, and the distribution of various waiting times for those being served by the clinic.

The purpose of the model is to permit hospital administrators to estimate the optimal number of families to assign each doctor in a Family Practice Clinic, and to estimate the support personnel and physical space required to effectively operate the clinic.

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I. INTRODUCTION

A. BACKGROUND

The American Medical Association (A. M. A.), the Department of Defense, and the Army, Navy, and Air Force are attempting to shift a large portion of medical practice from the impersonal realm of the specialists to that of a new generation of general practioners.

One of the most often heard complaints from patients about medical specialists, both civilian and military, is that the patient believes that the specialist is treating a disease or sympton and not the whole patient. Further, in the military community, the patient is often not able to see the same specialist for his follow-up treatment.

As the result of a felt demand, there has been an increase in the emphasis on the human relations aspect of family medical care. The U. S. Army has selected the Silas B. Hays Hospital at Fort Ord, California, as one of two Army hospitals to initiate an experimental program to provide family medical care to active duty and retired military personnel and their dependents. The new program is called the Family Practice Clinic, and is directed toward creating more of a "country doctor" atmosphere within the military community by assigning one doctor, a specialist in Family Practice, to provide medical care for a specific group of families.

The Family Practice Physician, or Family Physician, has been trained to provide primary care in such speciality areas

as pediatrics, obstetrics and gynecology, internal medicine, etc., and is able to provide total care for about 80% of the occurring medical problems. When necessary, the Family Physican will consult with other specialists to insure that his patients receive the best possible medical care.

Active duty and retired military personnel taking part in the Family Practice Program and all of their eligible family members will have one doctor whom they will see first for an illness, injury, pregnancy, and for routine matters such as well-baby exams, Pap tests, periodic check ups, etc. The same doctor will care for family members whether out-patients or admitted to the hospital.

Prior to the start of the Family Practice Clinic in January 1973, Hays Hospital was providing medical care for approximately 28,000 families, or about 85,000 individuals, plus 9,000 recruits assigned to Fort Ord for basic and advanced infantry training. The hospital staff in January 1973 was approximately 107 physicians, 145 nurses, and 1,240 other support personnel.

B. CLINIC DESCRIPTION AND OPERATION

The Family Practice Clinic began operation with four physicians, two nurses, two nurse clinicians, two medical aides, and four clerk-receptionists shared with the General Medical Clinic. The Family Practice Clinic, shown in figure 1, is located in Hays Hospital adjacent to the General Medical Clinic. The two nurse clinicians share the office indicated in the figure. The staff has access to the full range of laboratory

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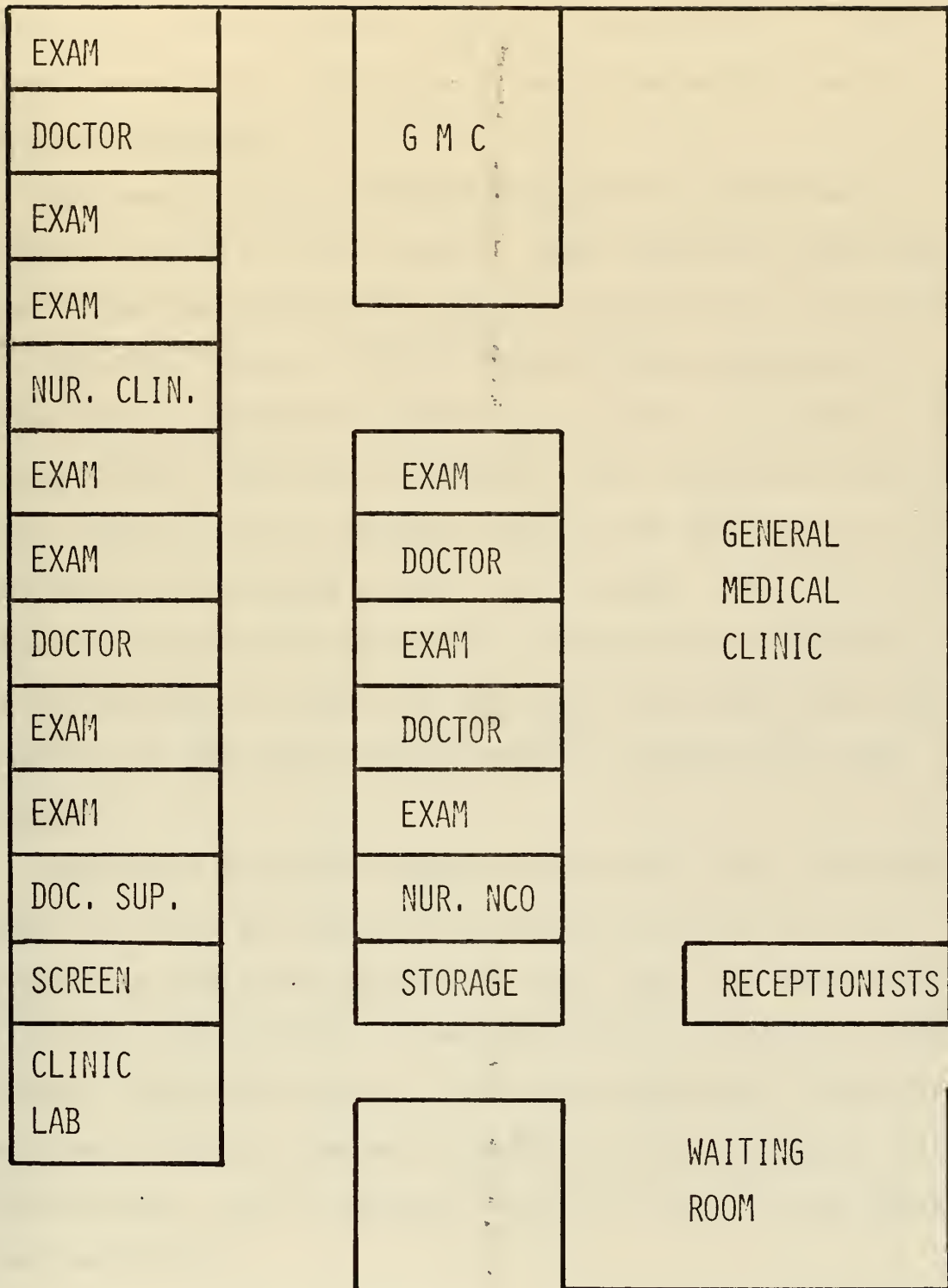
FIGURE 1. HAYS ARMY HOSPITAL FAMILY PRACTICE CLINIC

facilities, X-ray machines, medical specialists in other disciplines, etc., available in any other modern, well equipped hospital.

The general flow through the clinic is indicated in Figures 2.a, b., c., d., and e. When the need to seek medical attention occurs, the patient either calls the office or walks in. When a call is received the receptionist schedules the patient or forwards the call to a nurse. The nurse screens the call to determine the severity of the problem, and then either forwards the call to the doctor or has the patient scheduled by the receptionist. The doctor takes calls forwarded and advises the patient to be scheduled, or, if the problem is acute, to come into the office that day. Periods are set aside in the doctor's schedule for this purpose.

Emergency Patients during office hours take precedence over all other patients and take a doctor away from the clinic for the time required on that case. An emergency is handled by the patient's assigned doctor, if he is in the office, otherwise another doctor will be called. Patients waiting to see the doctor attending to the emergency will be rescheduled, seen by another doctor, or wait to see their assigned doctor.

A doctor's first appointment period in the morning is set aside for walk-ins. This is designed for military personnel, and is similar to sick call. The next ten appointment periods are for scheduled patients, followed by four
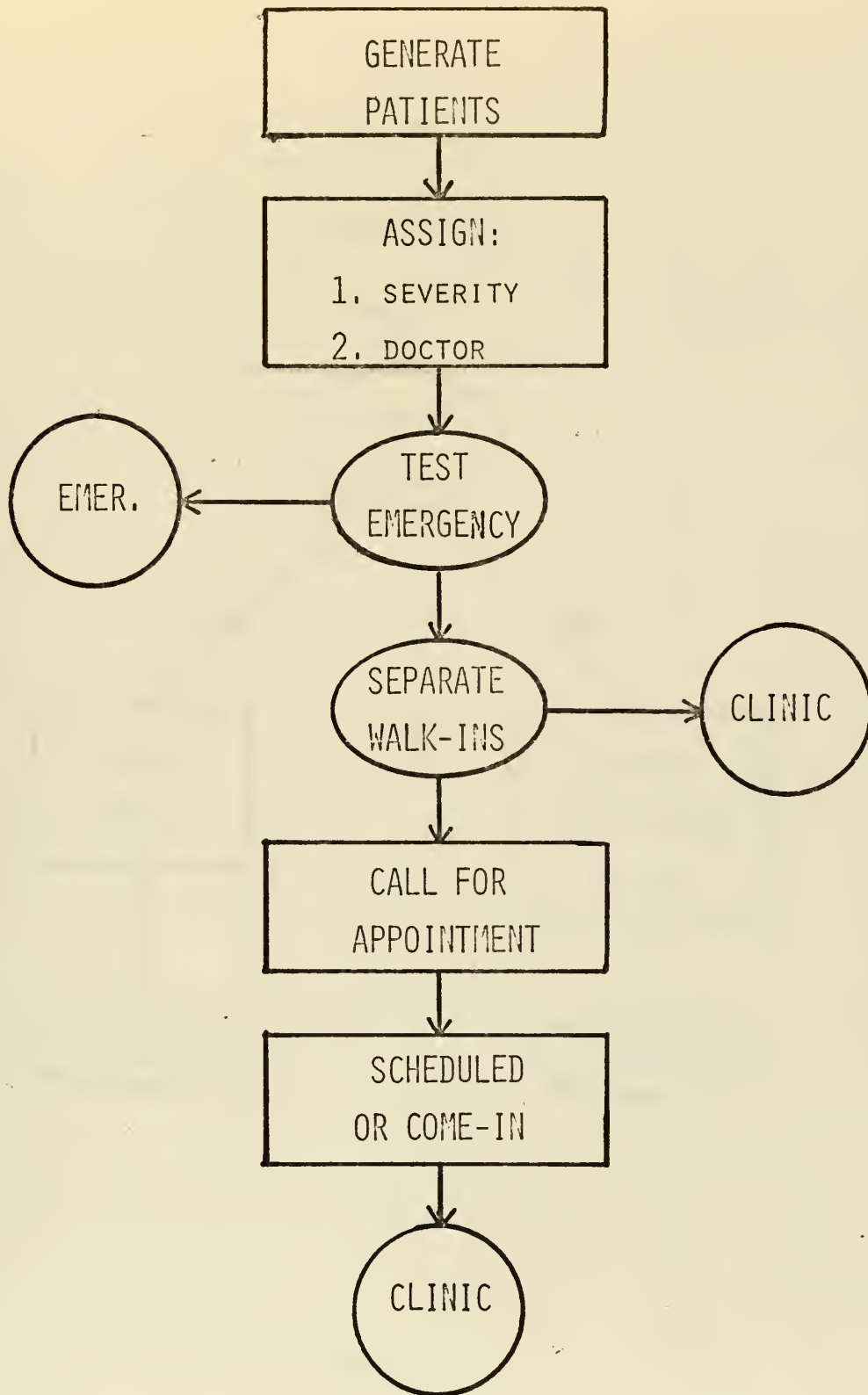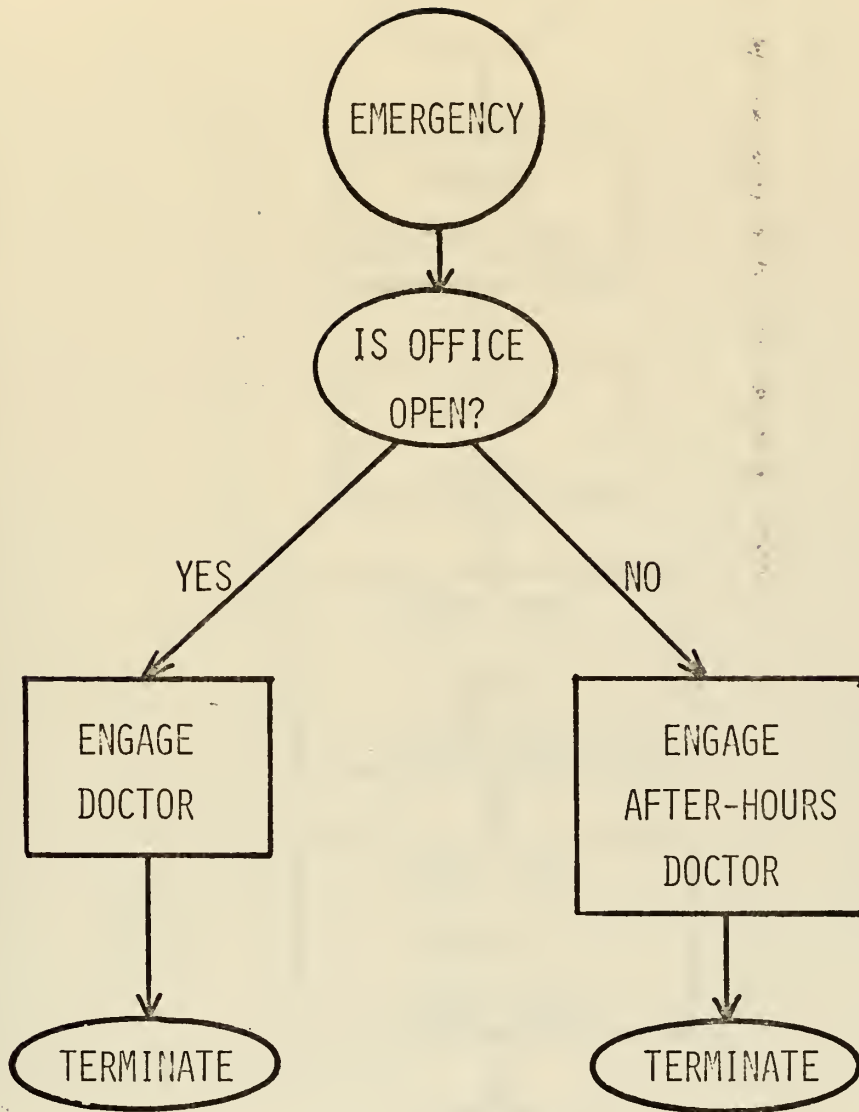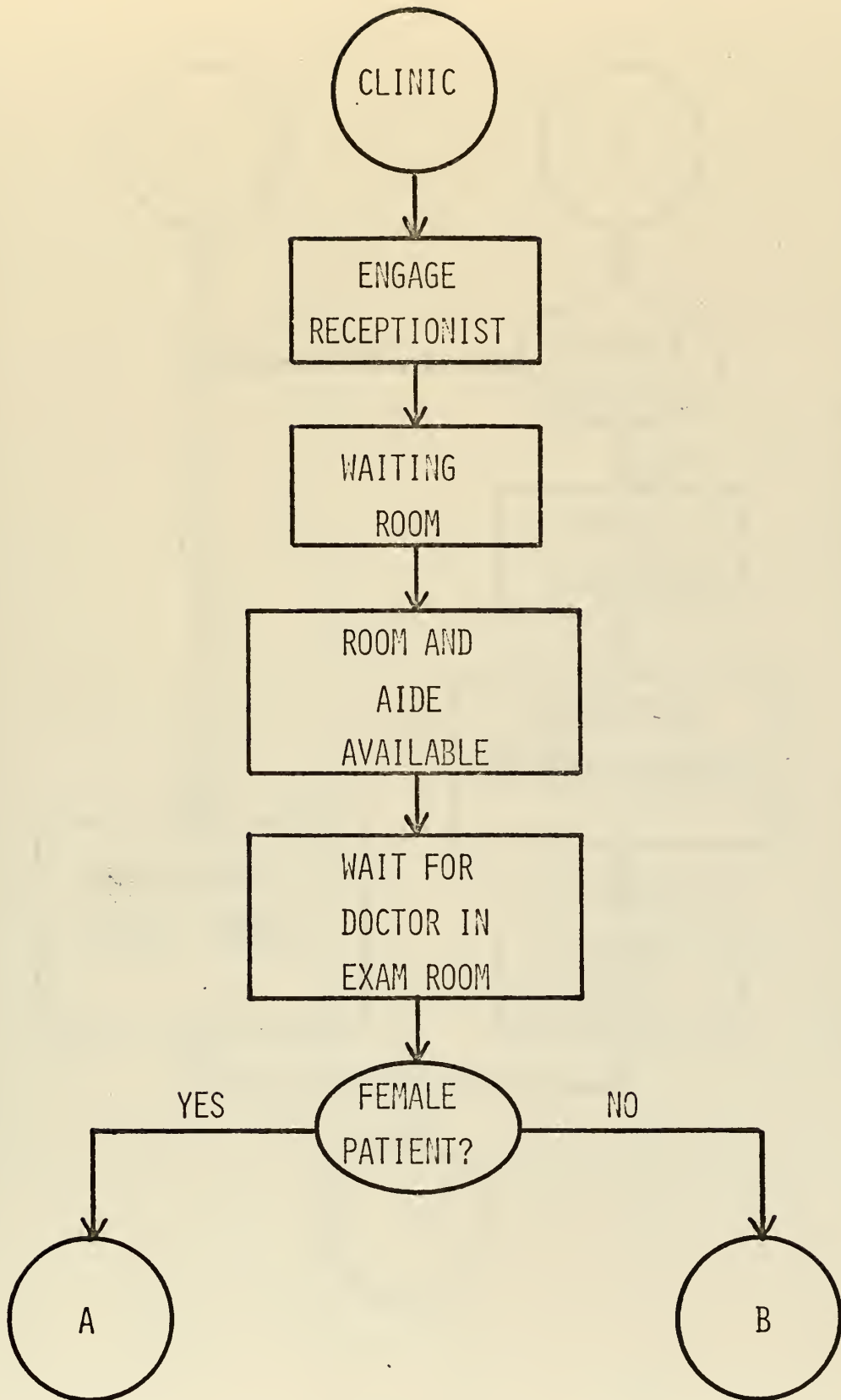
FIGURE 2.A. CLINIC FLOW DIAGRAM

FIGURE 2.B.

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FIGURE 2.c.

FIGURE 2.D.

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FIGURE 2.E.

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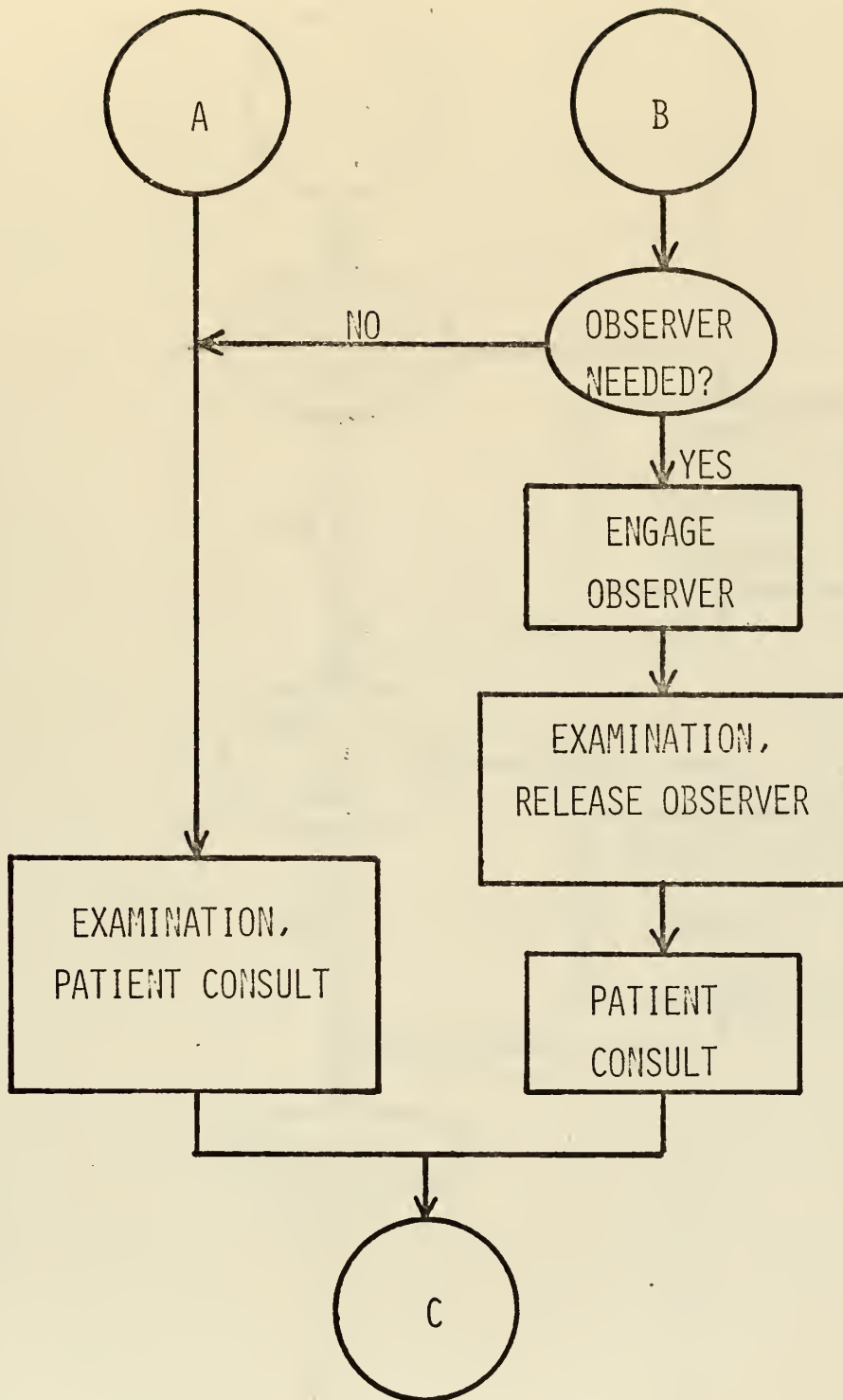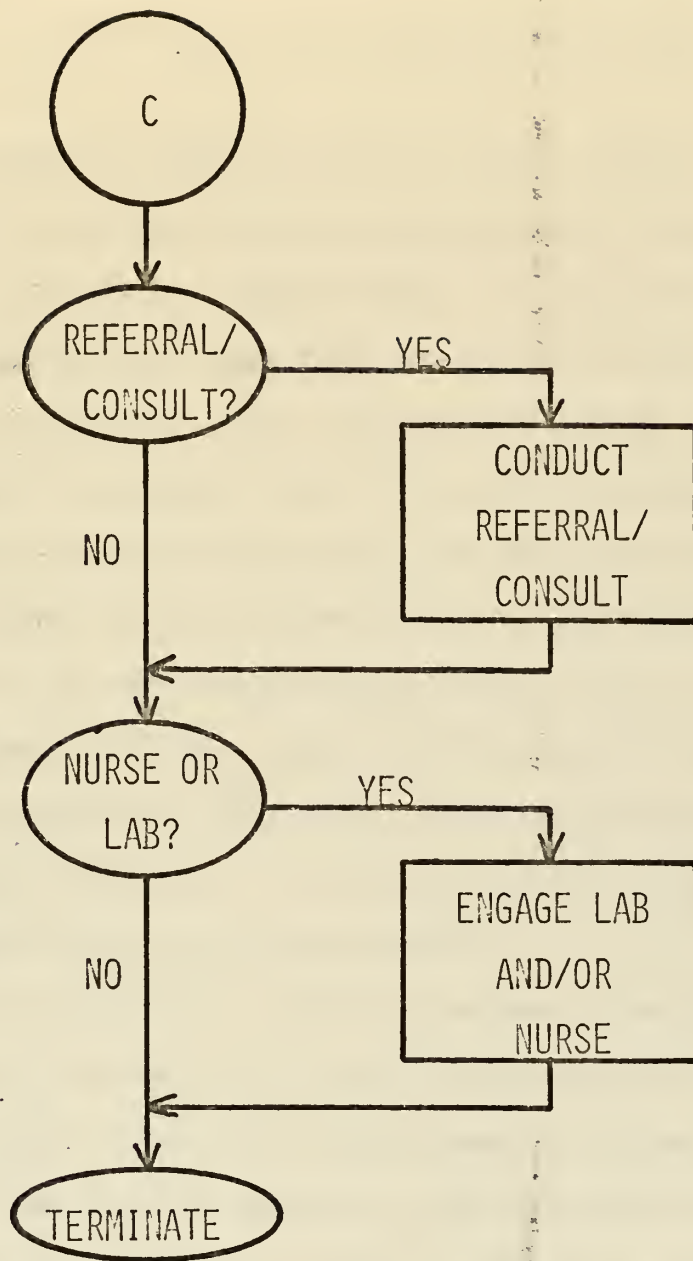
for patients who called in and must be seen that day. The afternoon schedule is similar except that the sick call period is omitted.

When a non-emergency patient arrives at the clinic, the receptionist logs the arrival and has the patient's chart waiting if it was a scheduled appointment. If the chart has not been pulled, the patient must then go to the record division to check out the chart. Next the patient enters the waiting area to wait for an exam room to become available. As the patient enters the waiting room, one of three priorities has been assigned to the patient by the receptionist. The highest priority is for scheduled patients, next is for those who called ahead, and the last priority is for walk-ins. In order to go into an exam room, three things must occur; (1) exam room available, (2) aide available, and (3) patient must be the highest priority waiting.

When all three of the above criteria are met, the aide takes the patient to the screening room and performs any preliminary work needed, such as blood pressure, temperature, and history. Next the patient waits in the exam room until the doctor is available. When the doctor arrives, he conducts the examination and in some cases, if the patient is female, he must obtain an observer. The observer is sometimes a friend or relative of the patient, but at other times the doctor must utilize a nurse or an aide.

Periods with the doctor are normally scheduled for fifteen minutes, but in some cases (physicals, or other extensive

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examinations/consultations) a longer time is required. These patients are scheduled for thirty minutes, an hour, or an hour and a half.

There are cases when a doctor needs to consult with a nurse clinician. These cases would usually be of a chronic nature and the doctor would like the nurse clinician to follow the case and attend to the patient on subsequent visits. An example of this situation would be that of a diabetic patient, after diagnosis, being scheduled for routine follow-up visits with the nurse clinician. In this situation the nurse clinician would handle the visits and notify the doctor if anything unusual occurred. Nurse clinicians care for patients referred to them by all four doctors. Patients waiting to see the nurse clinicians follow the same general routine as those waiting to see a doctor.

In each category of problems there is a possibility that the doctor will want to consult with a specialist in another medical area. In these cases the doctor either calls the specialist or prepares a "consult" form and sends the patient to the specialist. The Family Physician will continue to follow the patient's progress.

After the patient completes his visit with the doctor or nurse clinician he may leave, require lab work, or in some cases the patient is required to see a nurse for immunizations or other medication. When this is complete the patient will leave the clinic.

C.   STATEMENT OF THE PROBLEM

One of the many decisions that had to be made by the hospital administrators concerned the question of the number of families to assign to each doctor. These families make up the population which serves as potential patients for the doctors in the clinic, and are referred to as the doctor's "patient panel." The hospital administrators expressed a strong desire to have each doctor serve and treat a patient panel that was representative of the entire population being served by the hospital. The recruit population is not considered a part of this basic population.

Hays Hospital has been accredited by the American Medical Association as a teaching hospital which allows doctors to serve their residencies there. One of the requirements laid down by the A. M. A. dealt with the breadth of medical problems seen by a resident in the Family Practice speciality. The resident must deal with the full range of medical problems that a Family Practice Doctor is competent to handle. The clinic doctors must, therefore, be assigned families with young children, older children, pregnant females, middle aged and elderly people, etc., in approximately the proportion that they occur in the total population being served by the hospital.

Once the proportions of age/sex categories have been determined, the question of the total size of the patient panels assigned to each doctor presented itself. One of the

goals of the Family Practice Clinic was to increase overall patient satisfaction for the largest number of families. If the doctor is assigned too small a patient panel, patient satisfaction will be high and doctor utilization will be low. When too large a patient panel is assigned, doctor utilization will be high, but patient waiting times will greatly increase, leading to a drop in patient satisfaction.

Another decision faced by the hospital administration concerned the size and composition of the clinic staff. The number of doctors in the clinic was fixed at four and was assumed to stay constant throughout the operation of the clinic. However, the number and type of nurse clinicians, nurses, aides, and clerk-receptionists to assign to the clinic was a major question.

The nurse clinician is a relatively new member of the health care team. Many hospital administrators, doctors, and even nurse clinicians themselves are uncertain as to how many of the duties traditionally reserved for a doctor that they can assume. Nurse clinicians are more highly trained than nurses, and in any case they can assume many of the doctor's routine functions of well baby care, routine pediatric care, follow up care for geriatric patients, diabetics, etc., and routine prenatal checkups, etc., depending on the nurse clinician's speciality area.

The first problem addressed in this thesis is that of estimating the total number of families to assign each doctor so as to maximize the utilization of his time and maximize

patient satisfaction, measured solely by waiting time in the clinic and time spent waiting for an appointment. An ancillary part of this problem is determining the percentages of each age/sex group assigned to each doctor to reflect the population served by Hays Hospital. Further, the number of clinic visits from those in each age/sex group must be estimated in order to correctly gauge the expected work load of each doctor.

The second problem considered was that of maximum utilization of clinic support personnel and the physical layout of the clinic itself in order to most efficiently serve the patient panels.

II. PROBLEM FORMULATION

A. THE PATIENT PANEL

The problem of estimating the makeup of the potential patient population served by Hays Hospital proved to be a major one.

A one percent sampling of the hospital outpatient medical records was taken. Among the items of information were; the sex and age of military sponsor and dependents, and the number of visits to the hospital in the period from 1 July 1971 to 30 June 1972.

The data gathered, however, were not the entire answer to the problem of determining the potential population of the hospital. Some of the potential categories were simply not represented in the sample. Since dependents are no longer required to keep their medical records at the hospital, many of them are kept at their homes. Similarly, most of the active duty sponsors' records were kept at their military unit dispensaries and were not readily available. One of the biggest factors which lowered the credibility of the data obtained from the one percent sample was the fact that some active duty personnel and a larger number of retired personnel and their dependents do not utilize the medical facilities at Hays Hospital for all of their health care needs. Furthermore, some personnel, retired as well as those on active duty, do not make use of the hospital at all.

Data was available concerning the age distribution of military personnel and their dependents from one training command brigade. The training brigade data and the one percent sample data has been combined in Figure 3, and indicates the authors' best estimate of the age distribution of the potential population served by Hays Hospital.

The densities in Figure 3 are certainly open to question, but a more detailed and lengthy examination of data not readily available, if available at all, is beyond the scope of this thesis.

B. PATIENT INCIDENCE DATA

One of the more critical areas of the Family Practice Clinic model is that portion of the model which determines the arrival rates of patients at the clinic. The patient arrival rate at the clinic is determined by three factors: the age distribution of the patient panel, the distribution by sex, and the size of the population in each age/sex category.

In order to successfully model the Family Practice Clinic the authors felt that it was essential to know two things about a group of people once their age and sex were known: how often would a person, on the average, visit the clinic if they (or their parents) were satisfied with the quality of medical care received, and with what frequency would certain medical skills or knowledge be used during those visits?

Figure 3. Population Density of Computer Model Patient Panels

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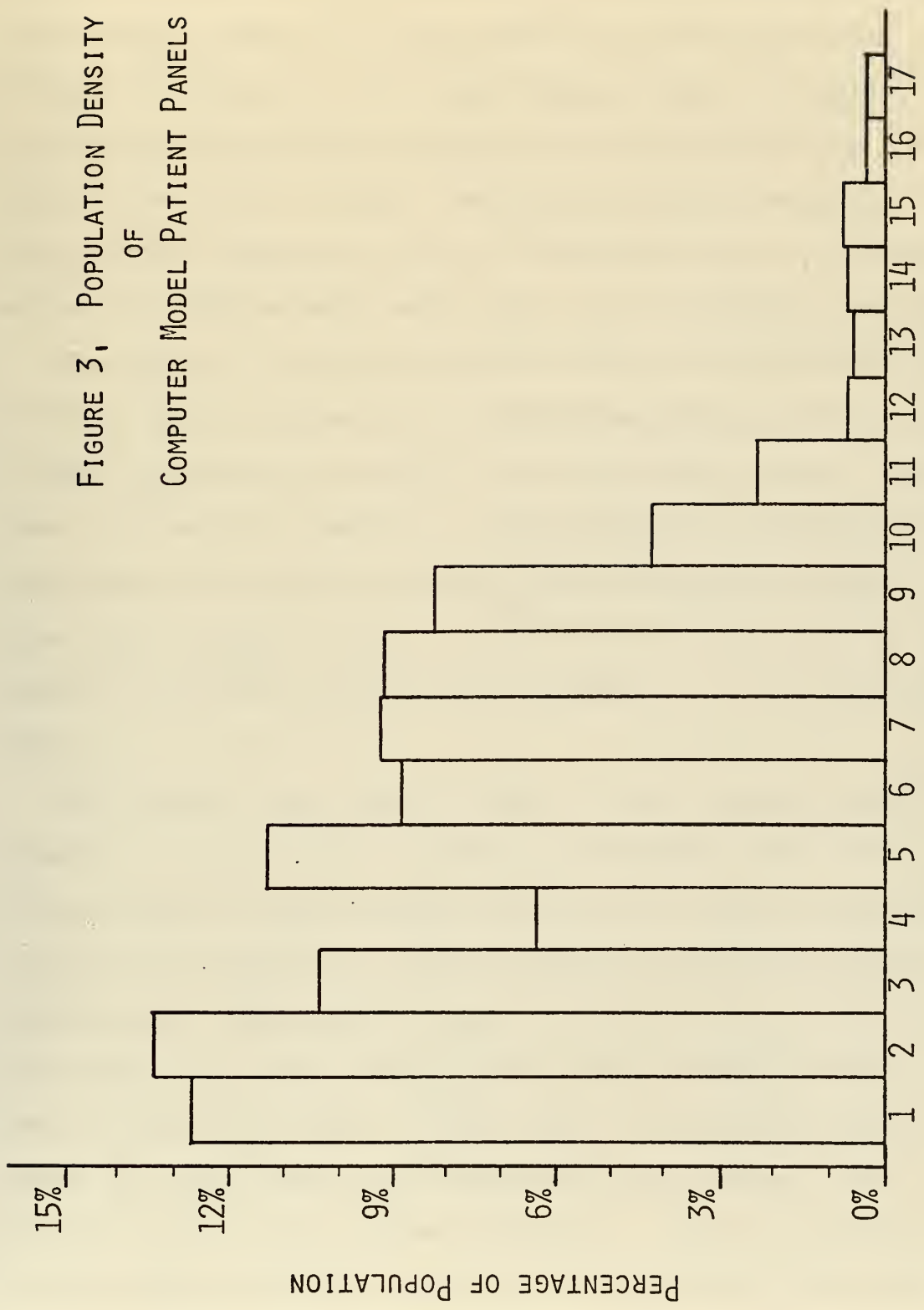
Again, the data from the one percent sample of out-patient records was incomplete for estimation of the values noted above. Not all of the people using the hospital utilize it exclusively for their medical care. Finally, the medical records were unclear as to the reason for the visit noted in the record. Short of attending medical school, there appeared to be no practical method of making use of the limited data available from the medical records.

The authors considered the fact that the clinic records of total visits per month for the different clinics might be used to obtain the patient visit incidence rates. This idea was discarded because of the drawback of insufficient knowledge of the base population from which the clinics drew these visits, and the unquantifiable reluctance of people to use the clinic and go elsewhere for their medical care.

The authors were able to obtain a five percent random sample of patient visit incidence data drawn from a one million member prepaid health plan for the period January through December 1971. Each record contained the following information: the patient's date of birth, date of visit to the clinic, and the medical area of the clinic visited, or medical specialty codes. There were 73 different specialty codes utilized, these were combined by the authors into nine general medical areas shown in Table 1. Table 1 also includes the age codes used when analyzing and presenting the data.

COMBINED MEDICAL SPECIALTY AREA (SPECIALTY CODE NUMBER)	INDIVIDUAL PHYSICIAN AND NON M. D. SPECIALISTS
GENERAL PRACTICE (1)............	GENERAL PRACTICE
SURGERY (2)...................	GENERAL, NEUROLOGICAL, PLASTIC, ORTHOPEDIC, AND THORACIC SURGERY, AND ANESTHESIOLOGY
ALERGY/SHOTS (3).............	ALERGY, ALERGY TESTING AND TREATMENT, INJECTION AND IMMUNIZATION
EYE, EAR, NOSE, THROAT (4)...	OTOLOGY, LARYNGOLOGY, RHINOLOGY, OPTHALMOLOGY, OPTOMETRIST, AND AUDIOLOGIST
INTERNAL MEDICINE (5)........	INTERNAL MEDICINE AND GASTROENTEROLOGY
MISCELLANEOUS (6)............	CARDIOVASCULAR DISEASE, NEUROLOGY, PATHOLOGY, PHYSICAL MEDICINE AND REHABILITATION, PSYCHIATRY, PULMONARY DISEASES, RADIOLOGY, UROLOGY, DIETICIAN, AND PSYCHOLOGIST
DERMATOLOGY (7).............	DERMATOLOGY
OBSTETRICS/GYNECOLOGY (8)....	OBSTETRICS/GYNECOLOGY
PEDIATRICS (9)..............	PEDIATRICS

AGE CODES

Age*	Age Code	Age*	Age Code	Age*	Age Code
0-4	1	30-34	7	60-64	13
5-9	2	35-39	8	65-69	14
10-14	3	40-44	9	70-74	15
15-19	4	45-49	10	75-79	16
20-24	5	50-54	11	80 +	17
25-29	6	55-59	12		

* AGE AT THE TIME OF THE VISIT TO THE CLINIC

TABLE 1. MEDICAL SPECIALTY AND AGE CODES

It is felt that this incidence data more nearly reflects the true propensity of a population to utilize medical care facilities than that obtained from the one percent sample of medical records from Hays Hospital. People who have already paid for their health care are not likely to go elsewhere and pay for it again, and they are also not likely to be shy about using the medical facilities when they believe such care is needed.

The data for male and female visits is summarized in Tables 2 and 3 by age and specialty codes. The letter 'A' in the specialty code column refers to the "actual" average visits per person per year for each age group and medical specialty category, calculated from the five percent random sample data. The letter 'C' refers to a "combined" rate.

In order to simplify the computer model simulation problem, some of these visit rates were combined horizontally and an average or combined rate was used. Instead of considering each age group in a medical specialty area to have a separate visit rate, these rates were combined when they were close to the same values. For example, the actual average number of visits to the General Practice section of the clinic for a male in age groups 4, 5, and 6 was 0.73, 0.76, and 0.71 visits per person per year, respectively. These rates were combined, or averaged, to yield a value of 0.73 visits per year for a person in age groups 4, 5, or 6.

AGE CATEGORIES

SP CODE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1C	0.76	0.53	0.53	0.73	0.73	0.73	0.57	0.57	0.57	0.57	0.57	0.64	0.64	0.64	0.64	0.64	1.35
1A	0.76	0.52	0.54	0.73	0.76	0.71	0.60	0.58	0.55	0.58	0.51	0.63	0.54	0.72	0.75	0.77	1.35
2C	0.34	0.34	0.34	0.50	0.50	0.50	0.50	0.50	0.58	0.58	0.58	0.58	0.82	0.82	0.82	0.50	0.50
2A	0.37	0.26	0.41	0.55	0.44	0.50	0.47	0.53	0.56	0.56	0.58	0.65	0.81	0.81	0.83	0.51	0.47
3C	1.19	1.57	1.57	1.05	0.68	0.68	1.08	1.08	1.08	1.05	1.05	1.08	0.61	0.61	1.18	0.51	0.51
3A	1.19	1.58	1.55	1.05	0.63	0.72	1.19	1.09	0.98	1.05	1.15	0.94	0.60	0.62	1.18	0.46	0.61
4C	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.62	0.62	0.62	0.62	1.20	1.20	1.20	1.20
4A	0.22	0.41	0.30	0.29	0.27	0.31	0.34	0.32	0.35	0.50	0.64	0.63	0.80	1.16	1.24	1.19	1.37
5C	0.08	0.08	0.08	0.77	1.15	1.15	1.15	1.15	1.15	1.46	1.87	1.87	2.48	2.48	2.48	2.90	2.90
5A	0.06	0.04	0.13	0.77	1.16	1.11	1.14	1.17	1.20	1.46	1.78	1.97	2.45	2.51	2.48	2.96	2.77
6C	0.14	0.14	0.14	0.14	0.14	0.14	0.46	0.46	0.46	0.46	0.64	0.64	1.14	1.14	1.14	1.14	1.14
6A	0.07	0.11	0.08	0.17	0.18	0.26	0.39	0.43	0.52	0.49	0.65	0.62	1.00	1.22	1.43	1.23	0.83
7C	0.07	0.07	0.07	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.56
7A	0.04	0.06	0.12	0.27	0.24	0.19	0.20	0.18	0.15	0.22	0.21	0.22	0.26	0.30	0.34	0.24	0.56
9C	5.33	2.00	1.27	0.13													
9A	5.33	2.00	1.27	0.13													
TOTC	8.22	5.04	4.31	3.85	3.73	3.73	4.29	4.29	4.37	4.99	5.58	5.65	5.53	7.11	7.68	7.08	8.16
TOTA	8.02	4.98	4.40	3.95	3.68	3.80	4.33	4.30	4.32	4.87	5.53	5.66	6.47	7.35	8.26	7.36	8.13

TABLE 2. MALE VISITS PER PERSON PER YEAR

AGE CATEGORIES

SP CODE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1C	0.63	0.38	0.38	0.75	0.75	0.75	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.70	0.70
1A	0.63	0.38	0.38	0.71	0.82	0.74	0.65	0.64	0.62	0.59	0.60	0.56	0.56	0.65	0.61	0.71	0.69
2C	0.24	0.24	0.24	0.38	0.38	0.38	0.38	0.60	0.60	0.60	0.77	0.77	0.77	0.77	0.77	0.77	0.51
2A	0.31	0.18	0.25	0.35	0.33	0.42	0.43	0.53	0.62	0.66	0.70	0.69	0.82	0.98	0.86	0.84	0.51
3C	1.05	1.05	1.05	0.80	0.80	0.89	1.71	1.15	1.15	1.15	1.45	1.03	1.03	1.03	1.03	1.03	0.27
3A	0.97	1.25	0.97	0.83	0.58	0.97	1.71	1.15	1.26	1.06	1.45	0.93	1.27	1.03	0.77	1.04	0.27
4C	0.15	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.56	0.56	0.56	0.74	0.74	1.27	1.27	1.27	1.27
4A	0.15	0.36	0.37	0.40	0.37	0.35	0.34	0.38	0.49	0.59	0.60	0.67	0.83	1.16	1.39	1.30	1.37
5C	0.08	0.08	0.08	1.04	1.49	1.49	1.49	1.49	1.49	2.06	2.06	2.06	2.52	2.97	2.97	3.41	2.83
5A	0.05	0.04	0.14	1.04	1.37	1.48	1.45	1.58	1.62	1.90	2.07	2.25	2.52	2.90	3.08	3.41	2.83
6C	0.10	0.10	0.10	0.10	0.10	0.33	0.33	0.33	0.68	0.68	0.68	0.95	0.95	1.55	1.55	1.55	0.73
6A	0.06	0.09	0.06	0.15	0.18	0.29	0.34	0.41	0.63	0.65	0.78	0.98	0.91	1.48	1.67	1.57	0.73
7C	0.10	0.10	0.10	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.42	0.42
7A	0.05	0.06	0.17	0.38	0.28	0.26	0.18	0.24	0.19	0.22	0.21	0.24	0.26	0.21	0.27	0.46	0.33
8C	0.02	0.02	0.02	0.77	2.49	2.49	1.71	0.96	0.96	0.75	0.75	0.53	0.53	0.39	0.39	0.39	0.07
8A	0.01	0.01	0.04	0.77	2.56	2.43	1.71	1.09	0.84	0.79	0.71	0.59	0.45	0.42	0.40	0.30	0.07
9C	4.89	1.98	1.22	0.13													
9A	4.89	1.98	1.22	0.13													
TOTC	7.26	4.32	3.56	4.59	6.63	6.86	6.85	5.76	6.30	6.66	7.13	6.94	7.40	8.84	8.84	9.54	6.80
TOTA	7.13	4.34	3.53	4.75	6.51	6.94	6.81	6.03	6.28	6.47	7.11	6.91	7.63	8.84	9.03	9.62	7.05

TABLE 3. FEMALE VISITS PER PERSON PER YEAR

The total visit rates are summarized across the bottom of the tables, both for the actual and combined rates.

The effect of applying the combined rates to the same population from which the original data was taken is indicated in Tables 4 and 5. It is noted that the overall effect on the number of visits generated when using the combined rates, compared to the actual number of visits, is very small.

Another factor which was investigated was the variation of the visit rates over time. Each age-sex-specialty category visit rate was calculated on a yearly and quarterly basis and the differences noted. The only significant seasonal variations observed were in the two lower age groups of the male and female pediatrics specialty area. These rates are noted in Table 6, and were used in several runs of the computer model noted later in the thesis.

In summary, the authors believe that the analysis of the five percent random sample data resulted in a good estimate of how often a person would be expected to visit a medical clinic, and what medical specialty areas that person would use in the clinic.

C. COMPUTER MODEL

The computer language General Purpose System Simulation (GPSS) was used to model the Family Practice Clinic (Program 1) and is well suited for clinic simulation because of the queuing aspects and alternative flow paths for patients. Simulation allows the prediction of effects that the differing

AGE CODE	COMBINED RATE INCIDENCE TOTALS	ACTUAL INCIDENCE TOTALS
1	17,648	17,223
2	13,633	13,474
3	12,274	12,536
4	9,471	9,722
5	6,188	6,103
6	7,408	7,555
7	7,889	7,962
8	6,757	6,780
9	6,796	6,686
10	7,764	7,580
11	7,617	7,543
12	6,435	6,445
13	5,518	5,467
14	3,605	3,728
15	2,381	2,561
16	1,161	1,207
17	685	679
TOTAL POPULATION	123,203	123,251

Table 4. Summary of Actual and Combined Incidence Rates Applied to Male Population

AGE CODE	COMBINED RATE INCIDENCE TOTALS	ACTUAL INCIDENCE TOTALS
1	14,901	14,635
2	11,199	11,257
3	9,799	9,853
4	10,958	11,344
5	14,373	14,114
6	15,997	16,186
7	12,406	12,342
8	8,875	9,284
9	9,826	9,798
10	10,956	10,640
11	9,964	9,940
12	7,817	7,785
13	5,950	6,139
14	4,424	4,424
15	2,976	3,035
16	1,611	1,624
17	476	494
TOTAL POPULATION	152,508	152,894

TABLE 5. SUMMARY OF ACTUAL AND COMBINED
INCIDENCE RATES APPLIED TO FEMALE POPULATION

| | MALE | | FEMALE | |
| | Age Codes | | Age Codes | |
	1	2	1	2
Yearly Rate	5.33	2.00	4.89	1.98
1st Quater Rate*	6.00	2.28	5.33	2.20
2nd Quater Rate*	5.06	1.89	4.78	1.87
3rd Quater Rate*	4.49	1.84	4.20	1.80
4th quater rate*	5.76	2.01	5.23	2.04

*Adjusted to a Yearly Rate

Table 6. Pediatric Visit Rates
For Children, Listed by Quarters

personnel and patient panels would have on the flow through the clinic. After the initial set-up effects of changes can be examined on the model before their introduction into the clinic.

The personnel assignment in the model is similar to the assignment of personnel at the Hays Hospital Family Practice Clinic. One laboratory technician was added to determine the feasibility of including a small laboratory. For convience another doctor was added. This doctor assumes all emergencies which occur after the office is closed. Although the four doctors rotate the night call duty, the night call doctor being separate allows the development of statistics on the time spent by the doctors on night calls.

For the model, each nurse clinician has one exam room
and each doctor is assigned two exam rooms. The schedule of
doctors' office hours cycles every two weeks and is repre-
sented in Table 7. Nurse clinicians work each day and
rotate Saturday duty. Nurses work the normal office days as
do two of the aides. The other aide and one receptionist
work nights and Saturdays. At Hays Hospital four reception-
ists work five days a week during regular office hours, but
are shared with the General Medical Clinic, therefore only
three receptionists were assumed for this simulation.

The above numbers of personnel and rooms were used as a
starting point to measure the effectiveness of clinic
operations. The number of personnel can be varied in order
to obtain an optimal mix for a given patient panel. The
number of exam rooms also may be changed to determine the
effects of increasing or decreasing space. The number of
doctors could be varied, but for purposes of this thesis they
are kept constant..

1. Inputs

The data gathered and explained earlier determine
the patient input into the model. The FORTRAN program
(Program 2) utilizes this data and an input of the distri-
bution of the ages for patients assigned to each doctor. The
interarrival time of patients in each category is outputed
in the form of a punched deck ready for insertion into the
basic model. The other output is the distribution of assign-
ments by medical specialty to doctors and nurse clinicians,

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FIRST WEEK

Doctor	Mon.	Tues.	Wed.	Thur.	Fri.	Sat.	Sun.
1	N	M	D	D	N	-	-
2	D	N	M	D	D	S	-
3	D	D	N	M	D	S	-
4	D	D	D	N	M	-	-

SECOND WEEK

	Mon.	Tues.	Wed.	Thur.	Fri.	Sat.	Sun.
1	D	D	N	M	D	S	-
2	D	D	D	N	M	-	-
3	N	M	D	D	N	-	-
4	D	N	M	D	D	S	-

D Day Duty (0800-1700)

M Morning Duty (0800-1300)

S Saturday Duty (0800-1230)   Saturday duty doctors
                               alternate weekend duty

N Night Duty (1300-2030)   All night duties are
                             followed by that doctor
                             being on call

TABLE 7. DOCTORS' SCHEDULE

based on the proportion of the load the nurse clinician can accept in each medical specialty category and the percentage of patients in a category assigned to each doctor. This produces a distribution of assignments to doctor and nurse clinicians in each of the various age/sex/medical specialty categories, and appears in the form of a punched deck which can be inserted into the basic model.

Three priorities were selected to describe the seriousness of a problem. These are:

(a) Emergency - problems that must be attended to in a short period of time. Problems such as severe accidents and cuts, cardiacs, and deliveries are included.

(b) Today problems - which must be attended to in the next period the office is open. Examples are high fever, abnormal bleeding and severe pain.

(c) Later problems - which can be delayed until the next available appointment time. Regular OB/GYN, aches and pains, well baby checks and physicals are included in this category.

The attempt was made to include as many of the normal operations of a clinic as possible. The data for the basic model was gathered from doctors' estimates and refs. 3, 4, 5, 7, 9, 10, 11, and 14.

2. The Model

Patients with problems are generated in one of ninety-two categories. These categories designate the age group, sex,

and which of the nine disease areas is involved. The inter-
arrival times are based on the number of people assigned to
the doctor in each sex and age group. The number of the
disease is also assigned to each patient. Using this disease
number, the severity of the problem and length of the appoint-
ment are assigned. The distribution of severities and
appointment lengths were obtained from estimates made by
the Family Practice Doctors at Hays Army Hospital. These
distributions are estimated because the clinic had no data
base and measurements were not possible.

If the problem is an emergency, it is separated
from the other cases. If the clinic is open, the emergency
is handled by one of the clinic doctors. After hours the
emergency is treated by the doctor on call. In the model
this doctor is the extra doctor, who for convenience handles
all after hours problems. The service time for this doctor
is considered exponental, because of the wide variation in
problems considered as emergencies. The mean length of
emergency service time, estimated by clinic doctors, was
ninety minutes. This includes the total time required to
handle the case, time to and from the emergency room and
actual treatment time. The patient would usually be scheduled
for an office appointment, but the input data to the model
was based on single visits to the office and not on return
visits.

When the emergency occurs during the day, the patient's
doctor is called from the office to treat the problem. If the

patient's doctor is not in, another doctor in the office is selected. The service time for these emergencies is shorter than at night. The patients in the waiting room must wait until the doctor's return, and will increase the length of the doctor's day and the average time spent by a patient in the clinic.

If the problem is not an emergency, there is a possibility that instead of calling first, the patient will simply walk-in. The walk-in rate in General Medicine at Hays Hospital is fifty percent. It was hoped by the supervisors of the Family Practice Clinic that with personal doctor-patient contact this rate would be reduced to fifteen percent. The fifteen percent rate was used, but other rates were tested and their effect on clinic operation will be discussed later.

The patients in the "walk-in" stream are allowed into the clinic immediately if it is open. If the clinic is closed the patients are queued up, waiting for the clinic to open. To make the model perform close to actual clinic operations, problems generated between eight P. M. and four A. M. are delayed twelve hours. This causes approximately one-sixth of the total to arrive at office opening. Two-thirds are spread uniformaly over normal working hours (8-4). Walk-ins are still allowed during evening hours and this accounts for the other one-sixth. Upon arriving at the office walk-ins are given the lowest priority for seeing the doctor.

The receptionists are always engaged in the same
order. The first is engaged if possible. If she is un-
available, then the second is engaged. Therefore the third
is only engaged if all others are busy. From this set up,
it is possible to estimate how many receptionists are used.
During the daylight hours up to three receptionists can be
used. In the evening only one receptionist is on duty.
After the patient talks on the telephone with the receptionist
he is scheduled or in some cases the call must be forwarded
to a nurse for further screening. This nurse may handle the
question or forward the call to the patient's doctor. Follow-
ing this sequence the patient is scheduled. In the scheduling
section, the patients who must be seen today are separated
from "later problems." If there is room on the schedule,
"today's problems" are scheduled. If the schedule for the
patient's doctor is full for that day, the patient is placed
in the queue for scheduled periods set aside for "today's
problems." Four periods are reserved at the end of the
morning for these problems. At the end of the afternoon
period, the clinic is opened to all patients who must be
seen today. These patients are allowed in at a rate of two
patients every thirty minutes.

The regular schedule has ten openings, morning and
afternoon. These are also at a rate of two every thirty
minutes, starting at 0830. The period at 0800 is reserved
for walk-ins. If a patient is to be scheduled for more than
one period, the following patient is delayed for that number
of periods.

After leaving the schedule section, all patients with either today or later problems are allowed to arrive according to an approximate normal distribution centered around their scheduled time. Even though patients are scheduled, this does not ensure that they will arrive, therefore a "no show" rate is included. If the patient does not show up he must be rescheduled. A rate of five percent was estimated by personnel at Hays Hospital.

When the patient enters the clinic, they engage a receptionist. During the day there are three receptionists available but at night only one is on duty. The receptionist's time with a patient was assumed to be uniformly distributed over (1,5). See Table 8. This means that each minute between one and five is equally likely. If the patient is a walk-in and his doctor is not in the office, another doctor is assigned to handle the problem. Following this the patient enters the waiting room where he remains until an exam room is vacated, he is the highest priority patient waiting to see his doctor, and there is an aide available to take him back and make all preparations to see the doctor. At this point the patient waits for the doctor to arrive in the exam room.

Upon the doctor's arrival, the model determines if the patient is female and if so, requires an observer for forty percent of all female patients under fifteen years of age and seventy percent of all female patients fifteen and older. The break at fifteen is caused by the fact that

CATEGORY	MINIMUM	AVERAGE	MAXIMUM	DISTRIBUTION
Night Emergency	0	90	720	Exponential
Day Emergency	0	40	320	Exponential
Receptionst Phone Calls	2	3	4	Uniform
Doctor/Nurse Phone Calls	1	3	5	Uniform
Arrival Time Relative to Scheduled Time	-30	0	+30	Approximate Normal
Receptionist Time	1	3	5	Uniform
Aide Time	1	5	9	Uniform
Observer (Female)	6	8	10	Uniform
Doctor/Patient Consult (Female)	3	5	7	Uniform
Exam/Consult (No Observer)	8	13	18	Uniform
Extra Periods	15	15	15	Constant
Nurse Clinician Consult	1	5	9	Uniform
Doctor Consult	5	10	15	Uniform
Doctor's Time Spent on Referral	3	5	7	Uniform
Nurse's Time With Patients	3	10	17	Uniform
Time in the Lab	5	10	15	Uniform

All times listed in minutes.

Table 8. Service and Arrival Times

younger patients are usually accompanied by another person. The observer engaged is either a nurse or an aide. The time for these female examinations was considered to be between six and ten minutes. All of these figures are based on estimates by doctors assigned to the Family Practice Clinic.

If the patient needs an observer, time is added following the examination for a doctor-patient conference. This conference time is usually short and is considered to be between three and seven minutes. For all male patients and those female patients not requiring an observer, the examination and consult time was estimated to be equally likely between eight and eighteen minutes. The mean of both routes, observer and no observer, is thirteen minutes. If the patient requires more than one period, fifteen minutes are added for each additional period.

To this point, patients assigned to both doctors and nurse clinicians follow the same sequence of events. But the flow changes here to allow for differing events. If the patient is not assigned to a nurse clinician, the doctor may have to consult with the nurse clinician to set up an ongoing attack on the problem. This rate was set at five percent. The model allows the consultation to be with the first nurse clinician available, if both are present. If only one nurse clinician is working, the other is bypassed. If neither is in the office no consultations are possible, and the nurse clinician is bypassed.

There are times when the nurse clinician must consult with the doctor. A rate of ten percent is used for these consultations, which include anything unusual noted during the clinician's examination. The time for the consultations was considered to be between five and fifteen minutes.

Another event that sometimes occurs in a clinic is the need to consult a specialist. Even though a patient may be referred to a specialist, the doctor continues to monitor the progress of treatment. The referral rate was estimated by the personnel at the Hays Hospital Family Practice Clinic. Rates were assigned to each of the nine problem categories. Twenty-five percent was the highest rate used. This occurred in the surgery area. The lowest, five percent, occurred in the allergy and immunization category.

The next section handles those patients who require the attention of a nurse. Because the nurses only work during the day, provisions are made to skip over this section at night and on Saturdays. If the nurses are there, it was estimated that ten percent of the patients would need to see the nurse for immunizations or other needed treatments. After this, it is sometimes necessary for the patient to return to the doctor. The basic rate used for return was three percent.

The last section is the laboratory in the clinic. This had little effect on the rest of the model. There are some patients who after going to the lab are to return to see the doctor. The rate of return from the lab was set at

ten percent. Five and twenty percent were tried but had little or no effect on the output.

3. Timer

The timer section runs for a total of twenty-eight days. It opens and closes the clinic, switchboard and portions of the schedule. It also controls the arrival and departure of personnel. This part of the model is divided into two major areas, weekdays and weekends.

4. Measures of Effectiveness

Several measures were used to determine the effectiveness of the clinic model. The measure used for doctors and all clinic personnel will be referred to as "utilization," which is given by $UTIL_{ts}=TB/TS$, where TB is the time busy and TS is time scheduled. A second form of utilization will be used for doctors and patients and will be called "time there utilization." The time there utilization is given by $UTIL_{tt}=TB/TT$, where TT is the time there. The measure referred to as "patient's time" is the average time a patient spends in the clinic from arrival until departure from the doctor's exam room. The last measure, other than standard averages, is the "doctor's time." This is the total number of minutes spent in the clinic, available to see patients, during the time period covered by the run (usually three months). This time varies with the quitting time of each day and in all cases is greater than the doctor's scheduled time. "Doctor's time" is used as the divisor to determine "time there utilization."

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Many statistics are available from each computer run. Not all are presented in this paper, but could be used for a more detailed analysis of any section of the model. Although all of the possible output is not recorded in this paper, it was examined. Given more time and resources a more detailed analysis could be performed in each small area of concern. The questions put forth in this paper are not affected by minute details, but are a measure of overall trends and utilizations.

5. Parameter Sensitivity

The model was always run initially one month during which no statistics were gathered. This allowed the system to be pre-loaded with patients and smooth the starting up shocks. For the next three months, snapshots were taken at the end of each month. In this way not only could an average over the three month period be obtained, but trends in the output could be identified.

Realizing that many assumptions were made, several computer runs were made to determine the sensitivity of the various parameters. To develop a base on which to test the sensitivity to change of these parameters, three simulations were performed varying only the random number seeds. These three sets of output were then used to determine if significant changes had occurred. The comparison of means and t-test were used to determine if the changing of random number seeds had any effect on the model. These results are listed in Appendix A. All means remained relatively close and the

t-test, at ninety-five percent confidence, showed no significant differences. Therefore, it is noted that the model does not seem to be sensitive to changes in the random number seeds.

Two methods of comparisons were used. The first was direct comparison of means. This was used to compare utilization of nurse clinicians and ancillary personnel as well as waiting times. The second method was the use of a t-test. This was used to test the significance of change in doctor's utilization, patient's clinic time, and the total doctor time spent in the clinic. Assuming that each doctor is independent of the others, each run produced data points in each category. Combining all three basic runs, this produced twelve basic data points. Each test, therefore, tested the difference of mean in two samples. One consisted of twelve points, the other consisted of four points. This gave a t-test with fourteen degrees of freedom. A ninety-five percent confidence interval was chosen. All t-scores are listed along with other data from each run in Appendix B.

The basic data is derived from averages of the three initial runs (Appendix A). Appendix B lists the results from each of the sensitivity runs. The basic data (B-1) is used to make the following analysis.

a. Appointment Time

The appointment size or visit length (fifteen, thirty, sixty, or ninety minutes) was drawn from one of nine distributions depending on disease category. Two runs were

made to determine the model sensitivity to this variable.
The first run set all distributions equal to the low of
eighty percent. This means that twenty percent of all
patients are seen for thirty, sixty, or ninety minutes.
This run showed a three percent decrease from the basic run
in patient utilization (Table 9.a.) Patient's and doctor's
time in the clinic increased, but not significantly accord-
ing to the t-test at ninety-five percent confidence level.
Doctor's utilization and time there utilization both in-
creased significantly.

The second change was to increase all distributions
to ninety-seven percent minimum time visits. This effectively
made almost all visits fifteen minutes in length. In this
run, patient's utilization increased eleven percent up to
forty-four percent. All other parameters tested decreased.
Waiting room time decreased seventeen minutes. All four
parameters tested by the t-test were found to have signifi-
cantly decreased.

This distribution can not be affected greatly by
changing the operation of the clinic, but does have a great
effect on the clinic. If the visit lengths were shorter,
more patients could be assigned to each doctor.

b. Emergency Rate

The percentage of emergency cases was dependent
upon the disease category. This percentage ranged from one-
half of one percent in the dermatology area to five percent

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PARAMETER	DOCTORS' UTILIZATION		PATIENT TIME		PATIENT UTILIZATION (%)	WAITING ROOM TIME (MIN)	APPENDIX RUN #
	MEAN (%)	T-SCORE	MEAN (MIN)	T-SCORE			
BASIC	94.8	0	76.7	0	33	41	B-1
APPOINTMENTS							
LARGER	98.3	2.60*	83.2	1.16	30	40	B-4
SMALLEST	79.8	8.61*	55.8	3.84*	44	24	B-5
EMERGENCY							
LOW RATE	97.1	1.60	77.9	0.21	32	39	B-6
HIGH RATE	97.4	1.91*	78.4	0.31	32	38	B-7
UNIFORM EMERGENCY TIME	95.2	0.23	72.1	0.78	35	34	B-8
PEDIATRIC RATE							
HIGHEST	93.7	0.80	73.7	0.51	34	35	B-9
LOWEST	94.2	0.46	75.1	0.26	33	37	B-10
WALK-IN RATE							
25%	95.1	0.18	92.2	2.51*	27	51	B-12
50%	91.8	1.90*	112.8	3.12	22	71	B-13

* SIGNIFICANT BY T-TEST (I.E. EXCEEDED 1.76)

TABLE 9.A. PARAMETER COMPARISONS

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in the OB/GYN area. The average was approximately three percent. Two simulations were performed varying these rates.

The first run set all emergency rates to one percent. This change had little effect on any of the measures (Table 9.a.), except the night doctor's utilization, which was cut in half. There was a very slight increase in the utilization of the ancillary personnel. But this is explained by the fact if emergencies are decreased and total occurrences remain constant, the number of less severe cases would increase. There were increases in doctor's utilization and patient's time, but these were not significant.

The second run increased all rates to five percent. This change had the opposite effect of the previous run, by decreasing the ancillary personnel utilization slightly. Doctor's utilization again increased, but this time the increase was significant. The night doctor's utilization was doubled to twenty percent. This would cause the doctor on call to be busy one-fifth of the time.

The number of emergencies cannot be controlled, but these two runs show that the emergency rate can vary and have little effect on the clinic operation. The major variation brought by changing this rate is with the night doctor. Any substantial increase greater than the five percent emergency rate would cause too many interruptions in the clinic operation.

c. Day Emergency Time Distribution

The model used an average time of forty minutes for emergencies which occurred during the clinic office hours. This distribution was assumed to be exponential. One run was made changing this to an uniform distribution (all times between ten and seventy minutes are equally likely). No significant changes in system performance resulted.

d. Pediatric Rate

Two simulations were made using different occurrence rates in the pediatric specialty area. All occurrence rates in the model are averages of a one year period. Pediatrics was the only area which seemed to fluxuate significantly. One run was made using the highest quarter's occurrence rate and another using the lowest quarter's rate. Changing this rate to either extreme had no significant effect upon the model. (Table 9a).

e. Walk-in Rate

The walk-in rate is the percentage of all patients who came directly to the office without calling ahead for an appointment. The walk-in rate for the model was fifteen percent. Three runs (Table 9a) were made to test the model at a rate less than fifteen and up to the fifty percent rate which is now experienced in the General Medical Clinic.

At a walk-in rate of five percent, ninety-five percent of the non-emergency patients were calling for

an appointment. At this rate the system could not handle all
who called, therefore, the waiting time to obtain an appoint-
ment grew excessively. The number of patients waiting grew
to the point where the simulation was stopped, (transaction
count exceeded). Data was therefore only available for one
month. Doctor's utilization decreased but ancillary person-
nel utilization remained about the same. Although patients
had to wait long periods of time to get into the clinic,
their time spent in the clinic decreased and their utilization
increased. This low walk-in rate allows the clinic to plan
better, and would allow more patients to be scheduled each
day. If changes in scheduling policy were not made, the
number of families served would be decreased.

Next the walk-in rate was changed to twenty-five
percent. Patient's utilization dropped to twenty-seven
percent, while the average waiting room time per patient in-
creased ten minutes. The time patients spent in the clinic
increased significantly to over one and one half hours.
Although doctor's utilization remained approximately the
same, their time spent in the clinic decreased.

The last run varying the walk-in rate was to
test the fifty percent rate. The trends listed above con-
tinued (less patient utilization and more patient time in
the clinic). The doctor's "time there" utilization remained
the same, but his utilization, using scheduled time, de-
creased significantly. The doctor's time in the clinic

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decreased even further. Higher walk-in rates cause the patient's time to be wasted by longer waiting periods.

f. No-Show Rate

The no-show rate is the percentage of patients who have scheduled appointments but do not arrive. The no-show rate was increased to fifteen then twenty-five percent. The twenty-five percent run was not examined too closely, because the system overflowed at the fifteen percent rate. On the first run, doctor's utilization decreased. This shows that the system is very sensitive to an increase in the no-show rate. In this model every no-show patient was placed back into the system to be rescheduled. This would then cause a pile up to occur in those patients awaiting appointments, and leads to saturation of the system. If no-shows were not required to be rescheduled only the doctor's utilization would be affected.

g. Arrival Delays

The authors assumed that patients arrived for appointments according to a normal distribution centered about their scheduled time. Two other distributions were simulated. The first was uniform over the range of scheduled times plus or minus twenty-five minutes. The second used the distribution depicted in figure 4. Neither of these had any noticeable affect on any of the measures.

h. Nurse Clinician and Doctor Consults

The probability of a doctor having to consult with a nurse clinician was varied from one to twenty percent

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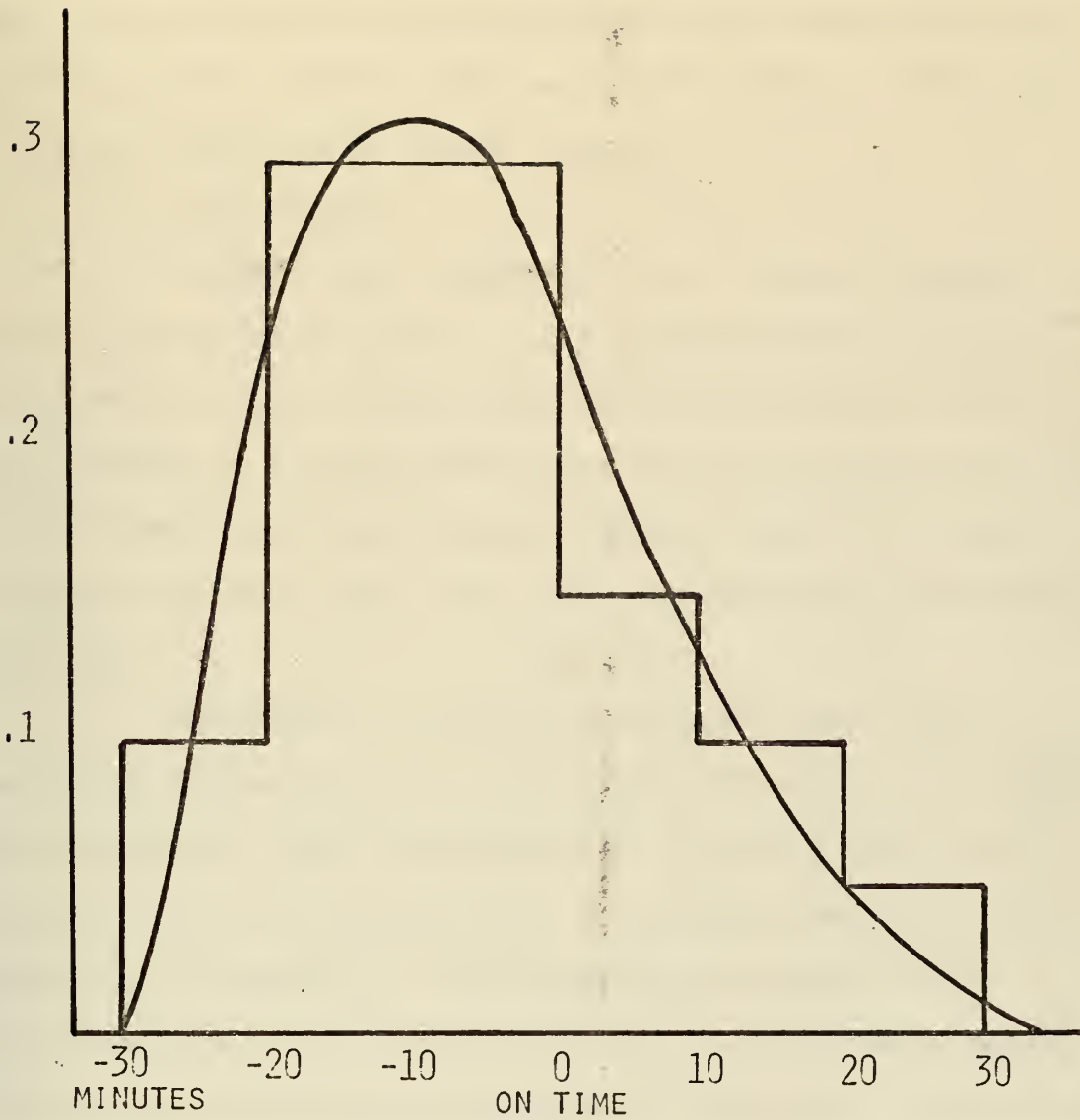
CONTINUOUS DENSITY FROM REF. 5, DISCRETE USED IN MODEL.

ARRIVAL DENSITY

FIGURE 4.

(Table 9b). These runs did not affect any of the measures, therefore this parameter is not sensitive to changes in this range. The varying of the probability of a nurse clinician consulting with a doctor also had little effect. This rate was varied from five to twenty percent.

i. Exam Lengths

Although the length of time a patient spends with the doctor is critical to the operation of a clinic, one parameter which affects more personnel than any other is the length of a female exam that requires an observer. The basic model used an average of eight minutes per exam. Two other runs were made using five and ten minute averages (Table 9c).

The first run using five minute exam shows a significant decrease in the doctor's utilization, but with little effect on other utilizations. Doctor's time there utilization also decreased while the doctor time there remained fairly constant. This demonstrates that a three minute decrease in only thirty percent of the exams causes a substantial decrease in the doctor's time busy. According to the t-test the decrease in the patient's time in the clinic was not significant at the ninety-five percent confidence level.

The second run increased the female exam time to ten minutes. This change had the opposite and predictable effect. Doctor's utilization and time there utilization increased significantly. But the doctor's time in the clinic

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PARAMETER	DOCTORS' UTILIZATION		PATIENT TIME		PATIENT UTILIZATION (%)	WAITING ROOM TIME (MIN)	APPENDIX RUN #
	MEAN (%)	T-SCORE	MEAN (MIN)	T-SCORE			
BASIC	94.8	0	76.7	0	33	41	B-1
ARRIVALS UNIFORM	94.5	0.26	73.6	0.50	33	35	B-18
GAMMA	95.5	0.45	74.3	0.40	34	35	B-19
NURSE CLINICIAN CONSULT RATE							
1 %	94.1	0.42	71.2	0.92	35	33	B-23
10 %	95.2	0.21	81.0	0.78	31	41	B-24
20 %	95.9	0.81	75.5	0.28	34	35	B-25
DOCTORS' CONSULT RATE							
5 %	94.9	0.03	73.5	0.54	34	34	B-26
20 %	95.6	0.55	76.4	0.05	33	37	B-27

TABLE 9.B. PARAMETER COMPARISONS

PARAMETER	DOCTORS' UTILIZATION		PATIENT TIME		PATIENT UTILIZATION (%)	WAITING ROOM TIME (MIN)	APPENDIX RUN #
	MEAN (%)	T-SCORE	MEAN (MIN)	T-SCORE			
FEMALE EXAM							
5 MINUTES	90.1	3.03*	67.0	1.66	36	30	B-28
10 MINUTES	100.3	3.74*	78.9	0.36	33	37	B-29
REFERRAL RATE							
5 %	95.3	1.67	74.6	1.11	34	36	B-30
25 %	100.3	2.04*	82.3	0.31	31	41	B-31
NURSE RETURN RATE							
10 %	96.7	1.12	80.0	0.54	32	40	B-32
25 %	102.4	5.07*	83.3	1.18	32	41	B-33
LAB RETURN RATE							
5 %	94.6	0.14	73.4	0.57	34	34	B-34
25 %	96.6	1.21	75.1	0.25	33	36	B-35
BASIC	94.8	0	76.7	0	33	41	B-1

* SIGNIFICANT BY T-TEST
(I.E. EXCEEDED 1.76)

TABLE 9.C. PARAMETER COMPARISONS

also increased. These two runs show that the system is extremely sensitive to exam time. If the thirteen minute normal patient exam time were altered only slightly there would be a substantial effect on the entire system.

j. Referral Rate

Two computer runs were performed using five and twenty-five percent referral rate instead of the basic model's ten percent. At a five percent rate, small changes were noted. When the rate was increased to twenty-five percent changes did occur. A significant increase appeared in the doctor's utilization and time there utilization. This indicates that increases in the referral rate have some effect on the system, but they seem to be slight.

k. Returns to the Doctor

Runs were made on the percentage of returns from the nurse and the lab (Table 9c). When the return rate from the nurses was increased to ten percent only slight changes in the measures were detected. But when the return rate was increased to twenty-five percent the doctor's utilization increased significantly. Twenty-five percent returns from the nurse seems to be quite high. Any change in rate of less than five percent would have little effect on the system. Return rates from the lab were varied between five and twenty-five percent. These changes did not cause noticeable increases or decreases in any of the measures of effectiveness.

III. MODEL UTILIZATION

The model is designed to determine the number of families that could be served by a Family Practice team consisting of four doctors plus ancillary personnel. A secondary objective is to analyze the best mix of personnel and number of exam rooms needed. These were determined using the input data developed in Section II. A. and B. and estimates by personnel at Hays Hospital.

The number of personnel considered were as follows:

(1) Doctors - 4

(2) Nurse Clinicians - 1, 2, 3

(3) Nurses - 1, 2

(4) Nurse's Aides - 2, 3

(5) Laboratory Technician - 1

(6) Receptionists - 2, 3, 4

Also varied was the number of exam rooms:

(1) Doctor's - 1, 2, 3

(2) Nurse Clinician's - 1, 2

The number of families was also varied to determine the number to assign to each doctor. It was discovered that around three hundred and twenty would keep the system busy and keep average waiting time at an acceptable level (Table 10).

Using the estimates from personnel at Hays Hospital, the number of nurse clinicians was reduced to one. The

| | 320 Families per Patient Panel | | | | 335 Families per Patient Panel | | | |
| | Quarters | | | | Quarters | | | |
	First	Second	Third	Fourth	First	Second	Third	Fourth
Number of Patients Waiting on the Schedule at the End of each Quarter	218	257	171	162	472	559	576	598
Doctors' Utilization	96%	95%	90%	92%	94%	99%	99%	101%
Average Patients' Time in the Clinic (Minutes)	80	75	74	74	79	81	81	85
Average Waiting Time once Scheduled (Days)	4.9	5.0	4.9	4.8	7.5	8.6	9.5	10.4

Table 10. Effect of Varying Patient Panel Size

utilization of the one nurse clinician doubled (Tables 11a and 11b), but still is well below any critical value. The usefullness of nurse clinicians seems to be restricted by the small portion of problems they are allowed to handle. An increase to three nurse clinicians at these rates would not increase the efficiency of the clinic. In later runs a change in the portion of problems handled by nurse clinicians was investigaged, and these results will be covered later.

Due to the set up of the clinic and the overlapping nature of duties performed by nurses and aides, nurses' busy time is very low. Cutting the number to one nurse had little effect on the running of the clinic. This is caused by the fact that in the model, aides were selected as observers for female exams before nurses. If nurses were used to escort patients to exam rooms, the decrease of one nurse could be considered as a decrease of one nurse or one aide.

The next change made was to decrease the number of aides to one. This increased the aide's utilization but a significant increase was noted in the average time spent at the clinic by the patient, and a consequent decrease in the patient's utilization. This increase in patient's time was quite significant according to the t-test. Even though the aide's utilization increased a great deal, the nurse's did not seem to increase correspondingly. This shows that more of the aide's time is spent in showing patients to exam rooms than spent in observing female exams. Therefore it would be helpful if nurses were tasked along with aides in this area.

PARAMETER	DOCTORS' UTILIZATION		PATIENT TIME		PATIENT UTILIZATION (%)	WAITING ROOM TIME (MIN)	REMARKS & APPENDIX RUN #
	MEAN (%)	T-SCORE	MEAN (MIN)	T-SCORE			
Basic	94.8	0	76.7	0	33	41	Receptionists' Utilization 40%, 24%, and 15% B-1
Three Exam Rooms	95.3	0.35	74.8	0.30	33	27	Time in Exam Rooms Increased B-2
12 Appointment Periods	98.8	2.77*	73.4	0.56	34	34	B-3
Receptionists on Duty During the Day							
Two	93.7	0.69	81.2	0.67	–	–	Recept. Util. 46% and 32% B-14
One	95.7	0.43	100.0	4.34*	–	–	Recept. Util. 77% B-15

* Significant by t-test (i.e. exceeded 1.76)

Table 11.a. Parameter Comparisons

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PARAMETER	DOCTORS' UTILIZATION MEAN (%)	DOCTORS' UTILIZATION T-SCORE	PATIENT TIME MEAN (MIN)	PATIENT TIME T-SCORE	PATIENT UTILIZATION (%)	WAITING ROOM TIME (MIN)	REMARKS & APPENDIX RUN #
BASIC	94.8	0	76.7	0	33	41	NURSE CLINICIAN UTILIZATION 20% AND 17%, AIDES' UTILIZATION 55% AND 41% B-1
ONE AIDE	94.6	0.19	121.3	6.49*	20	71	AIDE UTIL. 83% B-20
ONE NURSE CLINICIAN	93.5	0.99	74.7	0.30	33	37	NURSE CLINICIAN UTIL. 40% B-22

* SIGNIFICANT BY T-TEST (I.E. EXCEEDED 1.76)

TABLE 11.B. PARAMETER COMPARISONS

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The need for a full time laboratory technician in a clinic is highly questionable. The number of patients assigned to only four doctors is not sufficient to keep a full time technician busy. Two alternatives are offered. The first is to train a nurse in some aspects of the technician's job. This would allow some laboratory work in the clinic and more complicated work could be sent to the main hospital laboratory. The second alternative is to assign a technician from the hospital for a short period of the day.

The last of the personnel varied was the receptionist. The night receptionist was kept constant and the day receptionists were reduced to two and then to one. When reduced to two, utilization increased but still within limits of acceptability. An increase of five minutes was noted in average patient time, but this is not a significant increase. When reduced to only one, the receptionist was busy most of the time (77%), but still not near a saturation point. The average patient time spent in the office increased significantly by almost twenty-five minutes. Doctor's time spent in the clinic also increased. This indicates that two day receptionists are needed.

The number of doctor exam rooms was varied with the expected results. One exam room per doctor caused a severe slow down of the system, decreased doctor utilization, and increased quitting time. Raising the number of exam rooms to three had little effect except in two areas. Waiting time in the outer office decreased, while waiting time in the exam

room for the doctor increased. The overall time spent in the clinic by the patient did not change. There seems to be little gained by giving each doctor three exam rooms.

Due to the low utilization of nurse clinicians, increasing their exam rooms would not afford much increase in efficiency. The change to two exam rooms for nurse clinicians will be discussed later.

The final change was to schedule twelve patients per doctor in the morning and afternoon periods of each day instead of the original ten. The effect of this was to increase the doctor's utilization and "time there" utilization. All other measures did not change significantly. This change could be helpful, if not carried too far. If the number of appointments were greatly increased, it could affect both the doctor's and patient's time spent in the clinic.

IV. RESULTS AND CONCLUSIONS

The model shows the optimal number of families to assign a doctor to be approximately three hundred and twenty. This is quite a bit under most estimates of the number that could be served [Ref. 4]. It is also a substantial decline from the number being served by the General Medicine Clinic. The three hundred and twenty figure is based on giving total medical service to a family and assumes that the family would not seek medical service from another clinic or doctor. The Family Practice Clinic would care for all of the patient's needs as they develop.

On the basis of parameter estimates, the optimal mix of personnel would be: four doctors, one nurse clinician, one nurse, three aides, and three receptionists. This is the best set up for a clinic which is separated from other medical services. Each doctor needs two exam rooms and the nurse clinician only one.

The above results are based on estimates given by supervisory personnel at Hays Hospital. From other sources estimates of a nurse clinician's responsibility are greater [Ref. 4]. Therefore, runs were conducted using differing nurse clinician rates (Appendix C).

Runs covering one year were made to discover the optimal number of families that could be assigned under different parameters. The model with the three hundred and twenty

families was the first run for the one year period. The results of this run are used to compare the increases realized by varying the nurse clinician's responsibility. This one year run had similar results to the basic run used in the previous comparisons.

The first change was to increase the nurse clinician's responsibility to a level where the clinician could care for a minimum of twelve percent of all patients. The level in several specific areas was also increased (pediatrics-50%, allergies and immunizations-60%, OB/GYN-40%, patients over fifty-five-50%). The larger increases in these areas are a result of training received by the nurse clinicians. The two nurse clinicians should be trained in different areas so that as a group they can handle a larger proportion of problems. In this run, it was discovered that the nurse clinician's utilization increased to an acceptable rate. A bottleneck now appeared in the exam room of the nurse clinician, so this was increased to two exam rooms each.

With these changes a doctor was now able to care for four-hundred and twenty families. Doctor's utilization increased slightly as did all ancillary personnel's utilization (Appendix C). The major increase occurred in the nurse clinician's utilization to 73 percent. A slight increase was noted in patient's time in the clinic and a decrease in patient's utilization. These small changes for the patients are heavily outweighed by the increased number of patients served.

The greater utilization of nurse clinicians is a very important area. In a four doctor clinic, this caused a total increase of four-hundred and twenty families. This effectively is an increase of another doctor for the clinic, where the only change was better utilization of nurse clinicians.

Another simulation was performed, increasing the nurse clinician's rate again. This time the overall rate was increased to a minimum of fifteen percent. The rates in several specific areas were again increased (pediatrics-60%, allergy and immunizations-75%, OB/GYN-50% and patients over fifty-five-60%). This increase required the addition of a third nurse clinician and an extra aide or nurse to assist the night aide. With these changes, the utilization of all personnel increased and a doctor was now able to care for five hundred families. The patient's time in the clinic again increased and his utilization decreased.

V. RECOMMENDATIONS

The key to the Family Practice Clinic being able to pro-
vide total medical care for more families lies in increased
utilization of the nurse clinicians. If a single doctor can
care for only three hundred and twenty families, it will re-
quire eighty-eight Family Practice Physicians to care for the
28,000 families of the Hays Hospital potential patient
population. These eighty-eight doctors do not include the
other specialists in the hospital. If a doctor cares for five
hundred families, however, only fifty-six Family Practice Phy-
sicians will be required. Since the shortage of doctors has
been predicted to continue [Ref. 4], the increased utilization
of ancillary personnel is imperative.

The model can be improved by the collection of data to
provide more accurate estimates of the parameters listed in
Table 10.

The model presented in this thesis can be used to
simulate almost any group-doctor situation with a few minor
changes.

LENGTH OF RUN _3_ MONTHS

	UTILIZATION			UTILIZATION	
	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES	
DOCTOR 1	_95%_	_84%_	RECEPT. 1	39%
DOCTOR 2	_90%_	_84%_	RECEPT. 2	23%
DOCTOR 3	_93%_	_83%_	RECEPT. 3	15%
DOCTOR 4	_99%_	_88%_	NURSE 1	_7%_
NURSE CLIN. 1	_20%_		NURSE 2	17%
NURSE CLIN. 2	_16%_		NIGHT AIDE	48%
NURSE CLIN. 3	_-_%		AIDE 1	53%
NIGHT DOCTOR	_8%_		AIDE 2	41%
NIGHT RECEPT.	_36%_		LAB. TECH.	12%
PATIENTS		_34%_		

AVERAGE WAITING ROOM TIME _35_ MIN.

SCHEDULED _18_ MIN. CALL-AHEAD _45_ MIN. WALK-INS _112_ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
$UTIL_{TS}$	94.22 %	3.32	0
$UTIL_{TT}$	84.64 %	2.16	0
PATIENT'S TIME	74.15 MIN.	9.64	0
DOCTOR'S TIME*	28,748 MIN.	503.1	0

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

SECOND BASIC RUN (A-2)

LENGTH OF RUN _3_ MONTHS

UTILIZATION   UTILIZATION

	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	98%	84%	RECEPT. 1	40%
DOCTOR 2	92%	81%	RECEPT. 2	24%
DOCTOR 3	96%	84%	RECEPT. 3	15%
DOCTOR 4	95%	87%	NURSE 1	8%
NURSE CLIN. 1	19%		NURSE 2	18%
NURSE CLIN. 2	16%		NIGHT AIDE	48%
NURSE CLIN. 3	- %		AIDE 1	55%
NIGHT DOCTOR	8%		AIDE 2	40%
NIGHT RECEPT.	35%		LAB. TECH.	11%
PATIENTS		33%		

AVERAGE WAITING ROOM TIME _50_ MIN.

SCHEDULED _21_ MIN. CALL-AHEAD _51_ MIN. WALK-INS _162_ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
$UTIL_{TS}$	94.96 %	2.17	0.32
$UTIL_{TT}$	83.92 %	2.08	0.41
PATIENT'S TIME	75.99 MIN.	6.74	0.27
DOCTOR'S TIME*	29,278 MIN.	386.2	1.31

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

LENGTH OF RUN _3_ MONTHS

UTILIZATION			UTILIZATION	
	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	_95%_	_85%_	RECEPT. 1	41%
DOCTOR 2	_94%_	_85%_	RECEPT. 2	24%
DOCTOR 3	_96%_	_84%_	RECEPT. 3	16%
DOCTOR 4	_96%_	_86%_	NURSE 1	_8%_
NURSE CLIN. 1	_20%_		NURSE 2	19%
NURSE CLIN. 2	_19%_		NIGHT AIDE	50%
NURSE CLIN. 3	_-_%		AIDE 1	57%
NIGHT DOCTOR	_10%_		AIDE 2	42%
NIGHT RECEPT.	_35%_		LAB. TECH.	13%
PATIENTS		_32%_		

AVERAGE WAITING ROOM TIME _37_ MIN.

SCHEDULED _21_ MIN. CALL-AHEAD _51_ MIN. WALK-INS _112_ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
UTIL$_{TS}$	95.28 %	1.08	0.53
UTIL$_{TT}$	85.18 %	0.87	0.40
PATIENT'S TIME	79.80 MIN.	12.11	0.63
DOCTOR'S TIME*	28,893 MIN.	152.1	0.48

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

LENGTH OF RUN _3_ MONTHS

UTILIZATION			UTILIZATION	
	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	_96%_	_84%_	RECEPT. 1	40%
DOCTOR 2	_92%_	_83%_	RECEPT. 2	24%
DOCTOR 3	_95%_	_84%_	RECEPT. 3	15%
DOCTOR 4	_97%_	_87%_	NURSE 1	_7%_
NURSE CLIN. 1	_20%_		NURSE 2	18%
NURSE CLIN. 2	_17%_		NIGHT AIDE	49%
NURSE CLIN. 3	_-%_		AIDE 1	55%
NIGHT DOCTOR	_9%_		AIDE 2	41%
NIGHT RECEPT.	_35%_		LAB. TECH.	12%
PATIENTS		_33%_		

AVERAGE WAITING ROOM TIME _41_ MIN.

SCHEDULED _21_ MIN. CALL-AHEAD _49_ MIN. WALK-INS _129_ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
UTIL$_{TS}$	94.82 %	2.42	0
UTIL$_{TT}$	84.58 %	1.87	0
PATIENT'S TIME	76.65 MIN.	10.03	0
DOCTOR'S TIME*	28,956 MIN.	426.8	0

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

LENGTH OF RUN __3__ MONTHS

UTILIZATION   UTILIZATION

	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	94%	81%	RECEPT. 1	40%
DOCTOR 2	91%	84%	RECEPT. 2	23%
DOCTOR 3	95%	84%	RECEPT. 3	15%
DOCTOR 4	97%	88%	NURSE 1	8%
NURSE CLIN. 1	23%		NURSE 2	17%
NURSE CLIN. 2	18%		NIGHT AIDE	47%
NURSE CLIN. 3	-%		AIDE 1	55%
NIGHT DOCTOR	9%		AIDE 2	40%
NIGHT RECEPT.	36%		LAB. TECH.	-%
PATIENTS		33%		

AVERAGE WAITING ROOM TIME __27__ MIN.

SCHEDULED __13__ MIN. CALL-AHEAD __43__ MIN. WALK-INS __82__ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
$UTIL_{TS}$	95.29 %	1.17	0.35
$UTIL_{TT}$	84.23 %	2.39	0.28
PATIENT'S TIME	74.79 MIN.	9.92	0.30
DOCTOR'S TIME*	28,920 MIN.	467.2	0.13

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

LENGTH OF RUN _3_ MONTHS

UTILIZATION			UTILIZATION	
	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	100%	86%	RECEPT. 1	40%
DOCTOR 2	95%	87%	RECEPT. 2	23%
DOCTOR 3	101%	89%	RECEPT. 3	15%
DOCTOR 4	99%	90%	NURSE 1	8%
NURSE CLIN. 1	20%		NURSE 2	17%
NURSE CLIN. 2	18%		NIGHT AIDE	53%
NURSE CLIN. 3	- %		AIDE 1	57%
NIGHT DOCTOR	10%		AIDE 2	41%
NIGHT RECEPT.	39%		LAB. TECH.	- %
PATIENTS		34%		

AVERAGE WAITING ROOM TIME _34_ MIN.

SCHEDULED _20_ MIN. CALL-AHEAD _41_ MIN. WALK-INS _103_ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
$UTIL_{TS}$	98.79 %	2.02	2.77
$UTIL_{TT}$	87.85 %	1.46	2.97
PATIENT'S TIME	73.42 MIN.	7.23	0.56
DOCTOR'S TIME*	29,048 MIN.	497.7	0.34

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

20% OVER 1 APPOINTMENT PERIOD (B-4)

LENGTH OF RUN 3 MONTHS

UTILIZATION				UTILIZATION	
	SCHEDULED TIMES	TIME THERE			SCHEDULED TIMES
DOCTOR 1	97%	86%	RECEPT. 1		– %
DOCTOR 2	98%	88%	RECEPT. 2		– %
DOCTOR 3	98%	86%	RECEPT. 3		– %
DOCTOR 4	100%	90%	NURSE 1		– %
NURSE CLIN. 1	21%		NURSE 2		– %
NURSE CLIN. 2	20%		NIGHT AIDE		– %
NURSE CLIN. 3	– %		AIDE 1		– %
NIGHT DOCTOR	– %		AIDE 2		– %
NIGHT RECEPT.	– %		LAB. TECH.		– %
PATIENTS		30%			

AVERAGE WAITING ROOM TIME 40 MIN.

SCHEDULED – MIN. CALL-AHEAD – MIN. WALK-INS – MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
UTIL$_{TS}$	98.25 %	0.90	2.60
UTIL$_{TT}$	87.48 %	1.64	2.59
PATIENT'S TIME	83.17 MIN.	5.72	1.16
DOCTOR'S TIME*	29,010 MIN.	92.5	0.42

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

3% OVER 1 APPOINTMENT PERIOD (B-5)

LENGTH OF RUN 3 MONTHS

UTILIZATION	SCHEDULED TIMES	TIME THERE		UTILIZATION	SCHEDULED TIMES
DOCTOR 1	81%	74%	RECEPT. 1		- %
DOCTOR 2	74%	71%	RECEPT. 2		- %
DOCTOR 3	84%	78%	RECEPT. 3		- %
DOCTOR 4	80%	77%	NURSE 1		- %
NURSE CLIN. 1	18%		NURSE 2		- %
NURSE CLIN. 2	15%		NIGHT AIDE		- %
NURSE CLIN. 3	- %		AIDE 1		- %
NIGHT DOCTOR	- %		AIDE 2		- %
NIGHT RECEPT.	- %		LAB. TECH.		- %
PATIENTS		44%			

AVERAGE WAITING ROOM TIME __24__ MIN.

SCHEDULED _-_ MIN. CALL-AHEAD _-_ MIN. WALK-INS _-_ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
UTIL$_{TS}$	79.82 %	3.79	8.61
UTIL$_{TT}$	75.15 %	2.57	7.38
PATIENT'S TIME	55.77 MIN.	2.92	3.84
DOCTOR'S TIME*	27.420 MIN.	314.6	6.19

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

LENGTH OF RUN __3__ MONTHS

UTILIZATION   UTILIZATION

	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	99%	- %	RECEPT. 1	- %
DOCTOR 2	98%	- %	RECEPT. 2	- %
DOCTOR 3	94%	- %	RECEPT. 3	- %
DOCTOR 4	98%	- %	NURSE 1	8%
NURSE CLIN. 1	23%		NURSE 2	18%
NURSE CLIN. 2	20%		NIGHT AIDE	55%
NURSE CLIN. 3	- %		AIDE 1	58%
NIGHT DOCTOR	5%		AIDE 2	42%
NIGHT RECEPT.	- %		LAB. TECH.	- %
PATIENTS		32%		

AVERAGE WAITING ROOM TIME __39__ MIN.

SCHEDULED _-_ MIN. CALL-AHEAD _-_ MIN. WALK-INS _-_ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
UTIL$_{TS}$	97.09 %	1.95	1.60
UTIL$_{TT}$	- %	-	-
PATIENT'S TIME	77.85 MIN.	6.80	0.21
DOCTOR'S TIME*	- MIN.	-	-

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

Length of run _3_ months

UTILIZATION			UTILIZATION	
	Scheduled Times	Time There		Scheduled Times
Doctor 1	_99%_	_-_%	Recept. 1	_-_%
Doctor 2	_96%_	_-_%	Recept. 2	_-_%
Doctor 3	_98%_	_-_%	Recept. 3	_-_%
Doctor 4	_97%_	_-_%	Nurse 1	_7%_
Nurse Clin. 1	_20%_		Nurse 2	_17%_
Nurse Clin. 2	_18%_		Night Aide	_54%_
Nurse Clin. 3	_-_%		Aide 1	_56%_
Night Doctor	_21%_		Aide 2	_40%_
Night Recept.	_-_%		Lab. Tech.	_-_%
Patients		_32%_		

Average Waiting Room Time _38_ min.

Scheduled _-_ min. Call-ahead _-_ min. Walk-ins _-_ min.

T-Test

	Mean	Std. Dev.	T-Score
$UTIL_{TS}$	_97.37_ %	_1.11_	_1.91_
$UTIL_{TT}$	_-_ %	_-_	_-_
Patient's Time	_78.43_ min.	_6.25_	_0.31_
Doctor's Time*	_-_ min.	_-_	_-_

* Time in clinic during the number of months noted above.

LENGTH OF RUN __3__ MONTHS

UTILIZATION			UTILIZATION	
	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	_98%_	_-_%	RECEPT. 1	_-_%
DOCTOR 2	_92%_	_-_%	RECEPT. 2	_-_%
DOCTOR 3	_95%_	_-_%	RECEPT. 3	_-_%
DOCTOR 4	_96%_	_-_%	NURSE 1	_-_%
NURSE CLIN. 1	_19%_		NURSE 2	_-_%
NURSE CLIN. 2	_16%_		NIGHT AIDE	_-_%
NURSE CLIN. 3	_-_%		AIDE 1	_-_%
NIGHT DOCTOR	_-_%		AIDE 2	_-_%
NIGHT RECEPT.	_-_%		LAB. TECH.	_-_%
PATIENTS		_35%_		

AVERAGE WAITING ROOM TIME __34__ MIN.

SCHEDULED _-_ MIN. CALL-AHEAD _-_ MIN. WALK-INS _-_ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
UTIL$_{TS}$	95.15 %	1.91	0.23
UTIL$_{TT}$	_-_ %	_-_	_-_
PATIENT'S TIME	72.13 MIN.	7.29	0.78
DOCTOR'S TIME*	_-_ MIN.	_-_	_-_

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

LENGTH OF RUN __3__ MONTHS

UTILIZATION   UTILIZATION

	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	_91_%	_-_%	RECEPT. 1	40%
DOCTOR 2	_96_%	_-_%	RECEPT. 2	23%
DOCTOR 3	_95_%	_-_%	RECEPT. 3	15%
DOCTOR 4	_93_%	_-_%	NURSE 1	_6_%
NURSE CLIN. 1	_21_%		NURSE 2	17%
NURSE CLIN. 2	_18_%		NIGHT AIDE	50%
NURSE CLIN. 3	_-_%		AIDE 1	55%
NIGHT DOCTOR	_9_%		AIDE 2	40%
NIGHT RECEPT.	_35_%		LAB. TECH.	_-_%
PATIENTS		_34_%		

AVERAGE WAITING ROOM TIME __35__ MIN.

SCHEDULED __19__ MIN. CALL-AHEAD __53__ MIN. WALK-INS __100__ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
UTIL$_{TS}$	93.68 %	1.90	0.80
UTIL$_{TT}$	_-_ %	_-_	_-_
PATIENT'S TIME	73.69 MIN.	6.84	0.51
DOCTOR'S TIME*	_-_ MIN.	_-_	_-_

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

LOWEST PEDIATRIC RATE (B-10)

LENGTH OF RUN _3_ MONTHS

UTILIZATION				UTILIZATION	
	SCHEDULED TIMES	TIME THERE			SCHEDULED TIMES
DOCTOR 1	93%	- %	RECEPT. 1		40%
DOCTOR 2	98%	- %	RECEPT. 2		23%
DOCTOR 3	93%	- %	RECEPT. 3		15%
DOCTOR 4	93%	- %	NURSE 1		8%
NURSE CLIN. 1	21%		NURSE 2		18%
NURSE CLIN. 2	20%		NIGHT AIDE		48%
NURSE CLIN. 3	- %		AIDE 1		52%
NIGHT DOCTOR	11%		AIDE 2		41%
NIGHT RECEPT.	35%		LAB. TECH.		- %
PATIENTS		33%			

AVERAGE WAITING ROOM TIME _37_ MIN.

SCHEDULED _22_ MIN. CALL-AHEAD _49_ MIN. WALK-INS _102_ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
$UTIL_{TS}$	94.15 %	2.30	0.46
$UTIL_{TT}$	- %	-	-
PATIENT'S TIME	75.07 MIN.	8.49	0.26
DOCTOR'S TIME*	- MIN.	-	-

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

LENGTH OF RUN __1__ MONTH

	UTILIZATION			UTILIZATION
	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	87%	78%	RECEPT. 1	41%
DOCTOR 2	82%	74%	RECEPT. 2	24%
DOCTOR 3	83%	75%	RECEPT. 3	15%
DOCTOR 4	84%	75%	NURSE 1	8%
NURSE CLIN. 1	24%		NURSE 2	15%
NURSE CLIN. 2	21%		NIGHT AIDE	42%
NURSE CLIN. 3	-%		AIDE 1	52%
NIGHT DOCTOR	13%		AIDE 2	38%
NIGHT RECEPT.	36%		LAB. TECH.	-%
PATIENTS		41%		

AVERAGE WAITING ROOM TIME __23__ MIN.

SCHEDULED __17__ MIN. CALL-AHEAD __36__ MIN. WALK-INS __91__ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
UTIL$_{TS}$	-%	-	-
UTIL$_{TT}$	-%	-	-
PATIENT'S TIME	- MIN.	-	-
DOCTOR'S TIME*	- MIN.	-	-

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

LENGTH OF RUN __3__ MONTHS

UTILIZATION   UTILIZATION

	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	100%	89%	RECEPT. 1	39%
DOCTOR 2	94%	87%	RECEPT. 2	22%
DOCTOR 3	93%	83%	RECEPT. 3	14%
DOCTOR 4	92%	85%	NURSE 1	7%
NURSE CLIN. 1	20%		NURSE 2	18%
NURSE CLIN. 2	16%		NIGHT AIDE	52%
NURSE CLIN. 3	_ %		AIDE 1	55%
NIGHT DOCTOR	10%		AIDE 2	41%
NIGHT RECEPT.	32%		LAB. TECH.	_ %
PATIENTS		27%		

AVERAGE WAITING ROOM TIME __51__ MIN.

SCHEDULED __21__ MIN. CALL-AHEAD __47__ MIN. WALK-INS __133__ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
UTIL$_{TS}$	95.11 %	3.19	0.18
UTIL$_{TT}$	86.13 %	2.40	1.25
PATIENT'S TIME	92.20 MIN.	10.10	2.51
DOCTOR'S TIME*	28,515 MIN.	216.9	1.85

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

LENGTH OF RUN __3__ MONTHS

UTILIZATION			UTILIZATION	
	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	_94%_	_83%_	RECEPT. 1	34%
DOCTOR 2	_94%_	_87%_	RECEPT. 2	18%
DOCTOR 3	_87%_	_80%_	RECEPT. 3	11%
DOCTOR 4	_93%_	_88%_	NURSE 1	_5%_
NURSE CLIN. 1	19%		NURSE 2	16%
NURSE CLIN. 2	18%		NIGHT AIDE	56%
NURSE CLIN. 3	_-_%		AIDE 1	54%
NIGHT DOCTOR	10%		AIDE 2	38%
NIGHT RECEPT.	26%		LAB. TECH.	_-_%
PATIENTS		22%		

AVERAGE WAITING ROOM TIME __71__ MIN.

SCHEDULED __19__ MIN. CALL-AHEAD __31__ MIN. WALK-INS __125__ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
UTIL$_{TS}$	91.81 %	2.97	1.90
UTIL$_{TT}$	84.35 %	3.27	0.16
PATIENT'S TIME	112.83 MIN.	33.34	3.12
DOCTOR'S TIME*	28,125 MIN.	597.9	2.83

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

2 DAY RECEPTIONISTS _____ (B-14)

LENGTH OF RUN _3_ MONTHS

UTILIZATION			UTILIZATION	
	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	_89%_	_80%_	RECEPT. 1	_46%_
DOCTOR 2	_95%_	_85%_	RECEPT. 2	_32%_
DOCTOR 3	_93%_	_82%_	RECEPT. 3	_-%_
DOCTOR 4	_98%_	_86%_	NURSE 1	_-%_
NURSE CLIN. 1	_19%_		NURSE 2	_-%_
NURSE CLIN. 2	_19%_		NIGHT AIDE	_-%_
NURSE CLIN. 3	_-%_		AIDE 1	_-%_
NIGHT DOCTOR	_-%_		AIDE 2	_-%_
NIGHT RECEPT.	_-%_		LAB. TECH.	_-%_

AVERAGE WAITING ROOM TIME _-_ MIN.

SCHEDULED _-_ MIN. CALL-AHEAD _-_ MIN. WALK-INS _-_ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
$UTIL_{TS}$	93.68 %	3.31	0.69
$UTIL_{TT}$	83.26 %	2.55	1.04
PATIENT'S TIME	81.17 MIN.	13.49	0.67
DOCTOR'S TIME*	29,069 MIN.	437.5	0.39

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

1 Day Receptionist (B-15)

Length of run __3__ months

UTILIZATION				UTILIZATION	
	Scheduled Times	Time There			Scheduled Times
Doctor 1	95%	85%	Recept. 1		77%
Doctor 2	96%	85%	Recept. 2		- %
Doctor 3	103%	87%	Recept. 3		- %
Doctor 4	88%	79%	Nurse 1		- %
Nurse Clin. 1	20%		Nurse 2		- %
Nurse Clin. 2	17%		Night Aide		- %
Nurse Clin. 3	- %		Aide 1		- %
Night Doctor	- %		Aide 2		- %
Night Recept.	36%		Lab. Tech.		- %

Average Waiting Room Time __-__ min.

Scheduled __-__ min. Call-ahead __-__ min. Walk-ins __-__ min.

T-Test

	Mean	Std. Dev.	T-Score
$Util_{TS}$	95.67 %	4.87	0.43
$Util_{TT}$	83.77 %	3.13	0.58
Patient's Time	99.97 min.	1.74	4.34
Doctor's Time*	29,453 min.	484.8	1.82

* Time in clinic during the number of months noted above.

LENGTH OF RUN __1__ MONTHS

UTILIZATION   UTILIZATION

	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	89%	77%	RECEPT. 1	40%
DOCTOR 2	90%	81%	RECEPT. 2	24%
DOCTOR 3	84%	77%	RECEPT. 3	16%
DOCTOR 4	81%	75%	NURSE 1	6%
NURSE CLIN. 1	19%		NURSE 2	16%
NURSE CLIN. 2	21%		NIGHT AIDE	42%
NURSE CLIN. 3	- %		AIDE 1	55%
NIGHT DOCTOR	11%		AIDE 2	37%
NIGHT RECEPT.	35%		LAB. TECH.	- %
PATIENTS		37%		

AVERAGE WAITING ROOM TIME __30__ MIN.

SCHEDULED __17__ MIN. CALL-AHEAD __42__ MIN. WALK-INS __78__ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
UTIL$_{TS}$	- %	-	-
UTIL$_{TT}$	- %	-	-
PATIENT'S TIME	- MIN.	-	-
DOCTOR'S TIME*	- MIN.	-	-

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

LENGTH OF RUN __1__ MONTHS

UTILIZATION			UTILIZATION	
	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	_83%_	_73%_	RECEPT. 1	42%
DOCTOR 2	_77%_	_74%_	RECEPT. 2	24%
DOCTOR 3	_78%_	_68%_	RECEPT. 3	15%
DOCTOR 4	_86%_	_80%_	NURSE 1	_7%_
NURSE CLIN. 1	_21%_		NURSE 2	15%
NURSE CLIN. 2	_19%_		NIGHT AIDE	38%
NURSE CLIN. 3	_–_%		AIDE 1	52%
NIGHT DOCTOR	_10%_		AIDE 2	37%
NIGHT RECEPT.	_36%_		LAB. TECH.	_–_%
PATIENTS		_37%_		

AVERAGE WAITING ROOM TIME __–__ MIN.

SCHEDULED __–__ MIN. CALL-AHEAD __–__ MIN. WALK-INS __–__ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
UTIL$_{TS}$	__–__ %	__–__	__–__
UTIL$_{TT}$	__–__ %	__–__	__–__
PATIENT'S TIME	__–__ MIN.	__–__	__–__
DOCTOR'S TIME*	__–__ MIN.	__–__	__–__

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

LENGTH OF RUN __3__ MONTHS

	UTILIZATION				UTILIZATION
	SCHEDULED TIMES	TIME THERE			SCHEDULED TIMES
DOCTOR 1	_94%_	_83%_	RECEPT. 1		_-_%
DOCTOR 2	_95%_	_86%_	RECEPT. 2		_-_%
DOCTOR 3	_93%_	_82%_	RECEPT. 3		_-_%
DOCTOR 4	_96%_	_87%_	NURSE 1		_-_%
NURSE CLIN. 1	_21%_		NURSE 2		_-_%
NURSE CLIN. 2	_18%_		NIGHT AIDE		_-_%
NURSE CLIN. 3	_-_%		AIDE 1		_-_%
NIGHT DOCTOR	_-_%		AIDE 2		_-_%
NIGHT RECEPT.	_-_%		LAB. TECH.		_-_%
PATIENTS		_33%_			

AVERAGE WAITING ROOM TIME __35__ MIN.

SCHEDULED _-_ MIN. CALL-AHEAD _-_ MIN. WALK-INS _-_ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
$UTIL_{TS}$	94.47 %	1.09	0.26
$UTIL_{TT}$	84.74 %	2.02	0.14
PATIENT'S TIME	73.57 MIN.	9.60	0.50
DOCTOR'S TIME*	28,800 MIN.	99.5	0.68

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

LENGTH OF RUN 3 MONTHS

UTILIZATION			UTILIZATION	
	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	93%	83%	RECEPT. 1	- %
DOCTOR 2	97%	87%	RECEPT. 2	- %
DOCTOR 3	99%	86%	RECEPT. 3	- %
DOCTOR 4	94%	86%	NURSE 1	- %
NURSE CLIN. 1	21%		NURSE 2	- %
NURSE CLIN. 2	16%		NIGHT AIDE	- %
NURSE CLIN. 3	- %		AIDE 1	- %
NIGHT DOCTOR	- %		AIDE 2	- %
NIGHT RECEPT.	- %		LAB. TECH.	- %
PATIENTS		34%		

AVERAGE WAITING ROOM TIME 35 MIN.

SCHEDULED - MIN. CALL-AHEAD - MIN. WALK-INS - MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
$UTIL_{TS}$	95.49 %	2.33	0.45
$UTIL_{TT}$	85.63 %	1.48	0.95
PATIENT'S TIME	74.32 MIN.	7.95	0.40
DOCTOR'S TIME*	28,800 MIN.	277.4	0.64

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

LENGTH OF RUN _3_ MONTHS

UTILIZATION			UTILIZATION	
	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	_94%_	_82%_	RECEPT. 1	40%
DOCTOR 2	_94%_	_84%_	RECEPT. 2	24%
DOCTOR 3	_92%_	_82%_	RECEPT. 3	15%
DOCTOR 4	_98%_	_86%_	NURSE 1	_7%_
NURSE CLIN. 1	_20%_		NURSE 2	18%
NURSE CLIN. 2	_17%_		NIGHT AIDE	70%
NURSE CLIN. 3	_-%_		AIDE 1	83%
NIGHT DOCTOR	_10%_		AIDE 2	_-%_
NIGHT RECEPT.	_36%_		LAB. TECH.	_-%_
PATIENTS		_20%_		

AVERAGE WAITING ROOM TIME _71_ MIN.

SCHEDULED _39_ MIN. CALL-AHEAD _135_ MIN. WALK-INS _183_ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
$UTIL_{TS}$	94.55 %	2.08	0.19
$UTIL_{TT}$	83.30 %	1.94	1.09
PATIENT'S TIME	121.28 MIN.	13.96	6.49
DOCTOR'S TIME*	29,318 MIN.	305.5	1.47

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

LENGTH OF RUN _6_ MONTHS

UTILIZATION			UTILIZATION	
	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	_-_%	_-_%	RECEPT. 1	_-_%
DOCTOR 2	_-_%	_-_%	RECEPT. 2	_-_%
DOCTOR 3	_-_%	_-_%	RECEPT. 3	_-_%
DOCTOR 4	_-_%	_-_%	NURSE 1	20%
NURSE CLIN. 1	_-_%		NURSE 2	_-_%
NURSE CLIN. 2	_-_%		NIGHT AIDE	51%
NURSE CLIN. 3	_-_%		AIDE 1	56%
NIGHT DOCTOR	_-_%		AIDE 2	41%
NIGHT RECEPT.	_-_%		LAB. TECH.	_-_%
PATIENTS		32%		

AVERAGE WAITING ROOM TIME _39_ MIN.

SCHEDULED _-_ MIN. CALL-AHEAD _-_ MIN. WALK-INS _-_ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
$UTIL_{TS}$	_-_%	_-_	_-_
$UTIL_{TT}$	_-_%	_-_	_-_
PATIENT'S TIME	_-_ MIN.	_-_	_-_
DOCTOR'S TIME*	_-_ MIN.	_-_	_-_

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

LENGTH OF RUN _3_ MONTHS

UTILIZATION   UTILIZATION

	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	_93%_	_81%_	RECEPT. 1	_-_%
DOCTOR 2	_93%_	_83%_	RECEPT. 2	_-_%
DOCTOR 3	_93%_	_84%_	RECEPT. 3	_-_%
DOCTOR 4	_95%_	_85%_	NURSE 1	_7%_
NURSE CLIN. 1	_40%_		NURSE 2	_17%_
NURSE CLIN. 2	_-_%		NIGHT AIDE	_51%_
NURSE CLIN. 3	_-_%		AIDE 1	_52%_
NIGHT DOCTOR	_-_%		AIDE 2	_41%_
NIGHT RECEPT.	_-_%		LAB. TECH.	_-_%
PATIENTS		_33%_		

AVERAGE WAITING ROOM TIME _37_ MIN.

SCHEDULED _-_ MIN. CALL-AHEAD _-_ MIN. WALK-INS _-_ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
UTIL$_{TS}$	93.52 %	0.86	0.99
UTIL$_{TT}$	83.13 %	1.33	1.34
PATIENT'S TIME	74.69 MIN.	12.43	0.30
DOCTOR'S TIME*	29,063 MIN.	399.3	0.41

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

1% NURSE CLINICIAN CONSULTS (B-23)

LENGTH OF RUN 3 MONTHS

	UTILIZATION			UTILIZATION	
	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES	
DOCTOR 1	99%	86%	RECEPT. 1	- %	
DOCTOR 2	96%	89%	RECEPT. 2	- %	
DOCTOR 3	92%	82%	RECEPT. 3	- %	
DOCTOR 4	90%	82%	NURSE 1	- %	
NURSE CLIN. 1	17%		NURSE 2	- %	
NURSE CLIN. 2	16%		NIGHT AIDE	- %	
NURSE CLIN. 3	- %		AIDE 1	- %	
NIGHT DOCTOR	- %		AIDE 2	- %	
NIGHT RECEPT.	- %		LAB. TECH.	- %	
PATIENTS		35%			

AVERAGE WAITING ROOM TIME 33 MIN.

SCHEDULED 19 MIN. CALL-AHEAD 48 MIN. WALK-INS 92 MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
UTIL$_{TS}$	94.13 %	3.40	0.42
UTIL$_{TT}$	84.45 %	3.06	0.09
PATIENT'S TIME	71.20 MIN.	7.91	0.92
DOCTOR'S TIME*	28,793 MIN.	523.7	0.58

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

10% NURSE CLINICIAN CONSULTS (B-24)

LENGTH OF RUN 3 MONTHS

UTILIZATION			UTILIZATION	
	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	96%	85%	RECEPT. 1	- %
DOCTOR 2	94%	87%	RECEPT. 2	- %
DOCTOR 3	101%	88%	RECEPT. 3	- %
DOCTOR 4	90%	83%	NURSE 1	- %
NURSE CLIN. 1	25%		NURSE 2	- %
NURSE CLIN. 2	18%		NIGHT AIDE	- %
NURSE CLIN. 3	- %		AIDE 1	- %
NIGHT DOCTOR	- %		AIDE 2	- %
NIGHT RECEPT.	- %		LAB. TECH.	- %
PATIENTS		31%		

AVERAGE WAITING ROOM TIME 41 MIN.

SCHEDULED 23 MIN. CALL-AHEAD 61 MIN. WALK-INS 117 MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
$UTIL_{TS}$	95.18 %	3.83	0.21
$UTIL_{TT}$	85.79 %	1.85	1.05
PATIENT'S TIME	80.97 MIN.	4.89	0.78
DOCTOR'S TIME*	28,643 MIN.	432.3	1.19

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

20% NURSE CLINICIAN CONSULTS (B-25)

LENGTH OF RUN __3__ MONTHS

	UTILIZATION			UTILIZATION	
	SCHEDULED TIMES	TIME THERE			SCHEDULED TIMES
DOCTOR 1	_96%_	_84%_	RECEPT. 1		_-_%
DOCTOR 2	_97%_	_87%_	RECEPT. 2		_-_%
DOCTOR 3	_96%_	_85%_	RECEPT. 3		_-_%
DOCTOR 4	_95%_	_88%_	NURSE 1		_-_%
NURSE CLIN. 1	_28%_		NURSE 2		_-_%
NURSE CLIN. 2	_20%_		NIGHT AIDE		_-_%
NURSE CLIN. 3	_-_%		AIDE 1		_-_%
NIGHT DOCTOR	_-_%		AIDE 2		_-_%
NIGHT RECEPT.	_-_%		LAB. TECH.		_-_%
PATIENTS		_34%_			

AVERAGE WAITING ROOM TIME __35__ MIN.

SCHEDULED __20__ MIN. CALL-AHEAD __42__ MIN. WALK-INS __105__ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
UTIL$_{TS}$	95.88 %	0.84	0.81
UTIL$_{TT}$	86.12 %	1.61	1.38
PATIENT'S TIME	75.47 MIN.	6.51	0.28
DOCTOR'S TIME*	28,763 MIN.	343.6	0.77

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

93

5% DOCTORS' CONSULT   (B-26)

LENGTH OF RUN _3_ MONTHS

UTILIZATION   UTILIZATION

	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	_96%_	_85%_	RECEPT. 1	_-_%
DOCTOR 2	_93%_	_86%_	RECEPT. 2	_-_%
DOCTOR 3	_96%_	_86%_	RECEPT. 3	_-_%
DOCTOR 4	_94%_	_85%_	NURSE 1	_-_%
NURSE CLIN. 1	_18%_		NURSE 2	_-_%
NURSE CLIN. 2	_17%_		NIGHT AIDE	_-_%
NURSE CLIN. 3	_-_%		AIDE 1	_-_%
NIGHT DOCTOR	_-_%		AIDE 2	_-_%
NIGHT RECEPT.	_-_%		LAB. TECH.	_-_%
PATIENTS		_34%_		

AVERAGE WAITING ROOM TIME _34_ MIN.

SCHEDULED _18_ MIN. CALL-AHEAD _40_ MIN. WALK-INS _108_ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
$UTIL_{TS}$	_94.85_ %	_1.43_	_0.03_
$UTIL_{TT}$	_85.48_ %	_0.44_	_0.89_
PATIENT'S TIME	_73.53_ MIN.	_7.08_	_0.54_
DOCTOR'S TIME*	_28,658_ MIN.	_247.7_	_1.24_

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

20% DOCTORS' CONSULTS (B-27)

LENGTH OF RUN _3_ MONTHS

UTILIZATION			UTILIZATION	
	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	_98%_	_84%_	RECEPT. 1	_-_%
DOCTOR 2	_98%_	_88%_	RECEPT. 2	_-_%
DOCTOR 3	_95%_	_87%_	RECEPT. 3	_-_%
DOCTOR 4	_92%_	_86%_	NURSE 1	_-_%
NURSE CLIN. 1	_21%_		NURSE 2	_-_%
NURSE CLIN. 2	_19%_		NIGHT AIDE	_-_%
NURSE CLIN. 3	_-_%		AIDE 1	_-_%
NIGHT DOCTOR	_-_%		AIDE 2	_-_%
NIGHT RECEPT.	_-_%		LAB. TECH.	_-_%
PATIENTS		_33%_		

AVERAGE WAITING ROOM TIME _37_ MIN.

SCHEDULED _21_ MIN. CALL-AHEAD _49_ MIN. WALK-INS _108_ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
$UTIL_{TS}$	95.63 %	2.32	0.55
$UTIL_{TT}$	86.40 %	1.32	1.69
PATIENT'S TIME	76.36 MIN.	8.03	0.05
DOCTOR'S TIME*	28,590 MIN.	690.0	1.17

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

LENGTH OF RUN _3_ MONTHS

UTILIZATION   UTILIZATION

	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	92%	79%	RECEPT. 1	40%
DOCTOR 2	85%	79%	RECEPT. 2	24%
DOCTOR 3	93%	81%	RECEPT. 3	16%
DOCTOR 4	90%	82%	NURSE 1	6%
NURSE CLIN. 1	20%		NURSE 2	17%
NURSE CLIN. 2	16%		NIGHT AIDE	44%
NURSE CLIN. 3	-%		AIDE 1	58%
NIGHT DOCTOR	9%		AIDE 2	41%
NIGHT RECEPT.	34%		LAB. TECH.	-%
PATIENTS		36%		

AVERAGE WAITING ROOM TIME _30_ MIN.

SCHEDULED _-_ MIN. CALL-AHEAD _-_ MIN. WALK-INS _-_ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
UTIL_{TS}	90.07 %	2.88	3.03
UTIL_{TT}	80.26 %	1.52	3.91
PATIENT'S TIME	67.04 MIN.	7.15	1.66
DOCTOR'S TIME*	28,988 MIN.	555.4	0.11

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

10 MINUTE FEMALE EXAM   (B-29)

LENGTH OF RUN _3_ MONTHS

UTILIZATION				UTILIZATION	
	SCHEDULED TIMES	TIME THERE			SCHEDULED TIMES
DOCTOR 1	101%	88%	RECEPT. 1		40%
DOCTOR 2	101%	91%	RECEPT. 2		24%
DOCTOR 3	102%	84%	RECEPT. 3		15%
DOCTOR 4	97%	87%	NURSE 1		8%
NURSE CLIN. 1	20%		NURSE 2		17%
NURSE CLIN. 2	17%		NIGHT AIDE		52%
NURSE CLIN. 3	- %		AIDE 1		54%
NIGHT DOCTOR	11%		AIDE 2		41%
NIGHT RECEPT.	37%		LAB. TECH.		- %
PATIENTS		33%			

AVERAGE WAITING ROOM TIME _37_ MIN.

SCHEDULED _-_ MIN. CALL-AHEAD _-_ MIN. WALK-INS _-_ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
$UTIL_{TS}$	100.27%	2.19	3.74
$UTIL_{TT}$	87.60%	2.46	2.40
PATIENT'S TIME	78.85 MIN.	9.64	0.36
DOCTOR'S TIME*	29,580 MIN.	815.3	1.84

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

LENGTH OF RUN _3_ MONTHS

UTILIZATION			UTILIZATION	
	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	_93%_	_82%_	RECEPT. 1	40%
DOCTOR 2	_95%_	_86%_	RECEPT. 2	24%
DOCTOR 3	_97%_	_85%_	RECEPT. 3	15%
DOCTOR 4	_96%_	_88%_	NURSE 1	_7%_
NURSE CLIN. 1	_22%_		NURSE 2	18%
NURSE CLIN. 2	_18%_		NIGHT AIDE	47%
NURSE CLIN. 3	_-_%		AIDE 1	57%
NIGHT DOCTOR	_10%_		AIDE 2	42%
NIGHT RECEPT.	_36%_		LAB. TECH.	_-_%
PATIENTS		_34%_		

AVERAGE WAITING ROOM TIME _36_ MIN.

SCHEDULED _21_ MIN. CALL-AHEAD _47_ MIN. WALK-INS _106_ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
UTIL$_{TS}$	_95.33_ %	_1.72_	_1.67_
UTIL$_{TT}$	_85.20_ %	_2.22_	_0.50_
PATIENT'S TIME	_74.63_ MIN.	_4.79_	_1.11_
DOCTOR'S TIME*	_28,905_ MIN.	_280.2_	_1.51_

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

LENGTH OF RUN _3_ MONTHS

UTILIZATION			UTILIZATION	
	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	103%	90%	RECEPT. 1	39%
DOCTOR 2	103%	91%	RECEPT. 2	23%
DOCTOR 3	100%	87%	RECEPT. 3	15%
DOCTOR 4	96%	89%	NURSE 1	7%
NURSE CLIN. 1	19%		NURSE 2	16%
NURSE CLIN. 2	20%		NIGHT AIDE	50%
NURSE CLIN. 3	-%		AIDE 1	55%
NIGHT DOCTOR	10%		AIDE 2	39%
NIGHT RECEPT.	36%		LAB. TECH.	-%
PATIENTS		31%		

AVERAGE WAITING ROOM TIME _41_ MIN.

SCHEDULED _21_ MIN. CALL-AHEAD _51_ MIN. WALK-INS _131_ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
$UTIL_{TS}$	100.32%	2.59	2.04
$UTIL_{TT}$	89.26%	1.55	3.09
PATIENT'S TIME	82.25 MIN.	6.63	0.31
DOCTOR'S TIME*	28,748 MIN.	485.8	1.63

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

LENGTH OF RUN __3 MONTHS

	UTILIZATION			UTILIZATION	
	SCHEDULED TIMES	TIME THERE			SCHEDULED TIMES
DOCTOR 1	100%	86%	RECEPT. 1		- %
DOCTOR 2	101%	92%	RECEPT. 2		- %
DOCTOR 3	94%	84%	RECEPT. 3		- %
DOCTOR 4	93%	85%	NURSE 1		8%
NURSE CLIN. 1	20%		NURSE 2		17%
NURSE CLIN. 2	19%		NIGHT AIDE		50%
NURSE CLIN. 3	- %		AIDE 1		56%
NIGHT DOCTOR	- %		AIDE 2		41%
NIGHT RECEPT.	- %		LAB. TECH.		- %
PATIENTS		32%			

AVERAGE WAITING ROOM TIME __40 MIN.

SCHEDULED __21 MIN. CALL-AHEAD __58 MIN. WALK-INS __117 MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
UTIL$_{TS}$	96.71 %	3.54	1.12
UTIL$_{TT}$	86.65 %	3.25	1.47
PATIENT'S TIME	79.95 MIN.	9.80	0.54
DOCTOR'S TIME*	28,830 MIN.	356.6	0.49

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

LENGTH OF RUN __3__ MONTHS

UTILIZATION			UTILIZATION	
	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	101%	87%	RECEPT. 1	- %
DOCTOR 2	104%	93%	RECEPT. 2	- %
DOCTOR 3	105%	91%	RECEPT. 3	- %
DOCTOR 4	100%	89%	NURSE 1	7%
NURSE CLIN. 1	21%		NURSE 2	18%
NURSE CLIN. 2	18%		NIGHT AIDE	55%
NURSE CLIN. 3	- %		AIDE 1	56%
NIGHT DOCTOR	- %		AIDE 2	41%
NIGHT RECEPT.	- %		LAB. TECH.	- %
PATIENTS		32%		

AVERAGE WAITING ROOM TIME __41__ MIN.

SCHEDULED __22__ MIN. CALL-AHEAD __63__ MIN. WALK-INS __124__ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
UTIL$_{TS}$	102.36%	2.39	5.07
UTIL$_{TT}$	89.89%	2.39	4.27
PATIENT'S TIME	83.25 MIN.	5.31	1.18
DOCTOR'S TIME*	29,415 MIN.	303.4	1.86

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

LENGTH OF RUN 3 MONTHS

UTILIZATION   UTILIZATION

	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	96%	84%	RECEPT. 1	- %
DOCTOR 2	93%	85%	RECEPT. 2	- %
DOCTOR 3	96%	84%	RECEPT. 3	- %
DOCTOR 4	93%	85%	NURSE 1	7%
NURSE CLIN. 1	20%		NURSE 2	17%
NURSE CLIN. 2	17%		NIGHT AIDE	47%
NURSE CLIN. 3	- %		AIDE 1	55%
NIGHT DOCTOR	- %		AIDE 2	41%
NIGHT RECEPT.	- %		LAB. TECH.	- %
PATIENTS		34%		

AVERAGE WAITING ROOM TIME 34 MIN.

SCHEDULED - MIN. CALL-AHEAD - MIN. WALK-INS - MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
UTIL$_{TS}$	94.62 %	1.68	0.14
UTIL$_{TT}$	84.63 %	0.35	0.05
PATIENT'S TIME	73.40 MIN.	6.26	0.57
DOCTOR'S TIME*	28,875 MIN.	337.8	0.32

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

LENGTH OF RUN __3__ MONTHS

UTILIZATION			UTILIZATION	
	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	98%	87%	RECEPT. 1	- %
DOCTOR 2	98%	89%	RECEPT. 2	- %
DOCTOR 3	97%	85%	RECEPT. 3	- %
DOCTOR 4	93%	82%	NURSE 1	8%
NURSE CLIN. 1	19%		NURSE 2	17%
NURSE CLIN. 2	17%		NIGHT AIDE	52%
NURSE CLIN. 3	- %		AIDE 1	56%
NIGHT DOCTOR	- %		AIDE 2	41%
NIGHT RECEPT.	- %		LAB. TECH.	- %
PATIENTS		33%		

AVERAGE WAITING ROOM TIME __36__ MIN.

SCHEDULED __-__ MIN. CALL-AHEAD __-__ MIN. WALK-INS __-__ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
UTIL$_{TS}$	96.55 %	2.06	1.21
UTIL$_{TT}$	85.83 %	2.52	0.99
PATIENT'S TIME	75.14 MIN.	9.53	0.25
DOCTOR'S TIME*	29,063 MIN.	340.3	0.42

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

LENGTH OF RUN 12 MONTHS

UTILIZATION   UTILIZATION

	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	97%	87%	RECEPT. 1	40%
DOCTOR 2	94%	85%	RECEPT. 2	23%
DOCTOR 3	91%	79%	RECEPT. 3	15%
DOCTOR 4	97%	87%	NURSE 1	7%
NURSE CLIN. 1	19%		NURSE 2	17%
NURSE CLIN. 2	17%		NIGHT AIDE	49%
NURSE CLIN. 3	- %		AIDE 1	55%
NIGHT DOCTOR	10%		AIDE 2	40%
NIGHT RECEPT.	35%		LAB. TECH.	13%
PATIENTS		33%		

AVERAGE WAITING ROOM TIME 37 MIN.

SCHEDULED 20 MIN. CALL-AHEAD 52 MIN. WALK-INS 111 MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
$UTIL_{TS}$	94.96 %	-	-
$UTIL_{TT}$	84.49 %	-	-
PATIENT'S TIME	76.53 MIN.	-	-
DOCTOR'S TIME *116,165 MIN.	-	-	

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

425 FAMILIES, 2 NUR. CLIN., 2 EXAM ROOMS (C-2)

LENGTH OF RUN 12 MONTHS

UTILIZATION			UTILIZATION	
	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	102%	91%	RECEPT. 1	48%
DOCTOR 2	96%	86%	RECEPT. 2	32%
DOCTOR 3	96%	84%	RECEPT. 3	22%
DOCTOR 4	98%	87%	NURSE 1	12%
NURSE CLIN. 1	73%		NURSE 2	25%
NURSE CLIN. 2	73%		NIGHT AIDE	70%
NURSE CLIN. 3	-%		AIDE 1	64%
NIGHT DOCTOR	14%		AIDE 2	53%
NIGHT RECEPT.	47%		LAB. TECH.	16%
PATIENTS		28%		

AVERAGE WAITING ROOM TIME 46 MIN.

SCHEDULED 24 MIN. CALL-AHEAD 78 MIN. WALK-INS 132 MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
UTIL$_{TS}$	98.05 %	-	-
UTIL$_{TT}$	86.71 %	-	-
PATIENT'S TIME	88.87 MIN.	-	-
DOCTOR'S TIME*	116,850 MIN.	-	-

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

500 FAMILIES, 3 NUR. CLIN., 2 EXAM ROOMS (C-3)

LENGTH OF RUN __12__ MONTHS

UTILIZATION			UTILIZATION	
	SCHEDULED TIMES	TIME THERE		SCHEDULED TIMES
DOCTOR 1	104%	88%	RECEPT. 1	51%
DOCTOR 2	101%	90%	RECEPT. 2	36%
DOCTOR 3	107%	91%	RECEPT. 3	26%
DOCTOR 4	100%	89%	NURSE 1	15%
NURSE CLIN. 1	70%		NURSE 2	26%
NURSE CLIN. 2	68%		NIGHT AIDE	89%
NURSE CLIN. 3	74%		AIDE 1	68%
NIGHT DOCTOR	15%		AIDE 2	60%
NIGHT RECEPT.	54%		LAB. TECH.	17%
PATIENTS		24%		

AVERAGE WAITING ROOM TIME __57__ MIN.
SCHEDULED __28__ MIN. CALL-AHEAD __103__ MIN. WALK-INS __170__ MIN.

T-TEST

	MEAN	STD. DEV.	T-SCORE
UTIL$_{TS}$	103.07%	-	-
UTIL$_{TT}$	89.40%	-	-
PATIENT'S TIME	109.80 MIN.	-	-
DOCTOR'S TIME*	119,100 MIN.	-	-

* TIME IN CLINIC DURING THE NUMBER OF MONTHS NOTED ABOVE.

```
// EXEC GPSS,PARM=C,REGION=250K
//GO.DOUTPUT  DD  SYSOUT=A,SPACE=(CYL,(5,1))
//GO.SYSIN  DD *
        REALLOCATE  CCM,84000
        REALLOCATE  BLO,840,FUN,125,VAR,80
        REALLOCATE  FAC,36,STO,31,LOG,70,FSV,45
        REALLOCATE  HSV,0,CHA,0,GRP,0,BVR,0,FMS,0,FPS,0
        REALLOCATE  QUE,27,TAB,16,XAC,900
        SIMULATE
*
        RMULT       987,789,963,741,753,951,759,957
*
*
*
*          THIS IS A MODEL OF A FAMILY PRACTICE CLINIC
*                 J.M. LARKINS AND D. DILLEY
*
*
        INITIAL     LS1/LS2/LS3/LS4/LS5/LS6/LS7/LS8/LS9/LS10
        INITIAL     LS21/LS22/LS23/LS24/LS25/LS26/LS27/LS28
        INITIAL     LS29/LS30/LS31/LS32/LS33/LS34/LS36/LS37
        INITIAL     LS38/LS39/LS40/LS41/LS42/LS43/LS44
        INITIAL     LS45/LS46/LS47/LS48/LS49/LS50/LS51/LS52
        INITIAL     LS53/LS54/LS55/LS56/LS57/LS58/LS59/LS60
        INITIAL     X1-X10,30
        INITIAL     X11,10/X12,2/X13,3/X14,4/X15,1/X16,2/X17,3
        INITIAL     X18,6/X19,7/X20,10/X21,7
*
*
*       FACILITIES   1-5        DOCTORS
*       FACILITIES   6-10       NURSE CLINICIANS
*       FACILITIES   21-24      RECEPTIONISTS
*       FACILITY     25         NIGHT RECEPTIONIST
*       FACILITIES   26-29      DAY BACK OFFICE GIRLS
*       FACILITY     30         NIGHT BACK OFFICE GIRL
*       FACILITIES   31-34      NURSES
*       FACILITY     35         AFTER HOURS DOCTOR
*       FACILITY     36         LAB TECH
*
*
   1 STORAGE    2                              EXAM ROOMS FOR DOC 1
   2 STORAGE    2                              EXAM ROOMS FOR DOC 2
   3 STORAGE    2                              EXAM ROOMS FOR DOC 3
   4 STORAGE    2                              EXAM ROOMS FOR DOC 4
   5 STORAGE    2                              EXAM ROOMS FOR DOC 5
   6 STORAGE    1                              EXAM ROOM NUR CLIN 1
   7 STORAGE    1                              EXAM ROOM NUR CLIN 2
   8 STORAGE    1                              EXAM ROOM NUR CLIN 3
   9 STORAGE    1                              EXAM ROOM NUR CLIN 4
  10 STORAGE    1                              EXAM ROOM NUR CLIN 5
  11 STORAGE   10              S
  12 STORAGE   10               C
  13 STORAGE   10                H
  14 STORAGE   10                 E
  15 STORAGE   10                  D
  16 STORAGE   10                   U
  17 STORAGE   10                    L
  18 STORAGE   10                     I
  19 STORAGE   10                      N
  20 STORAGE   10                       G
  21 STORAGE    2
  22 STORAGE    2
  23 STORAGE    2                          S
  24 STORAGE    2                           T
  25 STORAGE    2                            O
  26 STORAGE    2                             R
  27 STORAGE    2                              A
  28 STORAGE    2                               G
  29 STORAGE    2                                E
  30 STORAGE    2                                 S
  31 STORAGE   10              LAB IN CLINIC
*
```

```
 1  TABLE       V60,720,15,50               DOC 1 QUITTING TIME
 2  TABLE       V60,720,15,50               DOC 2 QUITTING TIME
 3  TABLE       V60,720,15,50               DOC 3 QUITTING TIME
 4  TABLE       V60,720,15,50               DOC 4 QUITTING TIME
10  TABLE       V60,750,15,35               DUMP TABLE
11  QTABLE      11,0,720,100                TIME GENERATE TO OFF
12  QTABLE      12,0,10,100                 SCHED PAT WAITING
13  QTABLE      13,0,5,50                   OVERALL WAITING ROOM
14  QTABLE      14,0,10,40                  TODAY PAT WAITING RM
15  QTABLE      15,0,60,70                  WALK-IN GEN TO OFF.
16  QTABLE      16,0,10,30                  WALK-IN WAIT ROOM

*

 1  VARIABLE    P4+10
 2  VARIABLE    P6+101
 3  VARIABLE    P6+110
 4  VARIABLE    P1+9
 5  VARIABLE    P4+40
 6  VARIABLE    P4+20
 7  VARIABLE    P4+50
 8  VARIABLE    X19+50
 9  VARIABLE    ((P4+2)@4)+1
10  VARIABLE    (X15@4)+1
11  VARIABLE    (X12@4)+1
12  VARIABLE    (X13@4)+1
13  VARIABLE    ((((1+X12-X13)/2)+2)@4)+2
14  VARIABLE    ((X16+1)@4)+1
15  VARIABLE    ((X17+1)@4)+1
16  VARIABLE    ((X21+1)@2)+6
17  VARIABLE    X22@4
18  VARIABLE    X20+50
19  VARIABLE    X21+50
20  VARIABLE    30*P3
21  VARIABLE    X11+10
22  VARIABLE    X12+10
23  VARIABLE    X13+10
24  VARIABLE    X14+10
25  VARIABLE    X15+10
26  VARIABLE    X16+10
27  VARIABLE    X17+10
28  VARIABLE    X18+10
29  VARIABLE    X19+10
30  VARIABLE    X20+10
31  VARIABLE    X21+10
32  VARIABLE    X11+40
33  VARIABLE    X12+40
34  VARIABLE    X13+40
35  VARIABLE    X14+40
36  VARIABLE    X15+40
37  VARIABLE    X16+40
38  VARIABLE    X17+40
39  VARIABLE    X18+40
40  VARIABLE    X19+40
41  VARIABLE    X20+40
42  VARIABLE    X21+40
43  VARIABLE    X11+50
44  VARIABLE    X12+50
45  VARIABLE    X13+50
46  VARIABLE    X14+50
47  VARIABLE    X15+50
48  VARIABLE    X16+50
49  VARIABLE    X17+50
50  VARIABLE    X18+50
51  VARIABLE    P5+10
52  VARIABLE    P4+60
53  VARIABLE    X11+60
54  VARIABLE    X12+60
55  VARIABLE    X13+60
56  VARIABLE    X14+60
57  VARIABLE    X15+60
58  VARIABLE    X16+60
59  VARIABLE    X17+60
60  VARIABLE    C1@1440
```

```
 61 VARIABLE      (FR1*473)/1000
 62 VARIABLE      (FR2*464)/1000
 63 VARIABLE      (FR3*473)/1000
 64 VARIABLE      (FR4*464)/1000
 65 VARIABLE      (FR21*395)/1000
 66 VARIABLE      (FR22*395)/1000
 67 VARIABLE      (FR23*395)/1000
 68 VARIABLE      (FR24*395)/1000
 69 VARIABLE      (FR25*611)/1000
 70 VARIABLE      (FR26*375)/1000
 71 VARIABLE      (FR27*373)/1000
 72 VARIABLE      (FR30*747)/1000
 73 VARIABLE      (FR31*373)/1000
 74 VARIABLE      (FR32*373)/1000
 75 VARIABLE      (FR35*167)/1000
 76 VARIABLE      (FR36*373)/1000
 77 VARIABLE      (FR6*378)/1000
 78 VARIABLE      (FR7*378)/1000
 79 VARIABLE      (FR8*473)/1000
```

*
*   THESE FUNCTIONS ASSIGN THE REFERRAL RATE
*

```
      1 FUNCTION    RN2,D2
.85,C/1,1
      2 FUNCTION    RN2,D2
.75,C/1,1
      3 FUNCTICN    RN2,D2
.95,C/1,1
      4 FUNCTICN    RN2,D2
.85,C/1,1
      5 FUNCTION    RN2,D2
.85,C/1,1
      6 FUNCTICN    RN2,D2
.85,0/1,1
      7 FUNCTICN    RN2,D2
.80,C/1,1
      8 FUNCTICN    RN2,D2
.90,C/1,1
      9 FUNCTION    RN2,D2
.85,C/1,1
```

*
*   THE FOLLOWING FUNCTIONS ASSIGN A DOCTOR
*   OR NURSE CLINICIAN NUMBER
*

```
     10 FUNCTION    RN3,D6
.2375,1/.4750,2/.7125,3/.95,4/.975,6/1,7
     11 FUNCTION    RN3,D6
.2375,1/.4750,2/.7125,3/.95,4/.975,6/1,7
     12 FUNCTICN    RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
     13 FUNCTICN    RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
     14 FUNCTION    RN3,D6
.2125,1/.425,2/.6375,3/.85,4/.925,6/1,7
     15 FUNCTICN    RN3,D6
.2125,1/.425,2/.6375,3/.85,4/.925,6/1,7
     16 FUNCTICN    RN3,D6
.2375,1/.4750,2/.7125,3/.95,4/.975,6/1,7
     17 FUNCTION    RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
     18 FUNCTION    RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
     19 FUNCTICN    RN3,D6
.2125,1/.425,2/.6375,3/.85,4/.925,6/1,7
     20 FUNCTICN    RN3,D6
.2125,1/.425,2/.6375,3/.85,4/.925,6/1,7
     21 FUNCTION    RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
     22 FUNCTICN    RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
     23 FUNCTICN    RN3,D6
.20,1/.40,2/.60,3/.80,4/.90,6/1,7
```

```
      24  FUNCTION    RN3,D6
.20,1/.40,2/.60,3/.80,4/.90,6/1,7
      25  FUNCTION    RN3,D6
.20,1/.40,2/.60,3/.80,4/.90,6/1,7
      26  FUNCTION    RN3,D6
.20,1/.40,2/.60,3/.80,4/.90,6/1,7
      27  FUNCTION    RN3,D6
.20,1/.40,2/.60,3/.80,4/.90,6/1,7
      28  FUNCTION    RN3,D6
.20,1/.40,2/.60,3/.80,4/.90,6/1,7
      29  FUNCTION    RN3,D6
.2375,1/.4750,2/.7125,3/.95,4/.975,6/1,7
      30  FUNCTION    RN3,D6
.2375,1/.4750,2/.7125,3/.95,4/.975,6/1,7
      31  FUNCTION    RN3,D6
.2375,1/.4750,2/.7125,3/.95,4/.975,6/1,7
      32  FUNCTION    RN3,D6
.2375,1/.4750,2/.7125,3/.95,4/.975,6/1,7
      33  FUNCTION    RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      34  FUNCTION    RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      35  FUNCTION    RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      36  FUNCTION    RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      37  FUNCTION    RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      38  FUNCTION    RN3,D6
.2125,1/.425,2/.6375,3/.85,4/.925,6/1,7
      39  FUNCTION    RN3,D6
.2375,1/.4750,2/.7125,3/.95,4/.975,6/1,7
      40  FUNCTION    RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      41  FUNCTION    RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      42  FUNCTION    RN3,D6
.2125,1/.425,2/.6375,3/.85,4/.925,6/1,7
      43  FUNCTION    RN3,D6
.2375,1/.4750,2/.7125,3/.95,4/.975,6/1,7
      44  FUNCTION    RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      45  FUNCTION    RN3,D6
.2125,1/.425,2/.6375,3/.85,4/.925,6/1,7
      46  FUNCTION    RN3,D6
.2375,1/.4750,2/.7125,3/.95,4/.975,6/1,7
      47  FUNCTION    RN3,D6
.2375,1/.4750,2/.7125,3/.95,4/.975,6/1,7
      48  FUNCTION    RN3,D6
.2375,1/.4750,2/.7125,3/.95,4/.975,6/1,7
      49  FUNCTION    RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      50  FUNCTION    RN3,D6
.2375,1/.4750,2/.7125,3/.95,4/.975,6/1,7
      51  FUNCTION    RN3,D6
.2375,1/.4750,2/.7125,3/.95,4/.975,6/1,7
      52  FUNCTION    RN3,D6
.2375,1/.4750,2/.7125,3/.95,4/.975,6/1,7
      53  FUNCTION    RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      54  FUNCTION    RN3,D6
.2375,1/.4750,2/.7125,3/.95,4/.975,6/1,7
      55  FUNCTION    RN3,D6
.2375,1/.4750,2/.7125,3/.95,4/.975,6/1,7
      56  FUNCTION    RN3,D6
.2375,1/.4750,2/.7125,3/.95,4/.975,6/1,7
      57  FUNCTION    RN3,D6
.2375,1/.4750,2/.7125,3/.95,4/.975,6/1,7
      58  FUNCTION    RN3,D6
.2375,1/.4750,2/.7125,3/.95,4/.975,6/1,7
      59  FUNCTION    RN3,D6
.2375,1/.4750,2/.7125,3/.95,4/.975,6/1,7
```

```
      60 FUNCTION   RN3,D6
.2375,1/.4750,2/.7125,3/.95,4/.975,6/1,7
      61 FUNCTION   RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      62 FUNCTION   RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      63 FUNCTION   RN3,D6
.2125,1/.425,2/.6375,3/.85,4/.925,6/1,7
      64 FUNCTION   RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      65 FUNCTION   RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      66 FUNCTION   RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      67 FUNCTION   RN3,D6
.2125,1/.425,2/.6375,3/.85,4/.925,6/1,7
      68 FUNCTION   RN3,D6
.20,1/.40,2/.60,3/.80,4/.90,6/1,7
      69 FUNCTION   RN3,D6
.20,1/.40,2/.60,3/.80,4/.90,6/1,7
      70 FUNCTION   RN3,D6
.20,1/.40,2/.60,3/.80,4/.90,6/1,7
      71 FUNCTION   RN3,D6
.20,1/.40,2/.60,3/.80,4/.90,6/1,7
      72 FUNCTION   RN3,D6
.20,1/.40,2/.60,3/.80,4/.90,6/1,7
      73 FUNCTION   RN3,D6
.20,1/.40,2/.60,3/.80,4/.90,6/1,7
      74 FUNCTION   RN3,D6
.2375,1/.4750,2/.7175,3/.95,4/.975,6/1,7
      75 FUNCTION   RN3,D6
.2375,1/.4750,2/.7175,3/.95,4/.975,6/1,7
      76 FUNCTION   RN3,D6
.2375,1/.4750,2/.7175,3/.95,4/.975,6/1,7
      77 FUNCTION   RN3,D6
.2375,1/.4750,2/.7175,3/.95,4/.975,6/1,7
      78 FUNCTION   RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      79 FUNCTION   RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      80 FUNCTION   RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      81 FUNCTION   RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      82 FUNCTION   RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      83 FUNCTION   RN3,D6
.2125,1/.425,2/.6375,3/.85,4/.925,6/1,7
      84 FUNCTION   RN3,D6
.2125,1/.425,2/.6375,3/.85,4/.925,6/1,7
      85 FUNCTION   RN3,D6
.2375,1/.4750,2/.7175,3/.95,4/.975,6/1,7
      86 FUNCTION   RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      87 FUNCTION   RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      88 FUNCTION   RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      89 FUNCTION   RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      90 FUNCTION   RN3,D6
.2125,1/.425,2/.6375,3/.85,4/.925,6/1,7
      91 FUNCTION   RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      92 FUNCTION   RN3,D6
.2125,1/.425,2/.6375,3/.85,4/.925,6/1,7
      93 FUNCTION   RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      94 FUNCTION   RN3,D6
.20,1/.40,2/.60,3/.80,4/.90,6/1,7
      95 FUNCTION   RN3,D6
.20,1/.40,2/.60,3/.80,4/.90,6/1,7
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      96 FUNCTION    RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      97 FUNCTION    RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      98 FUNCTION    RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
      99 FUNCTION    RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
     100 FUNCTION    RN3,D6
.2125,1/.425,2/.6375,3/.85,4/.925,6/1,7
     101 FUNCTION    RN3,D6
.225,1/.45,2/.675,3/.90,4/.95,6/1,7
*
*        THESE FUNCTIONS ASSIGN A SEVERITY CODE
*
     102 FUNCTION    RN4,D3
.030,1/.15,2/1,3
     103 FUNCTION    RN4,D3
.040,1/.24,2/1,3
     104 FUNCTION    RN4,D3
.020,1/.12,2/1,3
     105 FUNCTION    RN4,D3
.020,1/.17,2/1,3
     106 FUNCTION    RN4,D3
.020,1/.10,2/1,3
     107 FUNCTION    RN4,D3
.030,1/.15,2/1,3
     108 FUNCTION    RN4,D3
.005,1/.05,2/1,3
     109 FUNCTION    RN4,D3
.050,1/.15,2/1,3
     110 FUNCTION    RN4,D3
.020,1/.20,2/1,3
*
*        THE APPOINTMENT SIZE IS ASSIGNED BY THE FOLLOWING
*
     111 FUNCTION    RN5,D4
.90,1/.95,2/.980,4/1,6
     112 FUNCTION    RN5,D4
.90,1/.95,2/.980,4/1,6
     113 FUNCTION    RN5,D4
.90,1/.95,2/.980,4/1,6
     114 FUNCTION    RN5,D4
.90,1/.95,2/.980,4/1,6
     115 FUNCTION    RN5,D4
.80,1/.90,2/.970,4/1,6
     116 FUNCTION    RN5,D4
.90,1/.95,2/.980,4/1,6
     117 FUNCTION    RN5,D4
.95,1/.98,2/.990,4/1,6
     118 FUNCTION    RN5,D4
.80,1/.90,2/.970,4/1,6
     119 FUNCTION    RN5,D4
.80,1/.90,2/.970,4/1,6
*
*
EXPO  FUNCTION    RN7,C24
0,0/.1,.104/.2,.222/.3,.335/.4,.509/.5,.69/.6,.915/.7,1.2/.7
.8,1.6/.84,1.83/.88,2.12/.9,2.3/.92,2.52/.94,2.81/.95,2.99/.
.97,3.5/.98,3.9/.99,4.6/.995,5.3/.998,6.2/.999,7/.9998,8
*
*
ARIVE FUNCTION    RN6,C7
0,0/.05,.333/.20,.667/.50,1/.80,1.333/.95,1.667/1,2
*
*
LONG  FUNCTION    P3,D4
1,0/2,1/4,3/6,5
*
*
DOTC  FUNCTION    RN7,D4
.25,1/.50,2/.75,3/1,4
```

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```
*           ASSIGNS NUR CLIN TO DAY OR NIGHT DUTY
*
  NDAY   STARTMACRO
         TEST E        V17,K3,#A
         SAVEVALUE     18,K10
         SAVEVALUE     20,K6
  #A     TEST E        V17,K0,#B
         SAVEVALUE     18,K6
         SAVEVALUE     20,K10
  #B     TEST E        V17,K1,#C
         SAVEVALUE     19,K10
         SAVEVALUE     20,K7
  #C     TEST E        V17,K2,#D
         SAVEVALUE     19,K7
         SAVEVALUE     20,K10
  #C     SAVEVALUE     15,V10
         SAVEVALUE     12,V11
         SAVEVALUE     13,V12
         ENDMACRO
*
*           OPENS AND CLOSES SCHEDULE GATES
*
  LOGSW  STARTMACRO
         LOGIC S       #A
         LOGIC S       #B
         LOGIC S       #C
         LOGIC S       #D
         LOGIC S       #E
         LOGIC R       #F
         LOGIC R       #G
         LOGIC R       #H
         LOGIC R       #I
         LOGIC R       #J
         ENDMACRO
*
*           RESET FIRST APPOINTMENT SIZE TO 1 PERIOD
*
  INIT   STARTMACRO
         SAVEVALUE     1,30
         SAVEVALUE     2,30
         SAVEVALUE     3,30
         SAVEVALUE     4,30
         SAVEVALUE     5,30
         SAVEVALUE     6,30
         SAVEVALUE     7,30
         SAVEVALUE     8,30
         SAVEVALUE     9,30
         SAVEVALUE     10,30
         ENDMACRO      .
*
*
*           THESE GENERATE PATIENT VISITS
*           THIS RUN FOR 320 FAMILIES
*
*
*           MALES
*
  SAD1   GENERATE      2216,FN$EXPO,,,8,6      GP MALE 0-4
         ASSIGN        1,1
         TRANSFER      ,AGN1
  SAD2   GENERATE      1758,FN$EXPO,,,8,6      GP MALE 5-14
         ASSIGN        1,2
         TRANSFER      ,AGN1
  SAD3   GENERATE      1146,FN$EXPO,,,8,6      GP MALE 15-29
         ASSIGN        1,3
         TRANSFER      ,AGN1
  SAD4   GENERATE      1352,FN$EXPO,,,8,6      GP MALE 30-54
         ASSIGN        1,4
         TRANSFER      ,AGN1
  SAD5   GENERATE      10528,FN$EXPO,,,8,6     GP MALE 55-79
         ASSIGN        1,5
         TRANSFER      ,AGN1
```

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SAC6    GENERATE    55619,FN$EXPO,,,8,6      GP MALE 8C+
        ASSIGN      1,6
        TRANSFER    ,AGN1
SAC7    GENERATE    1764,FN$EXPO,,,8,6       SURG MALE 0-14
        ASSIGN      1,7
        TRANSFER    ,AGN2
SAC8    GENERATE    948,FN$EXPO,,,8,6        SURG MALE 15-39
        ASSIGN      1,8
        TRANSFER    ,AGN2
SAC9    GENERATE    4137,FN$EXPO,,,8,6       SURG MALE 40-59
        ASSIGN      1,9
        TRANSFER    ,AGN2
SAC10   GENERATE    11869,FN$EXPO,,,8,6      SURG MALE 60-74
        ASSIGN      1,10
        TRANSFER    ,AGN2
SAD11   GENERATE    79878,FN$EXPO,,,8,6      SURG MALE 75+
        ASSIGN      1,11
        TRANSFER    ,AGN2
*
SAC12   GENERATE    1415,FN$EXPO,,,8,6       ALL/SHCTS MALE 0-4
        ASSIGN      1,12
        TRANSFER    ,AGN3
SAD13   GENERATE    593,FN$EXPO,,,8,6        ALL/SHOTS MALE 5-14
        ASSIGN      1,13
        TRANSFER    ,AGN3
SAC14   GENERATE    3821,FN$EXPO,,,8,6       ALL/SHCTS MALE 15-19
        ASSIGN      1,14
        TRANSFER    ,AGN3
SAC15   GENERATE    1555,FN$EXPO,,,8,6       ALL/SHOTS MALE 2C-29
        ASSIGN      1,15
        TRANSFER    ,AGN3
SAC16   GENERATE    696,FN$EXPO,,,8,6        ALL/SHOTS MALE 30-59
        ASSIGN      1,16
        TRANSFER    ,AGN3
SAC17   GENERATE    23287,FN$EXPO,,,8,6      ALL/SHQTS MALE 6C-69
        ASSIGN      1,17
        TRANSFER    ,AGN3
SAC18   GENERATE    26201,FN$EXPO,,,8,6      ALL/SHOTS MALE 7C-74
        ASSIGN      1,18
        TRANSFER    ,AGN3
SAC19   GENERATE    73613,FN$EXPO,,,8,6      ALL/SHOTS MALE75+
        ASSIGN      1,19
        TRANSFER    ,AGN3
*
SAD2C   GENERATE    805,FN$EXPC,,,8,6        EENT MALE 0-44
        ASSIGN      1,20
        TRANSFER    ,AGN4
SAC21   GENERATE    7184,FN$EXPC,,,8,6       EENT MALE 45-64
        ASSIGN      1,21
        TRANSFER    ,AGN4
SAC22   GENERATE    9125,FN$EXPO,,,6,6       EENT MALE 65+
        ASSIGN      1,22
        TRANSFER    ,AGN4
*
SAC23   GENERATE    7500,FN$EXPO,,,8,6       INT MED MALE 0-14
        ASSIGN      1,23
        TRANSFER    ,AGN5
SAC24   GENERATE    5210,FN$EXPO,,,8,6       INT MED MALE 15-19
        ASSIGN      1,24
        TRANSFER    ,AGN5
SAC25   GENERATE    416,FN$EXPC,,,8,6        INT MED MALE 2C-44
        ASSIGN      1,25
        TRANSFER    ,AGN5
SAC26   GENERATE    5625,FN$EXPO,,,8,6       INT MED MALE 45-49
        ASSIGN      1,26
        TRANSFER    ,AGN5
SAC27   GENERATE    6266,FN$EXPO,,,8,6       INT MED MALE 50-59
        ASSIGN      1,27
        TRANSFER    ,AGN5
SAD28   GENERATE    3924,FN$EXPO,,,8,6       INT MED MALE 60-74
        ASSIGN      1,28
        TRANSFER    ,AGN5
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 SAD29   GENERATE      12945,FN$EXPO,,,8,6      INT MED MALE 75+
         ASSIGN        1,29
         TRANSFER      ,AGN5
 SAD30   GENERATE      2496,FN$EXPO,,,8,6       CTHERS MALE 0-29
         ASSIGN        1,30
         TRANSFER      ,AGN6
 SAD31   GENERATE      1718,FN$EXPC,,,8,6       CTHERS MALE 30-49
         ASSIGN        1,31
         TRANSFER      ,AGN6
 SAD32   GENERATE      24154,FN$EXPO,,,8,6      CTHERS MALE 50-59
         ASSIGN        1,32
         TRANSFER      ,AGN6
 SAD33   GENERATE      6780,FN$EXPO,,,8,6       CTHERS MALE 60+
         ASSIGN        1,33
         TRANSFER      ,AGN6
*
 SAD34   GENERATE      8571,FN$EXPO,,,8,6       DERM MALE 0-14
         ASSIGN        1,34
         TRANSFER      ,AGN7
 SAD35   GENERATE      1721,FN$EXPO,,,8,6       DERM AMLE 15-79
         ASSIGN        1,35
         TRANSFER      ,AGN7
 SAD36   GENERATE      134081,FN$EXPO,,,8,6     DERM MALE 80+
         ASSIGN        1,36
         TRANSFER      ,AGN7
*
 SAD37   GENERATE      316,FN$EXPO,,,8,6        PED MALE 0-4
         ASSIGN        1,37
         TRANSFER      ,AGN9
 SAD38   GENERATE      775,FN$EXPO,,,8,6        PED MALE 5-9
         ASSIGN        1,38
         TRANSFER      ,AGN9
 SAD39   GENERATE      1859,FN$EXPO,,,8,6       PED MALE 10-14
         ASSIGN        1,39
         TRANSFER      ,AGN9
 SAD40   GENERATE      30863,FN$EXPO,,,8,6      PED MALE 15-19
         ASSIGN        1,40
         TRANSFER      ,AGN9
*
*
*       FEMALES UNDER 15
*
 SAD41   GENERATE      2673,FN$EXPO,,,8,6       GP FEMALE 0-4
         ASSIGN        1,41
         TRANSFER      ,AGN1
 SAD42   GENERATE      2305,FN$EXPO,,,8,6       GP FEMALE 5-14
         ASSIGN        1,42
         TRANSFER      ,AGN1
*
 SAD43   GENERATE      2401,FN$EXPO,,,8,6       SURG FEMALE 0-14
         ASSIGN        1,43
         TRANSFER      ,AGN2
*
 SAD44   GENERATE      548,FN$EXPO,,,8,6        ALL/SHCTS FEM 0-14
         ASSIGN        1,44
         TRANSFER      ,AGN3
*
 SAD45   GENERATE      11230,FN$EXPO,,,8,6      EENT FEMALE 0-4
         ASSIGN        1,45
         TRANSFER      ,AGN4
*
 SAD46   GENERATE      7203,FN$EXPO,,,8,6       INT MEC FEMALE 0-14
         ASSIGN        1,46
         TRANSFER      ,AGN5
*
 SAD47   GENERATE      5763,FN$EXPO,,,8,6       DERM FEMALE 0-14
         ASSIGN        1,47
         TRANSFER      ,AGN7
*
 SAD48   GENERATE      28815,FN$EXPO,,,8,6      OB/GYN FEMALE 0-14
         ASSIGN        1,48
         TRANSFER      ,AGN8
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*
*
  SAD49  GENERATE    344,FN$EXPO,,,8,6      PED FEMALE 0-4
         ASSIGN      1,49
         TRANSFER    ,AGN9
  SAD50  GENERATE    842,FN$EXPO,,,8,6      PED FEMALE 5-9
         ASSIGN      1,50
         TRANSFER    ,AGN9
  SAD51  GENERATE    1511,FN$EXPO,,,8,6     PED FEMALE 10-14
         ASSIGN      1,51
         TRANSFER    ,AGN9
*
*         ADULT FEMALES
*
  SAD52  GENERATE    1044,FN$EXPO,,,8,6     GP FEMALE 15-29
         ASSIGN      1,52
         TRANSFER    ,AGN1
  SAD53  GENERATE    1410,FN$EXPO,,,8,6     GP FEMALE 30-74
         ASSIGN      1,53
         TRANSFER    ,AGN1
  SAD54  GENERATE    37542,FN$EXPO,,,8,6    GP FEMALE 75+
         ASSIGN      1,54
  AGN1   ASSIGN      6,1
         TRANSFER    ,ASGN
*
  SAD55  GENERATE    1526,FN$EXPO,,,8,6     SURG FEMALE 15-34
         ASSIGN      1,55
         TRANSFER    ,AGN2
  SAD56  GENERATE    3106,FN$EXPO,,,8,6     SURG FEMALE 35-49
         ASSIGN      1,56
         TRANSFER    ,AGN2
  SAD57  GENERATE    6563,FN$EXPO,,,8,6     SURG FEMALE 50-79
         ASSIGN      1,57
         TRANSFER    ,AGN2
  SAD58  GENERATE    103058,FN$EXPO,,,8,6   SURG FEMALE 80+
         ASSIGN      1,58
  AGN2   ASSIGN      6,2
         TRANSFER    ,ASGN
*
  SAD59  GENERATE    979,FN$EXPO,,,8,6      ALL/SHOTS FEM 15-29
         ASSIGN      1,59
         TRANSFER    ,AGN3
  SAD60  GENERATE    1307,FN$EXPO,,,8,6     ALL/SHOTS 30-34
         ASSIGN      1,60
         TRANSFER    ,AGN3
  SAD61  GENERATE    1620,FN$EXPO,,,8,6     ALL SHOTS FEM 35-49
         ASSIGN      1,61
         TRANSFER    ,AGN3
  SAD62  GENERATE    18124,FN$EXPO,,,8,6    ALL/SHOTS FEM 50-54
         ASSIGN      1,62
         TRANSFER    ,AGN3
  SAD63  GENERATE    6074,FN$EXPO,,,8,6     ALL/SHOTS FEM 55-79
         ASSIGN      1,63
         TRANSFER    ,AGN3
  SAD64  GENERATE    194666,FN$EXPO,,,8,6   ALL/SHOTS FEMALE 80+
         ASSIGN      1,64
  AGN3   ASSIGN      6,3
         TRANSFER    ,ASGN
*
  SAD65  GENERATE    858,FN$EXPO,,,8,6      EENT FEMALE 5-39
         ASSIGN      1,65
         TRANSFER    ,AGN4
  SAD66  GENERATE    6094,FN$EXPO,,,8,6     EENT FEMALE 40-54
         ASSIGN      1,66
         TRANSFER    ,AGN4
  SAD67  GENERATE    20890,FN$EXPO,,,8,6    EENT FEMALE 55-64
         ASSIGN      1,67
         TRANSFER    ,AGN4
  SAD68  GENERATE    6897,FN$EXPO,,,8,6     EENT FEMALE 65+
         ASSIGN      1,68
  AGN4   ASSIGN      6,4
         TRANSFER    ,ASGN
```

```
*
*
  SAC69   GENERATE     2792,FN$EXPO,,,8,6      INT MED FEMALE 15-19
          ASSIGN       1,69
          TRANSFER     ,AGN5
  SAC70   GENERATE     367,FN$EXPO,,,8,6       INT MED FEMALE 20-44
          ASSIGN       1,70
          TRANSFER     ,AGN5
  SAC71   GENERATE     3037,FN$EXPO,,,8,6      INT MED FEMALE 45-59
          ASSIGN       1,71
          TRANSFER     ,AGN5
  SAC72   GENERATE     12268,FN$EXPO,,,8,6     INT MED FEMALE 60-64
          ASSIGN       1,72
          TRANSFER     ,AGN5
  SAD73   GENERATE     4424,FN$EXPO,,,8,6      INT MED FEMALE 65-74
          ASSIGN       1,73
          TRANSFER     ,AGN5
  SAD74   GENERATE     15413,FN$EXPO,,,8,6     INT MED FEMALE 75-79
          ASSIGN       1,74
          TRANSFER     ,AGN5
  SAD75   GENERATE     18572,FN$EXPO,,,8,6     INT MED 80+
          ASSIGN       1,75
  AGN5    ASSIGN       6,5
          TRANSFER     ,ASGN
*
  SAC76   GENERATE     3878,FN$EXPO,,,8,6      OTHER FEMALE 0-24
          ASSIGN       1,76
          TRANSFER     ,AGN6
  SAC77   GENERATE     2606,FN$EXPC,,,8,6      OTHER FEMALE 25-39
          ASSIGN       1,77
          TRANSFER     ,AGN6
  SAC78   GENERATE     5019,FN$EXPO,,,8,6      OTHER FEMALE 40-54
          ASSIGN       1,78
          TRANSFER     ,AGN6
  SAD79   GENERATE     16272,FN$EXPO,,,8,6     OTHER FEMALE 55-64
          ASSIGN       1,79
          TRANSFER     ,AGN6
  SAD80   GENERATE     6781,FN$EXPO,,,8,6      OTHER FEMALE 65-79
          ASSIGN       1,80
          TRANSFER     ,AGN6
  SAD81   GENERATE     72000,FN$EXPO,,,8,6     OTHER FEMALE 80+
          ASSIGN       1,81
  AGN6    ASSIGN       6,6
          TRANSFER     ,ASGN
*
  SAD82   GENERATE     1639,FN$EXPO,,,8,6      DERM FEMALE 15-74
          ASSIGN       1,82
          TRANSFER     ,AGN7
  SAD83   GENERATE     62571,FN$EXPC,,,8,6     DERM FEMALE 75+
          ASSIGN       1,83
  AGN7    ASSIGN       6,7
          TRANSFER     ,ASGN
*
  SAC84   GENERATE     3771,FN$EXPO,,,8,6      OB/GYN FEMALE 15-19
          ASSIGN       1,84
          TRANSFER     ,AGN8
  SAC85   GENERATE     430,FN$EXPO,,,8,6       OB/GYN FEMALE 20-29
          ASSIGN       1,85
          TRANSFER     ,AGN8
  SAD86   GENERATE     1307,FN$EXPC,,,8,6      OB/GYN FEMALE 30-34
          ASSIGN       1,86
          TRANSFER     ,AGN8
  SAD87   GENERATE     2329,FN$EXPC,,,8,6      OB/GYN FEMALE 35-44
          ASSIGN       1,87
          TRANSFER     ,AGN8
  SAD88   GENERATE     10459,FN$EXPO,,,8,6     OB/GYN FEMALE 45-54
          ASSIGN       1,88
          TRANSFER     ,AGN8
  SAD89   GENERATE     29167,FN$EXPO,,,8,6     OB/GYN FEMALE 55-64
          ASSIGN       1,89
          TRANSFER     ,AGN8
*
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SAC90   GENERATE    26953,FN$EXPO,,,8,6    OB/GYN FEMALE 65-79
        ASSIGN      1,90
        TRANSFER    ,AGN8
SAC91   GENERATE    750357,FN$EXPO,,,8,6   OB/GYN FEMALE 80+
        ASSIGN      1,91
AGN8    ASSIGN      6,8
        TRANSFER    ,ASGN
*
SAC92   GENERATE    22337,FN$EXPO,,,8,6    PED FEMALE 15-19
        ASSIGN      1,92
AGN9    ASSIGN      6,9
*
*
*       ASSIGN PARAMETERS
*
ASGN    ASSIGN      2,1,V2                 SEVERITY
        ASSIGN      3,1,V3                 APPOINTMENT SIZE
        ASSIGN      4,1,V4                 DOCTOR CR NUR CLIN #
        ASSIGN      6,FN*6                 REFERRAL RATE
        TEST NE     P2,K1,EMER             RE-ROUTE EMERGENCYS
CHG3    TRANSFER    .15,RESC,WALK          SEPARATE WALK-INS
*
*
*       THIS SECTION HANDLES THE EMERGENCIES
*
EMER    GATE LR     35,OPEN                HAVE DOCTORS GONE
        SEIZE       35                     ENGAGE AFT HRS DOC
        ADVANCE     90,FN$EXPO             EMERGENCY TIME
        RELEASE     35
TERM    TERMINATE   0
*
OPEN    PRIORITY    10                     EMERGENCY PRIORITY
        TEST G      P4,K5,ATE              IF A NUR. CLIN.
        ASSIGN      4,V9                   ASSIGN A DOCTOR
ATE     GATE LS     P4,PREE                IS HIS DOCTOR THERE
ASIN    ASSIGN      4,V9                   ASSIGN ANOTHER DOC
        GATE LS     P4,PREE                IS THAT DOC IN
        ASSIGN      4,V9
        GATE LS     P4,PREE
        ASSIGN      4,V9
        GATE LS     P4,PREE
        ASSIGN      4,35
PREE    PREEMPT     P4                     ENGAGE DOCTOR
        ADVANCE     40,FN$EXPO             DOCTOR TIME
        RETURN      P4
        TERMINATE   0                      PATIENT EXITS SYSTEM
*
*       THE PATIENTS CALL THE OFFICE
*
RESC    QUEUE       11                     CHECK TIME TO OFFICE
RETN    GATE LR     39                     PHONES OPEN UP
        GATE LR     21,RECP                IS DAY CREW ON
        TRANSFER    ALL,BLOK1,BLOK4,4      TRY 4 TELE LINES
RECP    PREEMPT     25                     ENGAGE NITE RECEPT.
        ADVANCE     3,1                    LENGHT CF CALL
        RETURN      25
        TRANSFER    ,HANG2
BLOK1   PREEMPT     21                     PHONE RINGS LINE 1
        ADVANCE     3,1                    LENGHT CF CALL
        RETURN      21
        TRANSFER    ,HANG1
BLOK2   PREEMPT     22                     PHONE RINGS LINE 2
        ADVANCE     3,1                    LENGHT CF CALL
        RETURN      22
        TRANSFER    ,HANG1
BLOK4   PREEMPT     24                     PHONE RINGS LINE 4
        ADVANCE     3,1                    LENGHT CF CALL
        RETURN      24
HANG1   TRANSFER    .9,FWRD,APPT           FORWARD SCME TC NUR.
FWRD    PREEMPT     31                     NURSE'S PHONE RINGS
        ADVANCE     3,2                    NURSE TALKS
        RETURN      31
HANG2   TRANSFER    .9,ADOC,APPT           FORWARD SCME TO DOC
```

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ADDC    GATE LR     P4,APPT              IS DOCTOR THERE
FDOC    PREEMPT     P4                   DOCTOR'S FHONE RINGS
        ADVANCE     3,2                  DOCTOR TALKS
        RETURN      P4
*
*       APPOINTMENT SECTION
*       SCHEDULES 2 PATIENTS EVERY 30 MINUTES
*
APPT    TEST NE     P2,K3,GATT           CHECK SEVERITY
        GATE LR     V1,TSEV              TODAY IF SCHED FULL
GATT    GATE LR     V1                   IS SCHEDULE FULL
        ENTER       V1,P3                ENTER SCHED BOOK
        ASSIGN      5,6                  SCHEDULED CODE
        GATE SF     V1,LIT               IS SCHED FULL
        LOGIC S     V1                   CLOSE SCHED BOOK
LIT     GATE LR     V5                   WAIT TIL DOC ARRIVES
        LEAVE       V1,P3                LEAVE SCHED BOOK
DELAY   ENTER       V6                   PROVIDES SEPARATION
        ADVANCE     X*4,0                PREV PAT APPT TIME
        SAVEVALUE   P4,V20               PATIENT'S APPT TIME
        LEAVE       V6                   SEPARATED
        ADVANCE     30,FN$ARIVE          ARRIVAL TIME
        TEST E      P5,K6,CONT           SCHED OR TODAY PAT.
        TRANSFER    .05,CONT,RETN        NO-SHOWS
*
TSEV    ASSIGN      5,4                  MUST COME IN TODAY
        GATE LR     V7                   TODAY GATE OPEN?
        TRANSFER    ,DELAY               NORMAL ARRIVE DIST.
*
*       WALK-INS ARE DELAYED TO DAYLIGHT
*
WALK    QUEUE       15                   CHECK TIME TO OFFICE
        GATE LS     37,DOCR              IS IT 8PM TO 4AM
        ADVANCE     720,0                ADVANCE TO DAYLIGHT
DOCR    GATE LR     38                   IS DOOR OPEN
        DEPART      15
        ASSIGN      5,2                  ASSIGN FUTURE PRIOR.
        TRANSFER    ,QUEUE
*
*       PATIENTS ARRIVE AT OFFICE
*
CONT    GATE LR     38                   ARE OFFICES OPEN
        DEPART      11
QUEUE   QUEUE       13                   WAITING ROOM TIMES
        GATE LR     21,RCEP              IS DAY CREW ON?
*
        TRANSFER    ALL,BLCK5,BLOK8,4    ENGAGE A RECEPT.
RCEP    SEIZE       25                   ENGAGE NITE RECEPT.
        ADVANCE     3,2                  RECEPTIONIST'S TIME
        RELEASE     25
        TRANSFER    ,WAIT
BLCK5   SEIZE       21                   ENGAGE FIRST RECEPT
        ADVANCE     3,2                  RECEPTIONIST'S TIME
        RELEASE     21
        TRANSFER    ,WAIT
BLOK6   SEIZE       22                   ENGAGE SECOND RECEPT
        ADVANCE     3,2                  RECEPTIONIST'S TIME
        RELEASE     22
        TRANSFER    ,WAIT
BLCK8   SEIZE       24                   ENGAGE LAST RECEPT
        ADVANCE     3,2                  RECEPTIONIST'S TIME
        RELEASE     24
*
WAIT    PRIORITY    P5                   WAITING PRIORITY
        TEST E      P5,K2,ROOM           IF NOT WALK-INS SKIP
        GATE LS     P4,ROOM              IS HIS DOCTOR THERE
ASSN    ASSIGN      4,V9                 ASSIGN ANOTHER DOC
        GATE LS     P4,ROOM              IS THAT DOC THERE
        ASSIGN      4,V9
        GATE LS     P4,ROOM
        ASSIGN      4,V9
*
```

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*
  RCCM    CEPART      13
  CUE     CUEUE       P4                      PAT'S TIME IN CLINIC
          QUEUE       V51                     WAIT TIME SCHED TYPE
          CUEUE       17                      AVG EXAM ROCM WAIT
*
*           PATIENT ENTERS EXAM ROOM
*
          ENTER       P4                      ENGAGE EXAM ROCM
          CEPART      V51
          CUEUE       V6                      WAIT TIME IN EXAM RM
          DEPART      17
          PRIORITY    6
          CATE LR     26,NBCG                 IS DAY BCG ON
          TRANSFER    ALL,BCG1,BCGN,4         TRY EACF ECG
  NBCG    SEIZE       30                      ENGAGE NICHT BOG
          ADVANCE     5,4                     BOG TIME
          RELEASE     30
          TRANSFER    ,COCT
  BCG1    SEIZE       26                      ENGAGE BACK BOG 1
          ADVANCE     5,4                     BOG TIME
          RELEASE     26
          TRANSFER    ,COCT
  BOGN    SEIZE       27                      ENGAGE BACK BOG 2
          ADVANCE     5,4                     BOG TIME
          RELEASE     27
*
*           CCCTOR SEES PATIENT
*
  DOCT    SEIZE       P4                      ENGAGE CCCTCR
          CEPART      V6
  TEGE    TEST GE     P1,K41,ADV              IS PATIENT FEMALE
          TRANSFER    .40,OLDER,FEM           SOME NEEC OBSERVER
  OLDER   TEST GE     P1,K52,ADV              IS FEMALE AN ADULT
          TRANSFER    .50,ADV,FEM             SOME NEEC CBSERVER
  FEM     FRIORITY    8                       TO ENGAGE CBSERVER
*
*           FEMALE OBSERVER NEEDED
*
          GATE LR     26,NAIC                     ARE CAY BOG THER
          TRANSFER    ALL,AID1,NURN,4         ENGAGE NLR CR BCG
  NAIC    SEIZE       30                      ENGAGE NIGHT BOG
          ADVANCE     8,2                     CBSERVER TIME
          RELEASE     30
          TRANSFER    ,TRAN
  AID1    SEIZE       26                      ENGAGE ECG AS CBS.
          ACVANCE     8,2                     OBSERVER TIME
          RELEASE     26
          TRANSFER    ,TRAN
  AICN    SEIZE       27                      ENGAGE BCG AS OBS.
          ADVANCE     8,2                     CBSERVER TIME
          RELEASE     27
          TRANSFER    ,TRAN
  NUR1    SEIZE       32                      ENGAGE NURSE AS OBS.
          ACVANCE     8,2                     CBSERVER TIME
          RELEASE     32
          TRANSFER    ,TRAN
  NURN    SEIZE       31                      ENGAGE NLRSE AS OBS.
          ADVANCE     8,2                     CBSERVER TIME
          RELEASE     31
  TRAN    ADVANCE     5,2                     DOCTOR CCNFER TIME
          FRIORITY    6                       RESET PRICRITY
          TRANSFER    ,NEXT
*
  ADV     ADVANCE     13,5                    DOCTOR'S TIME
*
  NEXT    ACVANCE     15,FN$LONG              IF MORE THAN 1 PER.
          ASSIGN      3,1                     ASSIGN PAT 1 PERIOD
          TEST L      P4,K6,CLIN              SEEN BY CCCTOR ?
*
  JUMF    TRANSFER    .05,CLIN,NURC           NUR CLIN CONSULT?
  NURC    PRIORITY    8                       CONSULT FRICRITY
```

```
          GATE LR      6,NCLN              IS NUR. CLIN. 1 IN?
          GATE LR      7,NCL1              IS NUR. CLIN. 2 IN?
          TRANSFER     ALL,NCL1,NCLN,5     TRY EACH NUR. CLIN.
NCL1      PREEMPT      6                   ENGAGE NUR CLIN 1
          GATE LR      6,CLIC              IS NUR CLIN 1 THERE
          ADVANCE      5,4                 NUR CLIN CONSULT
CLIC      RETURN       6
          TRANSFER     ,CLIN
NCLN      PREEMPT      7                   ENGAGE NUR CLIN 2
          GATE LR      7,CLAN              IS NUR CLIN 2 THERE
          ADVANCE      5,4                 NUR CLIN CONSULT
CLAN      RETURN       7
CLIN      PRIORITY     6                   RESET PRIORITY
*
          TEST GE      P4,K5,NONC          IF SEEN BY NUR CLIN
CHG2      TRANSFER     .10,NCNC,PRCB       NO CONSULT WITH DOC
PRCB      PRIORITY     7                   CONSULT PRIORITY
          ASSIGN       5,FN$DOTO           ASSIGN A DOCTOR
          GATE LS      P5,SEZE             IS THAT DOC THERE
ANCTH     ASSIGN       5,V9                ASSIGN ANOTHER DOC
          GATE LS      P5,SEZE             IS THAT DOC THERE
          ASSIGN       5,V9
          GATE LS      P5,SEZE
          ASSIGN       5,V9
SEZE      SEIZE        P5                  ENGAGE DOCTOR
          ADVANCE      10,5                DOCTOR'S TIME
          RELEASE      P5
          PRIORITY     6                   RESET PRIORITY
NCNC      TEST E       P6,K1,FINE          REFERRAL ?
REFF      ADVANCE      5,2                 REFERRAL TIME
*
*         DOCTOR LEAVES ROOM
*
FINE      RELEASE      P4                  DOCTOR DEPARTS
          GATE LR      32,OVER             ARE NURSES THERE?
          TRANSFER     .1,EXIT,NURS        SOME NEED NURSE ATTN
*
*         NURSE'S SECTION
*
NURS      TRANSFER     ALL,BLOKS,BLOKN,4   ENGAGE A NURSE
BLOK9     SEIZE        32                  ENGAGE A NURSE
          ADVANCE      10,7                NURSE TIME
          RELEASE      32
          TRANSFER     ,OVER
BLOKN     SEIZE        31                  ENGAGE A NURSE
          ADVANCE      10,7                NURSE TIME
          RELEASE      31
OVER      PRIORITY     7                   RETURN PRIORITY
*
CHG1      TRANSFER     .03,EXIT,DOCR       SOME RETURN TO DOC
DOCR      SEIZE        P4                  RE-ENGAGE DOCTOR
          TRANSFER     ,TEGE
EXIT      DEPART       P4                  PAT DEPARTS EXAM RM
          GATE LS      V52,LVE             DOC'S QUITTING TIME?
          TEST L       P4,K6,LVE           DOCTOR OR NUR CLIN
          TEST E       Q*4,K0,LVE          IS DOC'S QUEUE EMPTY
          TABULATE     P4                  RECORD QUITTING TIME
*
*         DEPART EXAM ROOM
*
LVE       LEAVE        P4                  EXIT EXAM ROOM
          TRANSFER     .1,TERM,CLAB        SOME NEED LAB WORK
CLAB      GATE LR      36,TERM             IS LAB TECH THERE?
          ENTER        31                  ENGAGE LAB
          SEIZE        36                  ENGAGE LAB TECH
          ADVANCE      10,5                TEST DONE
          RELEASE      36
          LEAVE        31
          PRIORITY     9                   RETURN PRIORITY
          ASSIGN       5,8                 RETURNEE NUMBER
          TEST NE      Q*4,K0,TERM         HAS DOC QUIT
          TRANSFER     .1,TERM,QUE         SOME GO BACK TO DOC
```

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```
*
        GENERATE    40320,C,1,,,5        START TIMER
        ASSIGN      1,5                  RUNS 4 WEEKS
BACKC   LOOP        1,OUTER              WEEKS
*
*       END OF THE MONTH
*
        SAVEVALUE   25,V61               UTILIZATION DOCTOR 1
        SAVEVALUE   26,V62               UTILIZATION DOCTOR 2
        SAVEVALUE   27,V63               UTILIZATION DOCTOR 3
        SAVEVALUE   28,V64               UTILIZATION DOCTOR 4
        SAVEVALUE   29,V77               UTIL. NUR CLIN 1
        SAVEVALUE   30,V78               UTIL. NUR CLIN 2
        SAVEVALUE   31,V79               UTIL. NUR CLIN 3
        SAVEVALUE   32,V65               UTIL. RECEPTIONIST 1
        SAVEVALUE   33,V66               UTIL. RECEPTIONIST 2
        SAVEVALUE   34,V67               UTIL. RECEPTIONIST 3
        SAVEVALUE   35,V68               UTIL. RECEPTIONIST 4
        SAVEVALUE   36,V69               UTIL. NIGHT RECEPT.
        SAVEVALUE   37,V70               UTILIZATION AIDE 1
        SAVEVALUE   38,V71               UTILIZATION AIDE 2
        SAVEVALUE   39,V72               UTIL. NIGHT AIDE
        SAVEVALUE   40,V73               UTILIZATION NURSE 1
        SAVEVALUE   41,V74               UTILIZATION NURSE 2
        SAVEVALUE   42,V75               UTIL. NIGHT DOCTOR
        SAVEVALUE   43,V76               UTILIZATION LAB TECH
        TERMINATE   1
*
*
 OUTER  ASSIGN      2,6                  RUNS 5 DAYS
 BACKI  LOOP        2,INTER              DAYS
*
*       WEEKEND SECTION
*
        ADVANCE     240,0                0400
        SAVEVALUE   11,K10               MORNING DOCTOR
        SAVEVALUE   22+,K1               ADD 1 DAY
        LOGIC R     37                   OPEN WALK-IN GATE
*
        ADVANCE     210,0                0730
        LOGIC S     V26                  SCHEDULE CONTROL
        LOGIC S     V27
        LOGIC S     V31
        LOGIC R     V37
        LOGIC R     V38
        LOGIC R     V42
        LOGIC R     25                   SAT. RECEPT ARRIVES
        LOGIC R     39                   SWITCHBOARD OPENS
*
        ADVANCE     30,0                 0800
        LOGIC S     35                   CLOSE NIGHT DOCTOR
        LOGIC R     X16                  SAT. DOCTORS
        LOGIC R     X17
        LOGIC R     X21                  SAT. NUR. CLIN.
        LOGIC R     30                   SAT. BCG
        LOGIC R     38                   OFFICE OPENS DOORS
*
        ADVANCE     120,0                1000
        LOGIC S     V37                  SCHEDULE CONTROL
        LOGIC S     V38
        LOGIC S     V42
        LOGIC R     V48
        LOGIC R     V49
        LOGIC R     V19
*
        ADVANCE     90,0                 1130
        LOGIC S     V48                  SCHEDULE CONTROL
        LOGIC S     V49
        LOGIC S     V19
        LOGIC R     V26
        LOGIC R     V27
        LOGIC R     V31
```

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*
          ADVANCE      30,0                    1200
          LOGIC  S     37                      CLOSE WALK-IN GATE
          LOGIC  S     39                      SWITCHBCARD CLOSES
          LOGIC  R     35                      OPEN AFT HRS DOCTOR
*
          ADVANCE      60,0                    1300
          LOGIC  S     38                      CLOSE DOORS
          LOGIC  S     25                      SAT. RECEF. LEAVES
          LOGIC  S     X16                     DOCTORS GO HOME
          LOGIC  S     X17
          LOGIC  S     X21                     SAT. NUR CLIN QUITS
**
**        THESE SECTIONS TABLE QUITING TIMES FOR DOCTORS
*
          ASSIGN       3,X16                   SAT. DOCTOR 1
          TEST E       Q*3,K0,WORK6            IS DOC 1 QUEUE EMPTY
          TABULATE     X16                     RECORDS TIME
          TRANSFER     ,LOG6
   WORK6  LOGIC  S     V58                     OPEN QUIT TIME TABLE
   LOG6   ASSIGN       3,X17                   SAT. DOCTOR 2
          TEST E       Q*3,K0,WORK7            IS DOC 2 QUEUE EMPTY
          TABULATE     X17                     RECORDS TIME
          TRANSFER     ,LOG7
   WORK7  LOGIC  S     V59                     OPEN QUIT TIME TABLE
   LOG7   LOGIC  S     30                      SAT. BOG FINISHES
   NDAY   MACRO        MAR85,MAR86,MAR87,MAR88
          SAVEVALUE    14,V13                  RESETS MORNING DOC
          SAVEVALUE    16,V14                  RESETS SAT. DOCTORS
          SAVEVALUE    17,V15
          SAVEVALUE    21,V16                  RESETS SAT. NUR CLIN
   INIT   MACRO
*
          ADVANCE      300,0                   1900
          LOGIC  R     V58                     CLOSE QUITTING TABLE
          LOGIC  R     V59                     CLOSE QUITTING TABLE
*
**
**        ADVANCES TO SUNDAY MIDNIGHT
**
          ADVANCE      1800,0                  2400
          TRANSFER     ,BACKO
**
**
**        DAILY SECTION
**
*
   INTER  SAVEVALUE    22+,K1                  ADD 1 DAY
          ADVANCE      240,0                   C400
          LOGIC  R     37                      ALLOW WALK-INS
*
          ADVANCE      210,0                   C700
          LOGIC  S     V21                     SCHEDULE CONTROL
   LOGSW  MACRO        V22,V23,V24,V28,V29,V33,V34,V35,V39,V40
          LOGIC  R     V32
          LOGIC  R     21                      RECEPTIONISTS ARRIVE
          LOGIC  R     39                      OPEN PHONES
*
          ADVANCE      30,0                    0800
          LOGIC  S     35                      CLOSE NIGHT DOCTOR
          LOGIC  R     X12                     DAY DOCTORS
          LOGIC  R     X13
          LOGIC  R     X14
          LOGIC  R     X11                     MORNING DOCTOR
          LOGIC  R     X18                     DAY NUR. CLIN.
          LOGIC  R     X19
          LOGIC  R     26                      BOG STARTS WORK
          LOGIC  R     27
          LOGIC  R     31                      NURSES ARRIVE
          LOGIC  R     32
          LOGIC  R     36                      LAB TECH STARTS WORK
          LOGIC  R     38                      OPEN DOORS
*
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```
          ADVANCE     120,0                              1000
          LOGIC  S    V32                                SCHEDULE CONTROL
LOGSW     MACRO       V33,V34,V35,V39,V40,V44,V45,V46,V50,V8
          LOGIC  R    V43
          LOGIC  R    V21
          LOGIC  R    V22
          LOGIC  R    V23
          LOGIC  R    V24
          LOGIC  R    V28
          LOGIC  R    V29
*
          ADVANCE     60,0                               1100
          LOGIC  S    V43                                SCHEDULE CONTROL
          LOGIC  S    V44
          LOGIC  S    V45
          LOGIC  S    V46
          LOGIC  S    V50
          LOGIC  S    V8
*
          ADVANCE     90,0                               1230
          LOGIC  S    X11                                MORNING DOCTOR QUITS
          ASSIGN      3,X11                              MORNING DOCTOR
          TEST E      Q*3,K0,WORK1                       IS MORN DOC QUEUE 0
          TABULATE    X11                                RECORDS TIME
          TRANSFER    ,LOG1
WORK1     LOGIC  S    V53                                OPEN QUIT TIME TABLE
LOG1      LOGIC  S    V25                                SCHEDULE CONTROL
          LOGIC  S    V30
LOGSW     MACRO       V22,V23,V24,V28,V29,V33,V34,V35,V39,V40
          LOGIC  R    V36
          LOGIC  R    V41
*
          ADVANCE     30,0                               1300
          LOGIC  R    X15                                AFTERNOON DOC STARTS
          LOGIC  R    X20                                AFTERNOON NUR. CLIN.
*
          ADVANCE     90,0                               1430
          LOGIC  S    V36                                SCHEDULE CONTROL
          LOGIC  S    V41
LOGSW     MACRO       V33,V34,V35,V39,V40,V44,V45,V46,V50,V8
          LOGIC  R    V47
          LOGIC  R    V18
          LOGIC  R    V22
          LOGIC  R    V23
          LOGIC  R    V24
          LOGIC  R    V25
          LOGIC  R    V28
          LOGIC  R    V29
          LOGIC  R    V30
*
          ADVANCE     60,0                               1530
          LOGIC  R    V53                                CLOSE QUITTING TABLE
          LOGIC  S    V18                                SCHEDULE CONTROL
          LOGIC  S    V47
          LOGIC  R    25                                 NITE RECEPT ARRIVES
          LOGIC  S    21                                 RECEPTIONISTS LEAVE
*
          ADVANCE     90,0                               1700
          LOGIC  S    V44                                SCHEDULE CONTROL
          LOGIC  S    V45
          LOGIC  S    V46
          LOGIC  S    V50
          LOGIC  S    V8
          LOGIC  R    30                                 NIGHT AID ARRIVES
          LOGIC  S    26                                 DAY AIDS LEAVE
          LOGIC  S    27
          LOGIC  S    31                                 NURSES LEAVE
          LOGIC  S    32
          LOGIC  S    36                                 LAB TECH LEAVES
          LOGIC  S    X12                                DAY DOCTORS GO HOME
          LOGIC  S    X13
          LOGIC  S    X14
```

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```
            ASSIGN      3,X12                   DAY DOCTCR 1
            TEST E      Q*3,KO,WORK2            IS DOC 1 CUEUE EMPTY
            TABULATE    X12                     RECORDS TIME
            TRANSFER    ,LOG2
    WCRK2   LOGIC S     V54                     OPEN CUIT TIME TABLE
    LCG2    ASSIGN      3,X13                   DAY DCCTCR 2
            TEST E      Q*3,KO,WORK3            IS DOC 2 CUEUE EMPTY
            TABULATE    X13                     RECCRDS TIME
            TRANSFER    ,LOG3
    WCRK3   LCGIC S     V55                     OPEN QUIT TIME TABLE
    LOG3    ASSIGN      3,X14                   CAY DCCTCR 3
            TEST E      Q*3,KO,WORK4            IS DOC 3 CLELE EMPTY
            TABULATE    X14                     RECCRDS TIME
            TRANSFER    ,LOG4
    WCRK4   LCGIC S     V56                     OPEN QUIT TIME TABLE
    LOG4    LOGIC S     X18                     DAY NUR. CLIN. LEAVE
            LOGIC S     X19
*
            ADVANCE     60,0                    1800
            LOGIC S     V25                     SCHEDULE CCNTROL
            LCGIC S     V30
            LOGIC R     V36
            LOGIC R     V41
*
            ADVANCE     60,0                    1900
            LOGIC R     V54                     CLOSE
            LCGIC R     V55                         QUITTING TIME
            LOGIC R     V56                                    TABLES
            LCGIC S     V18                     SCHEDULE CCNTROL
            LOGIC S     V36
            LOGIC S     V41
            LCGIC R     V25
            LCGIC R     V30
*
            ADVANCE     60,0                    2000
            LCGIC S     V18                     SCHEDULE CCNTROL
            LCGIC S     25                      NITE RECEPT LEAVES
            LCGIC S     37                      CLOSE WALK-IN GATE
            LOGIC S     39                      CLOSE SWITCHBOARC
*
            ADVANCE     30,0                    2030
            LCGIC S     38                      CLOSE CFFICE DCCR
            LCGIC S     30                      NIGHT BCG QUITS
            LCGIC S     X15                     NIGHT CCCTCR QUITS
            ASSIGN      3,X15                   NIGHT DCCTCR
            TEST E      Q*3,KO,WORK5            IS NITE DCC QUEUE 0
            TABULATE    X15                     RECCRDS TIME
            TRANSFER    ,LOG5
    WCRK5   LCGIC S     V57                     CPEN QUIT TIME TABLE
    LCG5    LOGIC S     X20                     NITE NUR CLIN QUITS
            LOGIC R     35                      DOCTOR CN CALL
*
            ADVANCE     210,0                   2400
            LOGIC R     V57                     CLOSE QUITTING TABLE
            SAVEVALUE   11,X15                  RESETS MORNING DOC
    NDAY    MACRO       MAR81,MAR82,MAR83,MAR84
            SAVEVALUE   14,K10                  RESETS CAY DOC 3
    INIT    MACRO
            TRANSFER    ,BACKI
*
*
            START       1
            RESET
            START       1
            RESET
            START       1
            END
```

PROGRAM 2

```
// EXEC FORTCLGP
//FORT.SYSIN DD *
C
      IMPLICIT INTEGER (A-B)                                            FIG00010
      DIMENSION CAT(92),NAS(2,17),INTER(92),CLIN(92),DOCT(5,92),NCAT(92)FIG00020
      DIMENSION ND(92),ND1(2,17),ND2(2,17),ND3(2,17),ND4(2,17)         FIG00030
C
C     NURSE CLINICIAN RATE FOR EACH CATAGORY
C
      DATA CLIN/.05,.05,.1,.1,.15,.15,.1,.1,.2,.2,.2,.2,.1,.1,          FIG00040
     12,.2,.05,.05,.1,.1,.15,.1,.15,.1,.05,.05,.1,.1,                  FIG00050
     225,.2,.05,.05,.1,.1,.05,.05,.1,.1,.05,.05,.1,.1,                 FIG00060
     33,.15,.1,.1,.05,.1,.1,.1,.2,.2,.1,.1,.1,.1,                      FIG00070
     44.15,.15,.05,.1,.1,.1,.1,.1,.1,.15,.1,.1,.15,.1/                 FIG00080
C
C     INTERARRIVAL TIME FOR ONE PATIENT IN EACH CATAGORY
C
      DATA CAT/691578.9375,991698.125,720000.0,922105.25,821250.0,     FIG00090
     1..., 125.720000.0,.9375,991698.125,200.0,562500.25,1105122.0,    FIG00100
     ...
     4500.0,.700800.0,991698.125,1347692.0,404077.07/                 FIG00230
C
C     READ IN THE NUMBER OF PATIENTS ASSIGNED TO EACH DOCTOR BY AGE/SEX CATAGORY
C
      DO 1 I=1,2                                                        FIG00240
      DO 2 J=1,17                                                       FIG00250
      READ (5,20) ND1(I,J),ND2(I,J),ND3(I,J),ND4(I,J)                  FIG00260
   20 FORMAT(4I5)                                                      FIG00270
      NAS(I,J)=ND1(I,J)+ND2(I,J)+ND3(I,J)+ND4(I,J)                     FIG00280
    2 CONTINUE                                                         FIG00290
    1 CONTINUE                                                         FIG00300
C
C     ADD TOTAL PATIENTS ASSIGNED BY AGE/SEX TO PROBLEM CATAGORY
C
      CALL ADD(NCAT,NAS)                                               FIG00310
```

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```
C     ADD PATIENT ASSIGNED TO EACH DOCTCR TO PROBLEM CATAGORY       FIG00320
C     AND FIGURE DOCTOR LOAD
C
C        CALL ADD(ND,ND1)                                           FIG00330
C                                                                   FIG00340
      DC 3 I=1,92                                                   FIG00350
      IF(NCAT(I).EQ. 0) NCAT(I)=1                                   FIG00360
      DCCT(1,I)=(FLOAT(ND(I))/NCAT(I))*(1.0-CLIN(I))
    3 CCNTINUE
C                                                                   FIG00370
C        CALL ADD(ND,ND2)
C                                                                   FIG00380
      DO 4 I=1,92                                                   FIG00390
      DOCT(2,I)=(FLOAT(ND(I))/NCAT(I))*(1.0-CLIN(I))+DOCT(1,I)     FIG00400
    4 CCNTINUE
C
C        CALL ADD(ND,ND3)                                           FIG00410
C
      DO 5 I=1,92                                                   FIG00420
      COCT(3,I)=(FLOAT(ND(I))/NCAT(I))*(1.0-CLIN(I))+DOCT(2,I)     FIG00430
    5 CCNTINUE                                                      FIG00440
C
C        CALL ADD(ND,ND4)                                           FIG00450
C
      DC 6 I=1,92                                                   FIG00460
      DCCT(4,I)=(FLOAT(ND(I))/NCAT(I))*(1.0-CLIN(I))+DOCT(3,I)     FIG00470
    6 CCNTINUE                                                      FIG00480
C
C     FIGURE NURSE CLINICIAN LOAD
C
      DO 19 I=1,92                                                  FIG00490
      COCT(5,I)=((1.0-DOCT(4,I))/2.0)+COCT(4,I)                    FIG00500
   19 CCNTINUE                                                      FIG00510
C
C     PREPARES PUNCHED DECK OF DOCTOR/NURSE CLINICIAN ASSIGNMENT
C     FOR INSERTION INTO GPSS PROGRAM
C
      DC 14 I=10,101                                                FIG00520
      PUNCH 78,I                                                    FIG00530
   78 FCRMAT(' ',I3,' FUNCTION    RN3,D6')                          FIG00540
      PUNCH 79,(DOCT(J,I-9),J=1,5)                                  FIG00550
   79 FORMAT(F5.4,',',1/',F5.4,',',2/',F5.4,',',3/',F5.4,',',4/',F5.4,',',6/1,7')  FIG00560
   14 CCNTINUE                                                      FIG00570
C
```

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```
C     FIGURE INTERARRIVAL TIMES FOR EACH CATAGORY
      DO 9 I=1,92                                                     FIG00580
      INTER(I)=CAT(I)/NCAT(I)                                         FIG00590
    9 CONTINUE                                                        FIG00600
C
C     PUNCHES CARDS FOR INSERTION INTO GPSS MODEL
      DC 10 I=1,9                                                     FIG00610
C
      IF (INTER(I) .GE. 1000) GO TO 11                                FIG00620
      WRITE (6,30) I,INTER(I)                                         FIG00630
      PUNCH 30,I,INTER(I)                                             FIG00640
   30 FORMAT(' SAD',I1,2X,'GENERATE',2X,I3,',',FN$EXPO,,,8,6')        FIG00650
      GC TO 10                                                        FIG00660
C
   11 IF (INTER(I) .GE. 10000) GO TO 12                               FIG00670
      WRITE (6,40) I,INTER(I)                                         FIG00680
      PUNCH 40,I,INTER(I)                                             FIG00690
   40 FORMAT(' SAD',I1,2X,'GENERATE',3X,I4,',',FN$EXPO,,,8,6')        FIG00700
      GC TO 10                                                        FIG00710
C
   12 IF (INTER(I) .GE. 100000) GO TO 13                              FIG00720
      WRITE (6,90) I,INTER(I)                                         FIG00730
      PLNCH 90,I,INTER(I)                                             FIG00740
   90 FORMAT(' SAD',I1,2X,'GENERATE',3X,I5,',',FN$EXPO,,,8,6')        FIG00750
      GC TO 10                                                        FIG00760
C
   13 WRITE (6,60) I,INTER(I)                                         FIG00770
      PUNCH 60,I,INTER(I)                                             FIG00780
   60 FORMAT(' SAD',I1,2X,'GENERATE',3X,I6,',',FN$EXPO,,,8,6')        FIG00790
   10 CCNTINUE                                                        FIG00800
```

```
C     PUNCHES CARDS FOR CATAGORY 10 THOUGH 92                          FIG00810

C     DO 50 I=10,92                                                    FIG00820

      IF (INTER(I)  .GE. 1000) GO TO 51                                FIG00830
      WRITE (6,35) I,INTER(I)                                          FIG00840
      PUNCH 35,I,INTER(I)                                              FIG00850
   35 FORMAT(' SAD',I2,1X,'GENERATE',3X,I3,',FN$EXPO,,,8,6')           FIG00860
      GO TO 50
C
   51 IF (INTER(I)  .GE. 10000) GO TO 52                               FIG00870
      WRITE (6,45) I,INTER(I)                                          FIG00880
      PUNCH 45,I,INTER(I)                                              FIG00890
   45 FORMAT(' SAD',I2,1X,'GENERATE',3X,I4,',FN$EXPO,,,8,6')           FIG00900
      GO TO 50                                                         FIG00910
C
   52 IF (INTER(I)  .GE. 100000) GO TO 53                              FIG00920
      WRITE (6,55) I,INTER(I)                                          FIG00930
      PUNCH 55,I,INTER(I)                                              FIG00940
   55 FORMAT(' SAD',I2,1X,'GENERATE',3X,I5,',FN$EXPO,,,8,6')           FIG00950
      GO TO 50                                                         FIG00960
C
   53 IF (INTER(I)  .GE. 1000000) GO TO 54                             FIG00970
      WRITE (6,65) I,INTER(I)                                          FIG00980
      PUNCH 65,I,INTER(I)                                              FIG00990
   65 FORMAT(' SAD',I2,1X,'GENERATE',3X,I6,',FN$EXPO,,,8,6')           FIG01000
      GO TO 50                                                         FIG01010
C
   54 INTER(I)=999999                                                  FIG01020
      WRITE (6,75) I,INTER(I)                                          FIG01030
      PUNCH 75,I,INTER(I)                                              FIG01040
   75 FORMAT(' SAD',I2,1X,'GENERATE',3X,I6,',FN$EXPO,,,8,6')           FIG01050
   50 CONTINUE                                                         FIG01060
C
      STOP                                                             FIG01070
      END                                                              FIG01080
```

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      SUBROUTINE ADD(A,B)
C
C     SUBROUTINE FOR COMBINING AGE/SEX GROUPS INTO PROBLEM CATAGORY
C
      IMPLICIT INTEGER (A-B)
      DIMENSION A(92),B(2,17)
C
C     ADD BY PROBLEM CATAGORY
C
C     MALE PATIENTS
C
      A(1)=B(1,1)
      A(2)=B(1,2)+B(1,3)
      A(3)=B(1,4)+B(1,5)+B(1,6)
      A(4)=B(1,7)+B(1,8)+B(1,9)+B(1,10)+B(1,11)
      A(5)=B(1,12)+B(1,13)+B(1,14)+B(1,15)+B(1,16)
      A(6)=B(1,17)
      A(7)=B(1,1)+B(1,2)+B(1,3)
      A(8)=B(1,4)+B(1,5)+B(1,6)+B(1,7)+B(1,8)
      A(9)=B(1,9)+B(1,10)+B(1,11)+B(1,12)
      A(10)=B(1,13)+B(1,14)+B(1,15)
      A(11)=B(1,16)+B(1,17)
      A(12)=B(1,1)+B(1,3)
      A(13)=B(1,2)+B(1,3)
      A(14)=B(1,4)+B(1,5)+B(1,6)
      A(15)=B(1,7)+B(1,8)+B(1,9)+B(1,10)+B(1,11)+B(1,12)
      A(16)=B(1,13)+B(1,14)
      A(17)=B(1,15)
      A(18)=B(1,16)+B(1,17)
      A(19)=B(1,1)+B(1,2)+B(1,3)+B(1,4)+B(1,5)+B(1,6)+B(1,7)+B(1,8)+B(1,
     15)
      A(21)=B(1,10)+B(1,11)+B(1,12)+B(1,13)
      A(22)=B(1,14)+B(1,15)+B(1,16)+B(1,17)
      A(23)=B(1,1)+B(1,2)+B(1,3)
      A(24)=B(1,4)+B(1,5)+B(1,6)+B(1,7)+B(1,8)+B(1,9)
      A(25)=B(1,10)+B(1,11)+B(1,12)
      A(26)=B(1,13)+B(1,14)+B(1,15)
      A(27)=B(1,16)+B(1,17)
      A(28)=B(1,1)+B(1,2)+B(1,3)+B(1,4)+B(1,5)+B(1,6)
      A(29)=B(1,7)+B(1,8)+B(1,9)+B(1,10)
      A(30)=B(1,11)+B(1,12)+B(1,13)+B(1,14)+B(1,15)+B(1,16)+B(1,17)
      A(31)=B(1,1)+B(1,2)+B(1,3)
      A(32)=B(1,4)+B(1,5)+B(1,6)+B(1,7)+B(1,8)+B(1,9)+B(1,10)+B(1,11)+B(1,
     1)
      A(34)=B(1,2)+B(1,3)
      A(35)=B(1,4)+B(1,5)+B(1,6)+B(1,7)+B(1,8)+B(1,9)+B(1,10)+B(1,11)+B(1,
```

```
      1,12)+B(1,13)+B(1,14)+B(1,15)+B(1,16)                         FIGO1470
      A(36)=B(1,17)                                                 FIGO1480
      A(38)=B(1,2)                                                  FIGO1490
      A(39)=B(1,3)                                                  FIGO1500
      A(40)=B(1,4)                                                  FIGO1510
                                                                    FIGO1520
C                                                                   FIGO1530
C     FEMALES UNDER 15                                              FIGO1540
C                                                                   FIGO1550
      A(41)=B(2,1)+B(2,2)+B(2,3)                                    FIGO1560
      A(42)=B(2,2)+B(2,3)                                           FIGO1570
      A(43)=B(2,1)+B(2,2)+B(2,3)                                    FIGO1580
      A(44)=B(2,1)+B(2,2)+B(2,3)                                    FIGO1590
      A(45)=B(2,1)+B(2,2)+B(2,3)                                    FIGO1600
      A(46)=B(2,1)+B(2,2)+B(2,3)                                    FIGO1610
      A(47)=B(2,1)+B(2,2)+B(2,3)                                    FIGO1620
      A(48)=B(2,1)+B(2,2)+B(2,3)                                    FIGO1630
      A(49)=B(2,2)+B(2,3)
      A(50)=B(2,2)+B(2,3)
      A(51)=B(2,3)
C
C     ADULT FEMALES
C
      A(52)=B(2,4)+B(2,5)+B(2,6)                                    FIGO1640
      A(53)=B(2,7)+B(2,8)+B(2,9)+B(2,10)+B(2,11)+B(2,12)+B(2,13)+B(2,14) FIGO1650
     1+B(2,15)                                                      FIGO1660
      A(54)=B(2,16)+B(2,17)                                         FIGO1670
      A(55)=B(2,4)+B(2,5)+B(2,6)+B(2,7)                             FIGO1680
      A(56)=B(2,8)+B(2,9)+B(2,10)                                   FIGO1690
      A(57)=B(2,11)+B(2,12)+B(2,13)+B(2,14)+B(2,15)+B(2,16)         FIGO1700
      A(58)=B(2,17)                                                 FIGO1710
      A(59)=B(2,4)+B(2,5)+B(2,6)                                    FIGO1720
      A(60)=B(2,7)+B(2,9)+B(2,10)                                   FIGO1730
      A(61)=B(2,11)                                                 FIGO1740
      A(62)=B(2,12)+B(2,13)+B(2,14)+B(2,15)+B(2,16)                 FIGO1750
      A(63)=B(2,17)                                                 FIGO1760
      A(64)=B(2,2)+B(2,4)+B(2,5)+B(2,6)+B(2,7)+B(2,8)               FIGO1770
      A(65)=B(2,9)+B(2,10)+B(2,11)                                  FIGO1780
      A(66)=B(2,12)+B(2,13)                                         FIGO1790
      A(67)=B(2,14)+B(2,15)+B(2,16)+B(2,17)                         FIGO1800
      A(68)=B(2,4)+B(2,5)+B(2,6)+B(2,7)+B(2,8)+B(2,9)               FIGO1810
      A(69)=B(2,4)+B(2,6)+B(2,7)+B(2,8)+B(2,9)                      FIGO1820
      A(70)=B(2,5)+B(2,10)+B(2,11)+B(2,12)                          FIGO1830
      A(71)=B(2,11)+B(2,13)                                         FIGO1840
      A(72)=B(2,13)                                                 FIGO1850
      A(73)=B(2,14)+B(2,16)                                         FIGO1860
      A(74)=B(2,16)                                                 FIGO1870
      A(75)=B(2,17)                                                 FIGO1880
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      A(76)=B(2,1)+B(2,2)+B(2,3)+B(2,4)+B(2,5)                       FIGO1890
      A(77)=B(2,6)+B(2,7)+B(2,8)                                     FIGO1900
      A(78)=B(2,9)+B(2,10)+B(2,11)                                   FIGO1910
      A(79)=B(2,12)+B(2,13)                                          FIGO1920
      A(80)=B(2,14)+B(2,15)+B(2,16)                                  FIGO1930
      A(81)=B(2,4)+B(2,5)+B(2,6)+B(2,7)+B(2,8)+B(2,9)+B(2,10)+B(2,11)+B( FIGO1940
     12,12)+B(2,13)+B(2,14)+B(2,15)                                  FIGO1950
      A(82)=B(2,16)+B(2,17)                                          FIGO1960
      A(83)=B(2,6)                                                   FIGO1970
      A(84)=B(2,4)+B(2,5)+B(2,6)                                     FIGO1980
      A(85)=B(2,7)+B(2,9)                                            FIGO1990
      A(86)=B(2,8)+B(2,9)                                            FIGO2000
      A(87)=B(2,10)+B(2,11)                                          FIGO2010
      A(88)=B(2,12)+B(2,13)                                          FIGO2020
      A(89)=B(2,14)+B(2,15)+B(2,16)                                  FIGO2030
      A(90)=B(2,17)                                                  FIGO2040
      A(91)=B(2,14)+B(2,15)+B(2,16)                                  FIGO2050
      A(92)=B(2,17)                                                  FIGO2060
      RETURN                                                         FIGO2070
      END                                                            FIGO2080
```

BIBLIOGRAPHY

1. Ad Hoc Committee on Education for Family Practice of
    the Council on Medical Education-American Medical
    Association, Meeting the Challenge of Family Practice,
    September 1966.

2. Carmichael, L. P., and others, "Residents Evaluate
    Office Practices," Patient Care, p. 35-51,
    15 August 1972.

3. Darsky, B. J., Sinai, N., and Axelrod, S. J.,
    Comprehensive Medical Service under Voluntary Health
    Insurance, Harvard University Press, 1958.

4. Fein, R., The Doctor Shortage: An Economic Diagnosis,
    The Brooking Institution, 1967.

5. Fetter, R. B., and Thompson, J. D., "Patient's Waiting
    Time and Doctor's Idle Time in the Outpatient
    Setting," Health Services Research, v. 1, p. 66-90,
    Summer 1966.

6. Garfield, S. R., "The Delivery of Medical Care,"
    Scientific American, v. 222, p. 15-23, April 1970.

7. Health Economics Branch U. S. Public Health Service,
    Medical Care Financing and Utilization, U. S. Public
    Health Service, 1962.

8. Hess, I., Riedel, D. C., and Fitzpatrick, T. B.,
    Probability Sampling of Hospitals and Patients,
    University of Michigan, 1961.

9. Schonfeld, H. K., Heston, J. F., and Falk, I. S.,
    "Number of Physicians Required for Primary Medical
    Care," New England Journal of Medicine, v. 286,
    p. 571-576, 16 March 1972.

10. Smith, K. R., Miller, M., and Golladay, F. L., "An
    Analysis of the Optimal Use of Inputs in the
    Production of Medical Services," Journal of Human
    Resources, v. 7, p. 208-225, Spring 1972.

11. Soriano, A., "Comparison of Two Scheduling Systems,"
    Operations Research, v. 14, p. 388-408, May-June 1966.

12. Stanford, B. J., "Portraits of Family Practice Residencies," American Family Physician/GP, v. 1, p. 149-158, May 1970

13. Ullmann, J. E. (editor), The Application of Management Science to the Evaluation and Design of Regional Health Services, Hofstra University, 1968.

14. Zemach, R., "A Model of Health-Services Utilization and Resource Allocation," Operations Research, v. 18, p. 1071-1086, November-December 1970.

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DOCUMENT CONTROL DATA · R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

ORIGINATING ACTIVITY (Corporate author)	2a. REPORT SECURITY CLASSIFICATION
Naval Postgraduate School Monterey, California 93940	Unclassified
	2b. GROUP

REPORT TITLE

Computer Simulation of a Family Practice Clinic

DESCRIPTIVE NOTES (Type of report and, inclusive dates)

Master's Thesis; June 1973

AUTHOR(S) (First name, middle initial, last name)

David Dilley and James Marion Larkins Jr.

REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1973	137	14

a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)
b. PROJECT NO.	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
d.	

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13. ABSTRACT

A simulation model of the Family Practice Clinic at Silas B. Hays Army Hospital, Fort Ord, California, is presented. The inputs to the model are the number of doctors, number and type of support personnel, number of waiting and examination rooms assigned and available to the clinic, and the population of potential patients assigned to each doctor, categorized by sex and age. The outputs of the model are the percentage utilization of doctors, support personnel, waiting and examination rooms, and the distribution of various waiting times for those being served by the clinic.

The purpose of the model is to permit hospital administrators to estimate the optimal number of families to assign each doctor in a Family Practice Clinic, and to estimate the support personnel and physical space required to effectively operate the clinic.

DD FORM 1473 (PAGE 1)
1 NOV 68

/N 0101-807-6811

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UNCLASSIFIED
Security Classification

A-31408

KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
MEDICAL CLINICS						
FAMILY PRACTICE CLINIC						
MILITARY MEDICAL CARE						

FORM 1473 (BACK)
1 NOV 65

01-807-6821

137 UNCLASSIFIED
Security Classification

A-31409