

Evaluating a Primary Care Clinic in a Local Health Department

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IN early 1970, the health department of Los Angeles County set up a Family Care Clinic in its West District Health Center (WDHC). Medical care was neither readily available nor accessible in certain areas of the district (1). For example, in the Venice community there were only five practicing physicians to serve 38,000 persons. Many of the residents of this and neighboring communities were members of ethnic minorities, and a sizable percentage lived at or near poverty level. For those who could afford private care, the closest medical center was 5 miles away; for those who could not afford medical care, the traditional source for these services was the outpatient department of the Los Angeles County/U.S.C. Medical Center, about 26 miles away.

Members of the district staff had been discussing the desirability of providing medical care over and above the health department's usual prevention-oriented services. When \$39,100 in Federal funds from the Comprehensive Health Care Program was granted Los Angeles County, the health department took this opportunity to set up a program to alleviate the shortage of primary health care in the community. To accomplish this, the

district needed to reorient some of its categorical services and clinics, to secure new personnel, and to establish relationships with other facilities for laboratory, X-ray, and other kinds of backup service.

In designing the Family Care Clinic, the district staff believed that by building on the “strengths” of the health department approach—a family care orientation, an emphasis on the use of public health nurses, and a team approach—it would be possible to offer the community a type of primary care which would be superior to that available in the typical specialty-oriented medical clinic.

No effort was made to screen patients at the time the clinic opened its doors. In the early weeks of the clinic’s operation, most of the patients seen were referred by the district’s professional staff. These patients generally were registered users of the district’s preventive health services. As time passed, increasing numbers of walk-in patients began to request care. Although most of these appeared to be poor and unable to afford private care, there were others who were known to be well off or to have health insurance.

Soon after the clinic began to admit patients, staff members started to critically question the clinic’s operation. For example, they were interested in the objectives of the clinic, the specific population that should be served, the kinds of health problems the clinic was being called upon to treat, and the clinic’s capability for handling these problems. Other questions which arose were: What was the flow of patients in the clinic? Which health professional saw which patients and for what kinds of problems? What kinds of appointments were broken? What was the referral pattern of patients within the district’s facilities, clinics, and services? What was the outcome of patient’s encounter with the clinic in terms of resolution or alleviation of health problems?

These questions formed the basis for an evaluation of this primary health care clinic. The health department, however, did not have the capability to undertake such a study without assistance. Fortunately, an opportunity to evaluate the clinic became a reality when the University of California at Los Angeles headquarters group of the California Center for Health Services Research agreed to make the study part of its program to develop and test a methodology with which to compare centers providing primary health care.

There were three objectives of the study. The first objective was to answer the questions that the

clinic staff had raised. The second was to provide some idea of the adequacy of the clinic program so that it could be compared with other programs with similar goals. Finally, since the health department was in the process of changing its posture—in the sense of providing curative services in addition to the traditional preventive services—it was hoped that the evaluation would yield information which would help the health department establish primary care centers in other districts.

Methodology

A multidisciplinary team whose members were from the fields of economics, clinical medicine, health services administration, and engineering and operations research carried out the evaluation. In designing the evaluation study, the clinic needed to clearly define its goals and to specify what actions it could undertake to achieve those goals. The study had four phases:

1. Delineation of values and goals
2. Analysis of system performance with respect to goals
3. Delineation of system problems
4. Cost analysis.

Delineation of values and goals. One of the evaluation team’s first tasks was to determine how closely the actual users of the clinic corresponded to a defined target population. This determination was central to the evaluation and was essential for the health department in justifying continued support for this new public service program. A major problem existed, however, in that a target population for the clinic had not been well defined—other than that those served be poor and without ready access to health care. To clarify this issue, a questionnaire was distributed to the clinic staff and to key persons in the health department to allow them to express preferences as to the characteristics desired of the target population. The subject areas included age, sex, race, size of family, socioeconomic status, place of residence, and types of health problems to be treated.

In addition to the results from the questionnaire, a series of meetings and individual interviews were held with the staff and the key administrator. The results of the questionnaire and the meetings and individual interviews were used to assist the staff in exploring and making explicit their values and goals for the clinic.

Analysis of system performance with respect to goals. The analysis of system performance re-

quired first that a system be defined and then a method be developed for studying the system's operation and for measuring various aspects of the system's performance. The clinic was already in operation with resources committed and the general problem was measuring the clinic's current operations with respect to (a) the size and characteristics of the user population, (b) the resources provided by the health department to maintain the clinic, and (c) the content of the medical services offered.

The purpose of the analysis was to assist the clinic staff and administrators in determining what policy changes would help them achieve their goals. The analysis of clinic performance only before changes were instituted is discussed in this paper.

The final aspect of the system's performance measurement related to the characteristics of the medical care provided. The evaluation team attempted to specify and to quantify the health problems presented by the patients and the actions taken to solve those problems. Although no absolute criteria were available against which to compare all aspects of the care provided, the data collected would permit comparisons among clinics which had similar information. Admittedly few clinics now have this information, but the development of sufficiently general methods was attempted so that others can use this methodology and in time interclinic comparisons will be easier to make.

Measurement of performance was approached by relating the clinic's activities to the persons receiving services. Because per person and per family information is desirable, a method was devised for linking visits to both individual persons and to their families. Analyses of the clinic's operation were based on measurements of performance derived from data contained in two files, a master file and a problem-oriented encounter file, especially constructed for this research. In a master file for each family, data on residence, income, ethnic identity, age, sex, family members, previous source of medical care, source of referral (or how the patient heard about the clinic), and details concerning health insurance were entered once. In an encounter file, information was collected at each visit on the type of visit, appointment status, health professional or professionals who saw the patient, patient's problems, diagnostic and treatment actions recommended, actions taken and their disposition, and recommendations for fol-

lowup visits or referrals. Both files had the patient's clinic number.

The term, encounter, as used in this study includes a patient visit actually made or a scheduled appointment which was canceled or broken. A visit was defined as a patient contact with the clinic at a given time regardless of the number of services provided or the number of providers of service seen.

The clinic was divided into two sections, one for infants and children and one for adults, and the physicians participating were either pediatricians or internists. Health care services were provided in a new facility which had been designed, however, to deliver traditional public health services rather than primary care.

Members of the clinic staff who saw the patient entered data on forms designed by members of the research team from UCLA. While interviewing the patient, a clerk filled out the form for the master file and part of the form for the encounter file before the patient was seen by a physician or other staff members. Generally the physician recorded medical information such as health problems, diagnostic or treatment actions, and referrals.

Once the clinic staff had become familiar with the forms, few delays were caused by data collection and these had little effect on the overall operation of the clinic. The data from both files were processed by the evaluation team at UCLA.

The technique used to record data on problems and actions linked actions to problems. Thirty-four categories of problems were listed on the encounter form. These were then recoded according to major diseases and symptoms categories as defined in the Eighth Revision, International Classification of Diseases, plus several nondisease categories, such as general or special-purpose examinations, followup visits, and skin test readings.

A similar approach was used to record actions. Forty-eight categories of actions were classified and were designated as either diagnostic or treatment. Next, the site where the action was taken or where the service was provided was specified under disposition. Potential dispositions included a range of possibilities, such as various other services of the district health center itself and referrals to outside private, voluntary, or government health-related agencies or facilities. Where no source for the recommended diagnostic or treatment action was available, this unavailability was noted.

The original research design called for analysis of at least 1,000 consecutive patient visits, not counting broken or canceled appointments. During the study period, February 17 to May 7, 1971, 54 clinic sessions were analyzed, a total of 1,389 patient encounters were recorded (representing 1,151 actual consecutive patient visits) and 238 canceled or no-show appointments.

Delineation of system problems. Problems related to various aspects of the Family Care Clinic operation became apparent in several ways. Some were obvious to the clinic staff, some to the users of the clinic, and others surfaced as a result of the evaluation study. Initially, these problems were stated largely in qualitative terms. The task of the evaluation team was to quantify these problems and to establish baseline measurements against which future changes in performance could be compared. Practically speaking, data were collected with which to measure and study specified problems, broken appointments, the extent to which needed services and supplies or sources of referral were not available, and insufficient participation of certain disciplines in patient care, for example.

Cost analysis. The method of the cost analysis used was to relate resource inputs to clinic outputs. The inputs were space, persons, equipment, and consumables, and the outputs were sessions of the clinic as an indicator of service provided, and the number of persons served.

The main task of the resource analysis was to determine the personnel inputs for each 4-hour session of the clinic. This analysis was made by measuring the number of person-days for each skill category, by observing the number of persons actually working in the clinic for several days, and by interviewing individual persons to determine how much of their time was spent on clinic activities. Costs of man-days were estimated by using rates from the county salary ordinance, and cost of space and equipment were estimated at local market rates.

Results

This evaluation provided answers to many of the questions which stimulated the study. The results selected for discussion are those considered of general interest and which, it is hoped, will enable the reader to see how a similar approach might be used in evaluating ambulatory health care in other settings.

Target population. As a result of the values

and goals analysis, the clinic staff agreed that the target population should consist of families of the ethnic minority poverty-stricken population living in the South Santa Monica-Venice area and should include chiefly persons without other medical care resources. A summary of demographic characteristics of patients, February 17–May 17, 1971, related to total encounters, including broken appointments follows.

<i>Characteristic</i>	<i>Percent of patients</i>	<i>Percent of encounters</i>
Sex:		
Male.....	44.9	41.2
Female.....	55.1	58.8
Ethnic identity:		
White.....	49.0	48.7
Black.....	8.1	8.0
Spanish surname.....	39.5	37.1
Other.....	3.4	6.1
Family size (median=3):		
1.....	14.1	14.3
2.....	13.4	15.9
3.....	21.6	22.7
4-6.....	37.8	35.1
7-10.....	9.5	8.1
11-15.....	3.6	3.8
Age (median = under 9 year):		
0- 9.....	50.2	46.6
10-14.....	4.9	4.5
15-21.....	10.8	11.7
22-39.....	27.3	28.0
40-59.....	5.3	7.3
60 and over.....	1.4	1.8
Income (median = \$1,801-\$3,000):		
0-1,800.....	35.4	33.9
1,801-3,000.....	15.2	16.4
3,001-4,200.....	15.4	17.6
4,201-5,400.....	14.8	14.9
5,401-6,600.....	7.9	7.0
6,601-7,800.....	4.0	4.4
7,801 and over.....	7.3	5.8
Residence:		
West district target area.....	48.8
Remainder of west district.....	48.2
Remainder of Los Angeles County..	3.0

Although the target population seems similar to the preferences of the clinic staff on size of income, family status, and ethnic identity, only about half of the patients were from the census tracts defined as the target area.

Other characteristics and relationships pertaining to the user population which could have significance for those making decisions regarding the clinic were as follows:

INCOME AND ETHNIC IDENTITY. The median annual family income of the white patients was less than \$3,000, whereas for Spanish-surname and black patients, it was less than \$4,200.

INCOME AND FAMILY SIZE. The median annual

income increased with family size. Based on the definition of poverty of the Office of Economic Opportunity (OEO), 59 percent of those who reported family incomes would be considered living in poverty. OEO defines poverty as an annual income below a specific amount related to family size. For example, for one person, an income below \$2,000; for two persons, below \$2,600; for three persons, below \$3,300; for four persons, below \$4,000; for five persons, below \$4,700; for six persons, below \$5,300; and for seven persons, below \$5,900 (personal communication, Jan. 12, 1972, Mrs. Martha Edwards, regional office, OEO, Los Angeles).

ETHNIC IDENTITY AND FAMILY SIZE. The median size of the families of patients with Spanish surnames was four persons, for other ethnic groups, three persons.

ETHNIC IDENTITY AND MEDICAL INSURANCE. No significant differences appeared in this relationship. About one-third said that they had some medical insurance.

AGE AND ETHNIC IDENTITY. Children in the 0 to 9 age class were the largest category of users regardless of ethnic identity, comprising 63 percent of patients with Spanish surnames, 53 percent of black patients, and 38 percent of white patients. The age class, 22 to 39 years, comprised 18 percent of patients with Spanish surnames, 15 percent of black patients, and 31 percent of white patients. In other age classes, the ethnic differences were less pronounced.

ETHNIC IDENTITY BY REFERRAL SOURCE. The patients with Spanish surnames appear to have a higher referral rate from the health department than do the black or white patients. Forty-eight percent of the patients with Spanish surnames were referred by the health department, 33 percent were referred by friends or relatives, and 11 percent were self-referred. The referrals of white and black patients were rather evenly distributed from each of the three major referral sources noted (table 1).

ETHNIC IDENTITY BY PREVIOUS SOURCE OF MEDICAL CARE. Although almost 50 percent of the patients who were black or white had previously received their medical care from a physician in private practice, only 21 percent of the patients with Spanish surnames stated that they had previously received services from a physician in private practice (table 2). When hospitals were given as a source of previous medical care, the patients with Spanish surnames used hospital clinics twice as

frequently (11 percent) as did the white (6 percent) and black (5 percent) patients.

Size of population served. The size of the clinic's potential user population is difficult to estimate. Because the clinic's data system was oriented to accumulating data by patient encounters, the number of persons who might be considered users of the clinic, though not observed during the 13-week study period, was not directly available from the data collected.

During the period of observation, 372 persons had one encounter, 190 had two encounters, and so forth, up to two persons who had eight, yielding a mean of 1.6 encounters per patient for the 13-week period. Seven hundred and twenty-nine different persons either visited or had visits scheduled with the clinic. Obviously, the clinic clientele was larger than 729 because some people who would use the clinic regularly may not have come during the period studied. A simple approach to estimating the size of the clinic's practice is to assume that the number of times the clinic is used by each of the potential users is a statistically random process over time.

The number of potential users who were not seen but who were just as likely to have been seen as those who actually did visit the clinic can then be estimated. A Poisson distribution can be fit to the observed truncated distribution of encounters with the clinic in the 13-week period. If the encounter distribution was Poisson, then 221 addi-

Table 1. Ethnic identity by referral source, in percent

Referral source	Spanish				All
	White	Black	surname	Other	
Self.....	28.1	30.4	10.8	15.8	21.2
Friend or relative.....	27.7	32.7	32.3	47.4	30.6
Other health department, clinic, or person.....	27.4	23.9	48.5	31.6	35.4
Other.....	16.8	13.0	8.4	5.2	12.8

Table 2. Ethnic identity by previous source of health care, in percent

Previous source	Spanish				All
	White	Black	surname	Other	
None.....	11.4	10.0	13.0	25.0	12.3
Physician in private practice.....	48.8	45.0	21.2	43.7	37.9
Health department..	22.8	37.5	35.9	18.7	28.8
Hospital.....	6.1	5.0	11.4	0	7.8
Other.....	10.9	2.5	18.5	12.5	13.2

tional persons who did not come in during the observation period could be considered regular users, or clientele, of the clinic. This distribution is shown in the chart. Assuming that encounters are Poisson distributed, then a 95 percent confidence interval on the total clientele is in the range 907-995.

Other distributions, such as the negative binomial, could have been used as a basis for calculation and would have yielded different values for the size of the zero class. However, the investigation of the relative merits of the myriad distributions which could have been examined would be a major undertaking in and of itself. Our principal aim was to indicate a methodology for such estimation, leaving the detailed examination of different distributions to future investigation.

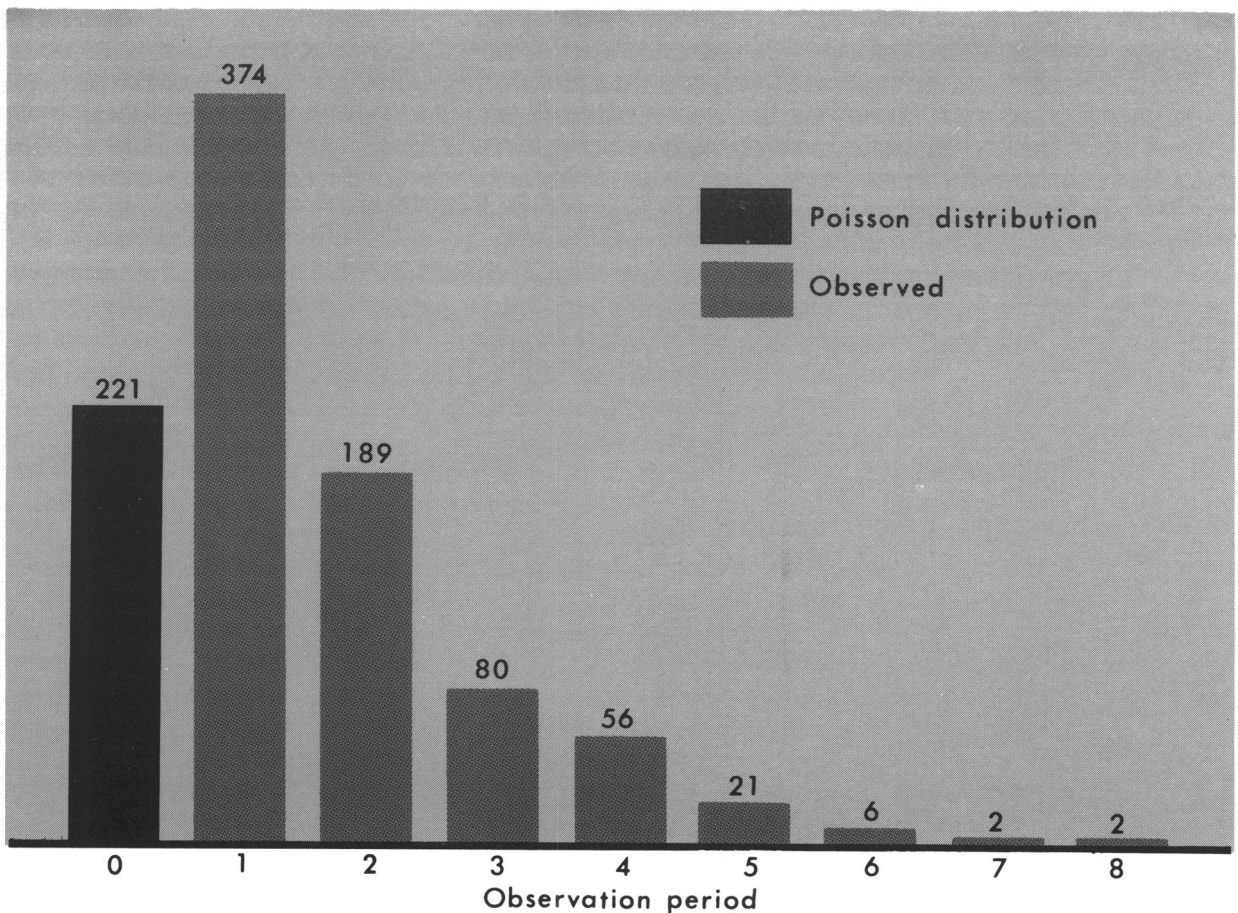
By looking at the distribution of frequency of use, one obtains a better impression of how the clinic is serving its clientele other than by merely looking at total numbers of encounters over a period of time. Thus some users had many more

encounters than others during the observation period. For example, 73 percent of all encounters were made by persons with two or more encounters. At the high use level, 10 percent of the potential users accounted for 30 percent of all clinic contacts and at the low use level, 50 percent of the potential user population accounted for only 15 percent of the clinic contacts, including 23 percent who made no visits and had no scheduled visits which were broken or canceled.

Clinic use by families. One measure of performance was the determination of the number of families being served by the clinic. The 729 patients seen during the study represented 555 family units. The largest number of family users came from families with three members in the household; 80 percent of the families had four members or less. Families from which two or more persons were seen during the observation period accounted for 40 percent of the persons seen.

Visits and broken appointments. Staff members had suggested the possibility that better control of

Statistical estimate of number of persons using family care clinic



appointments might reduce congestion in the waiting rooms and the time patients waited to see a physician. Although scheduling was outside the scope of this study, the following observations were made. The number of visits varied with the day of the week, with Thursday the highest, 23.5, and Friday the lowest, 17.4, with an overall average of 21.6 patients per day. The clinic sessions were approximately 4 hours on all days except Friday when 1 hour was devoted to a staff conference, leaving only 3 hours for clinic work. The average number of patient visits per hour of physician's time ranged from 2.7 to 2.9.

Of all scheduled appointments, broken appointments averaged 20 percent. This average was within the range (15–30 percent) observed in other studies of ambulatory care systems (2). Analysis of the data so far, however, indicates an inverse relationship between the frequency of clinic use and broken appointments. The highest proportion of scheduled appointments broken occurred with patients with only one clinic contact, and the percentage of broken appointments decreases as the number of clinic contacts increases. The percentage of broken appointments compared with number of clinic contacts was as follows.

<i>Contacts per patient</i>	<i>Scheduled appointments</i>	<i>Percent broken</i>
1.....	275	23.6
2.....	329	22.8
3.....	217	22.1
4.....	202	14.3
5.....	93	11.8
6-8.....	57	10.5

Problems and actions taken. During the observation period, 1,840 problems were recorded. The cumulative frequency distribution of patients' problems follows.

<i>Problem</i>	<i>Frequency</i>
Diseases of respiratory system ¹	265
General or special medical examination ²	185
Diseases, genitourinary system ³	173
Diseases, nervous system or sense organs ⁴	131
Diseases, skin and subcutaneous tissue ⁵	103
Endocrine, nutritional, or metabolic disease ⁶	101
Infectious or parasitic disease.....	93
Prophylactic inoculation and vaccination.....	91
Diseases, circulatory system.....	84
Other nonspecified problems.....	77
Diseases, digestive system ⁷	74
Immunization and skin sensitization tests.....	64
Diseases, blood or blood-forming organs.....	54
Diseases, musculoskeletal system.....	45
Symptoms, digestive system.....	45
Accidents, poisonings, injuries.....	37
Other general symptoms.....	33

Special requests for service.....	24
Symptoms, nervous system, or senses.....	20
Behavior complaints.....	20
Symptoms, limbs and joints.....	18
Laboratory examination.....	18
Symptoms, respiratory system.....	15
Symptoms, genitourinary system.....	12
Mental disorders.....	11
Dental caries.....	11
Examination for pregnancy.....	11
Complications of pregnancy or childbirth.....	10
Contacts with carrier of infectious disease.....	10
Symptoms, circulatory system.....	4
Neoplasms.....	1
Congenital anomalies.....	0
Well-child care.....	0
Prenatal postpartum care.....	0
All problems.....	1,840

¹ 14.4 cumulative percentage. ² 24.5 cumulative percentage. ³ 33.9 cumulative percentage. ⁴ 41.0 cumulative percentage. ⁵ 46.6 cumulative percentage. ⁶ 52.1 cumulative percentage. ⁷ 74.8 cumulative percentage.

Fifty-two percent of the problems were in the following six categories—diseases of the respiratory system, general or special examination, diseases of the genitourinary tract, diseases of the nervous system or sense organs, diseases of the skin and subcutaneous tissue, and endocrine, nutritional, or metabolic diseases. Generally only one problem was recorded per visit, but two problems were recorded in 35 percent of patient visits, three problems in 10 percent, and four problems in 4 percent. These figures are somewhat higher than those reported in a Massachusetts survey of general practice (3).

During the observation period, 2,283 actions were recorded. The cumulative frequency distribution of actions follows.

<i>Action</i>	<i>Frequency</i>
Medication, oral ¹	697
Advising or counseling of patient.....	248
Blood count or sedimentation rate ²	218
Urinalysis.....	184
Counseling of family member.....	156
Medical procedure (including inoculations or immunization).....	113
Observation, treatment deferred ³	108
Injection.....	94
Chemistry.....	64
Culture.....	29
Cytology.....	28
Chest X-ray.....	27
Nutritionist referral (service within WHDC).....	24
Appointment for physician (walk-in patient, physician not available) ⁴	24
Electroencephalogram, electromyogram, audiometry.....	23
Stool.....	21
Serology.....	18
Medical consultation.....	17
Wet mount.....	15
Hospital emergency room referral.....	12
Youth clinic in district.....	10
Ear, nose, and throat referral.....	10

Sickle cell tests.....	10
Social worker referral (WDHC).....	9
Electrocardiogram.....	9
Family planning referral (WDHC).....	8
Extremities, X-ray.....	7
Prenatal referral (WDHC).....	6
Surgery consultation.....	6
Well-child conference referral (WDHC).....	5
Dental referral (WDHC).....	5
Health officer clinic referral (WDHC).....	5
Veneral disease clinic referral.....	5
Psychiatry or mental health consultation.....	5
Surgical procedure.....	4
Public health nurse referral (WDHC).....	4
Urology consultation.....	4
Obstetric-gynecologic consultation.....	4
Barium enema.....	4
Orthopedic consultation.....	3
Upper gastrointestinal series.....	3
Drug abuse clinic referral (WDHC).....	2
Other treatment.....	2
Mental health referral, psychology (WDHC)....	1
Spinal X-ray.....	1
Intravenous pyelogram.....	1
Other X-ray.....	1
All actions.....	2,283

¹ 30.5 cumulative percentage. ² 50.9 cumulative percentage. ³ 75.5 cumulative percentage. ⁴ 89.5 cumulative percentage.

Fifty-one percent of the actions were taken in the following three categories—medication (oral), advising or counseling of patient, and complete blood count.

The clinicians in the Family Care Clinic were aware of limitations in available diagnostic and treatment procedures. To try to quantify this resource deficiency, the number of diagnostic and treatment actions recommended were measured and these were related to health problems. A total of 663 diagnostic and 1,620 treatment actions recommended during the 1,151 patients' visits were recorded, averaging 0.58 diagnostic actions and 1.40 treatment actions per visit.

Most of the actions recommended were carried out in the clinic. Hospitals and other resources were little used. X-rays, other than of the chest, electrocardiograms, and many other commonly used diagnostic procedures were seldom recommended. The disposition of actions recommended in the management of diseases of the respiratory system, nervous system and sense organs, genitourinary system was as follows.

	<i>At the clinic or other service in health center</i>	<i>Outside referral (private, hospital)</i>	<i>Service unavailable</i>
<i>Diagnostic actions</i>			
Blood count.....	123	1	5
Cultures.....	13	4	1
Urinalysis.....	114	2	5

Cytology.....	25	0	1
Chest X-ray.....	7	0	1
Blood chemistry.....	5	6	1
Smear (trichomonas).....	12	0	1
Other laboratory work..	5	1	0

Treatment actions and their disposition follow.

<i>Treatment actions</i>	<i>Clinic or other service in health center</i>	<i>Outside referral</i>
Oral medication.....	284	27
Patient counseling.....	76	0
Family counseling.....	69	0
Medical procedure (including immunization).....	59	1
Observation.....	40	2
Gynecology procedure.....	17	0
Ear, nose, and throat referral.....	0	4

Diagnostic actions were recommended most frequently at visits for general and special examinations, an average of one a visit. For patients who came to the clinic for care of specific health problems, diagnostic measures were less frequently used. Of the six most frequently reported problems, the number of diagnostic actions per problem recorded ranged over a factor of 10. The range for treatment actions was smaller, less than a factor of 2, with diseases of the respiratory system having the most treatments per problem (table 3). Although in our data collection system each action was associated with a problem, some of the spread in actions may have been because one action may have applied to more than one problem.

Team care. The staff of the Family Care Clinic emphasized the desirability of a team approach to patient care. Patients were referred to the nutritionist on 24 occasions and to a social worker on nine occasions (see table on pages 71, 72). The number of times a patient was seen at the same

Table 3. Number of diagnostic and treatment actions recommended for the six most frequently reported problems

Problem designation	Problems recorded	Diagnostic actions	Treatment actions
Diseases of respiratory system.....	265	0.21	1.13
General and special examinations.....	185	1.0	.66
Diseases of genitourinary system.....	173	.49	.88
Diseases of nervous system and sense organs.....	131	.11	.89
Diseases of skin and subcutaneous tissue... ..	103	.08	1.10
Endocrine, metabolic, and nutrition diseases.	101	.40	.89

visit by both a physician and some other category of health worker was a nurse, 33 times; a nutritionist, 11 times; and a social worker, four times.

The data concerning nurses are somewhat misleading since nurses participated in the care of virtually every patient. In addition, there were 33 patient contacts designated by a nurse when, in her opinion, she rendered a service which was different from the routine clinic nursing service ordinarily provided. Examples of such a special service include arranging for a referral for a diagnostic or treatment procedure where considerable time was involved or carrying out a special treatment procedure. In contrast to the nurses, however, patient contact with the nutritionist, and particularly with the social worker, was extremely limited.

In the absence of the physician, the nurse often saw a patient for triage, to read skin tests, and to give inoculations. This type of service amounted to approximately 10 percent of patient visits. The following is a breakdown of problems listed by the nurse when she was the only professional seeing a patient.

<i>Problem</i>	<i>Number of patients</i>
Mantoux reading.	34
Request for referral.	18
Genitourinary distress.	17
Upper respiratory infections or flu.	14
Immunization, inoculations.	10
Trauma.	6
Gastrointestinal distress.	6
Infectious hepatitis contact.	6
Audiovisual screening.	4
Miscellaneous.	8
Total.	113

Cost. Based on observations and calculations, it is estimated that operation of the Family Care Clinic cost approximately \$350 per 4-hour session and the annual cost for the clinic is estimated at \$83,300 assuming 238 sessions per year. An average of 21.6 patients were seen in the clinic per session, so that the estimated cost per visit is \$16.20.

Discussion

Values and goals. The first task of this evaluation was to help members of the clinic staff specify their goals in a precise quantifiable fashion. The approach employed, called value system analysis, has been used in the design of products or services, particularly where multiple competing

objectives need to be reconciled. Engineers have developed value system analysis as a means of quantifying preferences or values of the attributes desired in a finished product so that managers may employ a rational decision process in selecting the optimum design from a field of alternatives. A detailed account of the use of value analysis methodology in the design of primary health care facilities is being prepared for later publication. The present discussion is limited to an example which will demonstrate applications of the method.

When the clinic opened its doors all comers were accepted without screening. Screening, the staff believed, was an indignity to be avoided. They recognized, however, that clinic resources were extremely limited and that, if they could choose their clientele, they would prefer to serve predominantly low income families who were without reasonable access to other medical care.

The value analysis of the characteristics desired in the target population provided criteria against which to measure the actual user population. Thus, it appears that roughly half the users did not live in those census tracts defined by the staff as the focus of the clinic's program. Furthermore, although only 7 percent of the users reported annual family incomes of more than \$7,800, roughly 35 percent of the incomes of patients were high enough to take them out of the poverty class as defined by OEO. This income level posed a problem for clinic management; that is, how to reconcile the competing objectives of not screening potential clinic users and at the same time serving a specified user population. To date screening has not been instituted, and the clinic is concerned with the task of attracting more patients who have the characteristics desired (outreach).

Health care activities, problems, and actions. Although the process of diagnosis and treatment of health problems was not studied directly, linking actions with problems gives clues to the performance and professional habits of the clinic staff. Clearly, this information would have been more valuable if keyed to changes in the health status of clinic users, but even without outcome measurements, significant information emerges.

When the study began, clinicians and other members of the health care team were concerned that they could not provide or arrange for all the diagnostic and treatment services their patients required. The Family Care Clinic did not have facilities for performing electrocardiograms or most

X-ray procedures, for example, and if a patient was unable to purchase or otherwise secure these services outside the clinic, the service was not rendered.

Members of the clinic staff saw this problem as directly affecting patient care. The evaluation team was anxious to quantify the deficiencies in services, as perceived by staff members, for use in future planning. Staff members were instructed to list procedures recommended in providing patient care and then to note those times when the recommended action was not carried out because the service was unavailable. In practice this method for quantifying service gaps did not work out, because the physicians rarely recommended a procedure they knew a priori was unavailable. The main reason they gave for this decision was a concern that they would be leaving themselves open to a malpractice action if they did not carry out what they had recommended.

One of the intriguing discoveries made in the study was a considerable difference in the frequency and pattern in the use of diagnostic procedures. For example, on the average, physicians ordered at least one diagnostic procedure at each visit when a patient came for an examination, but for patients seen for a specific health problem, a diagnostic procedure was ordered much less frequently. The evaluation team speculated that in the face of resource shortages a patient seen for

illness was treated primarily on the basis of clinical judgment; when, however, a patient was seen specifically for a periodic or special examination, the physician did order a diagnostic procedure, usually a blood count or urinalysis, because he considered such a procedure a required part of the health examination.

The frequency with which diagnostic and treatment actions were recommended in other clinics which considered that they were providing either primary or family care was also measured and these were compared with the results of the Family Care Clinic. The facilities chosen for comparison included the family practice clinic of a community hospital located 3 miles from the Family Care Clinic, a prepaid general pediatric clinic operated by the UCLA School of Medicine, and the Family Medicine Clinic of the Los Angeles County Harbor General Hospital. In each facility, 50 charts were examined. These represented consecutive patient visits which had occurred in the preceding several days. Data only from the last patient visit were analyzed.

The various clinics surveyed differed in many ways, including size, location, socioeconomic status of clients, health problems seen, availability of facilities and resources, source of funds, and makeup and training of the staff. These differences are summarized in table 4, where the number of diagnostic and treatment actions per visit overall

Table 4. Comparison of four primary care clinics with the average number of diagnostic and treatment actions per patient visit and per respiratory system disease visit

Clinic	Health problem characteristics	Physician characteristics	Diagnostic and treatment resources available ¹	Diagnostic actions per patient visit	Treatment actions per patient visit	Diagnostic actions per respiratory disease visit	Treatment actions per respiratory disease visit
Health department family care clinic.	Mostly non-serious ² .	Experienced clinicians.	Limited to simple modalities.	0.58	1.40	0.21	1.13
Community hospital family practice clinic.	Mostly non-serious with some serious.	Resident physicians, with some attendings.	Routine hospital capability.	.89	.92	.20	1.00
Prepaid medical school pediatric clinic.	Mixture of non-serious, serious and complicated.	Residents, fellows and faculty.	Complete range . .	.52	.76	.16	1.16
County hospital family medicine clinic.	Mixture of non-serious, serious and complicated.	Resident physicians, with some attendings.	Complete range . .	.79	1.22	.29	1.14

¹ Although formally available, not all patients had access to all services.

² Nonserious refers to the range of problems routinely seen, including examinations, minor infections, and chronic disease.

and per visit for respiratory system disease are compared.

Although the data were derived from a small number of patient visits, the results show that the number of diagnostic and treatment actions per visit have a wide range, and that the Family Care Clinic was not always at the lower extreme. For example, on comparing the number of diagnostic actions recommended in the management of respiratory system disease, one notes that only in the county hospital's Family Medicine Clinic were more diagnostic procedures ordered than in the Family Care Clinic. Overall, the Family Care Clinic recommended the most treatment actions per patient visit.

These results suggest that further work to delineate the distributions of procedures per person in primary health care clinics needs to be done so that more precise evaluations can be made of the adequacy of services provided to patients with a particular problem. It should be mentioned, however, that just because a facility has the capability to provide a particular service does not guarantee that the user population actually has access to that service. Even in a university medical center, for example, special procedures may be offered only through a specialty clinic that meets infrequently, effectively limiting the number of persons to whom that service is available. Another factor which limits access is the cost of a procedure. Physicians who are caring for patients on a pre-paid capitation plan, for example, may be more reluctant to order procedures than they would be were compensation made on a fee-for-service basis.

Team approach. It was noted earlier in this report that the staff of the clinic had indicated that they favored a team approach to the patient. The data collected, however, suggest an infrequent participation of the nutritionist and particularly of the social worker in contact with patients. The reason is not immediately evident; that is, whether there was underreporting of patients seen by the nutritionist and the social worker or whether, despite an expressed desire for team action, the clinicians, traditional practitioners, did not appreciably change their style of practice so as to allow participation of other health professionals in patient care. But the study did bring such matters to the surface where they can be discussed and changes made if desired.

Resource allocation. In all practical decision situations, a constraint on feasible options is set

by the resources available. In the Family Care Clinic, although these resource inputs can be valued at a dollar amount, this dollar amount does not mean that money was available to the clinic to be allocated at will. Because of prior health department commitments to buildings and to certain categories of personnel, the clinic had limited freedom to purchase equipment and to hire personnel who had the special skills required to operate a primary health care facility. In practice, therefore, the clinic largely made do with the resources available and the per capita cost reported is based on a dollar valuation of these resources.

At this point several observations can be made. One is that many ambulatory care units estimate the cost of their services on a per visit basis even though they do not specify the services given or the number of persons served. For example, in 1970, on the basis of per visit costs, three clinics of the Good Samaritan Hospital in Los Angeles reported an average cost of \$14.20 per visit, exclusive of physician's fee (4). A survey of OEO clinics in 1971 showed an average cost of \$19 per visit with a physician (5). Calculated on this basis, the average per visit cost was \$16.20 for the Family Care Clinic.

Another approach to cost analysis, which may be more meaningful to those planning health services, is to calculate the cost required to provide a defined service to a defined population. This basis for comparison enables decision makers to evaluate each service by the number of persons using the service and offers an organization like a health department a measure of the number of dollars of resources spent per person in each of its various programs. Thus, since the estimated annual cost to operate the clinic was \$83,300 and the clinic's estimated clientele was 950 persons, the annual cost of service per person in the Family Care Clinic is \$87.70, or \$352.80 for a family of four.

Management and logistics. Clinic management of health department logistics per se was not evaluated in this study. The evaluation team did, however, recognize two major problems which handicapped the operation of the clinic: (a) a scarcity of referral sources for many kinds of routine diagnostic and treatment procedures, and (b) the inability of the health department to adapt to the special needs of the clinic in supplying drugs, equipment, and personnel that are not routinely used in traditional health department clinics and services. These problems are largely related to lack of financial resources, but not entirely so.

Some of the difficulty is inherent in the health department, which may require internal changes to accommodate a type of service which for the department is an innovation.

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An evaluation study was made of a family oriented primary health care clinic established in 1970 by the Los Angeles County Health Department. The study design involved analysis of more than 1,000 consecutive patient visits.

The four phases of the study were delineation of values and goals, analysis of system performance with respect to goals, delineation of system problems, and a cost analysis.

Value system analysis was used to assist the clinic staff in defining and making explicit program goals, characteristics of the desired target population, and the content of the service program. System performance was analyzed by linking recommended diagnostic and treatment actions to health problems and noting the disposition of the recommended actions. This type of analysis allowed study of the clinic's process as well as identification of gaps in service.

The majority of the clinic's users met the characteristics desired in the target population, in that more than one-half were from minority groups and almost two-thirds were below the poverty level as defined by the Office of Economic Opportunity and that most users were members of families who were enrolled in the clinic's clientele.

The average number of diagnostic and treatment actions per visit was calculated for all visits and for specified health problems. These data were compared to similar data obtained from three nearby primary care clinics; one in a medical school, one in a community hospital, and one in a large county general hospital. Despite the many differences among these four clinics, the per visit number of diagnostic and treatment actions used in managing respiratory system diseases, the most frequent problem seen by the Family Care Clinic, was quite similar.

Costs were analyzed by relating resource inputs to clinic outputs, and the per visit cost was estimated at \$16.20. This cost was comparable to per visit cost for other local primary care clinics. A more interesting calculation was that the health department was spending about \$88 per year for each person who was included in the clinic's clientele.

Many difficulties limited the effectiveness of the clinic, of which resource shortages and lack of adequate backup diagnostic and treatment referral sources were the most significant. Most of these difficulties were financial, but some problems on the part of members of the health department in adapting to the needs of a new service program also played a role. The department is now making organizational and other changes required to improve the delivery of quality primary care and to expand these services to other areas in the county.