Family Utilization of a Medical Center

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This study shows that "high utilization families" do exist and demonstrates a method, based on the calculation of expected contact rates for individuals and families, for identifying them. The high utilization families are not composed of chance combinations of high utilization individuals. This trend becomes apparent in two member families and is statistically significant for families of three or more. High utilization families were shown to have greater numbers of social problems, economic problems, and health maintenance problems when compared to a control group.

Utilization by patients of health-care facilities is a subject of interest to a wide variety of people including medical professionals, sociologists, politicians, governmental agencies, and the public at large.

Previous studies relate utilization to such variables as age, sex, social class, health status, and other socioeconomic factors. Brotherston, Chave, et al[1] presented in 1965 an analysis of utilization by patients in a new housing development near London, England. They were able to show that 76 percent of all registered patients consulted a physician at least once during the year. Their study showed that females had more consultations than males, and 80 percent of all consultations were made by patients less than 45 years of age. They reported a consultation rate of 4.1 consultations per person per year based on the average registered population. One sixth of their patients accounted for one half of all consultations, and 30 percent of consultations were made by seven percent of the patients. More consultations were made by those patients in the lower socioeconomic class, and males over 65 years of age were shown to have the highest consultation rates.

Picken and Ireland[2] dealt with effects of family size, social class, and family role on utilization. Their study in 1958 showed no significant relationships between social class or family size and the number of consultations sought by parents. It also showed that children from the upper class and smaller families consulted more often than other children. They found no temporal relationships between consultations of family members. A study by Laughton, Buck, et al[3] in 1969 compared morbidity and three socioeconomic groups of an urban population and found that the three groups did not differ in total illness or in psychiatric or psychosomatic illness.

In this same study, chronic illness was shown to increase with decreasing socioeconomic status, although the difference was not statistically significant. In a 1973 study by Williams and Wanklin,[4] the utilization by an insured health service population was unaffected by social class.

The studies cited above have dealt generally with utilization in terms of the individual patient rather than in terms of utilization by the entire family. Because family medicine is oriented toward the family, the family's utilization as a whole rather than utilization by individual family members becomes important, and this approach raises a number of questions. Does such an entity as the "high utilization family" exist as distinct from high utilization by one or more members? If there exists such an entity as a "high utilization family," does it possess characteristics which would distinguish it from a low or normal utilization family? What are these characteristics?

Method

This study is based on the experiences during a six-month period of those families registered with one practice at the St. Joseph's Family Medical Center. A family is *registered* if they

Table 1. Expected Contact Rates According to Age/Sex

Age (Years)	No. of Contacts	No. of Patients	Expected Contact Rate
Females			
Under 1	67	20	3.35
1 to 5	159	95	1.67
6 to 15	103	133	0.77
16 to 25	419	244	1.71
26 to 45	417	232	1.80
46 to 65	170	89	1.91
Over 65	76	32	2.37
All ages	1,411	845	1.67
Males			
Under 1	58	17	3.41
1 to 5	132	100	1.32
6 to 15	117	130	0.90
16 to 25	131	158	0.82
26 to 45	214	213	1.00
46 to 65	118	74	1.59
Over 65	28	19	1.47
All ages	798	711	1.12

Table 2. Calculation of the Family's Expected and Observed Contact Rate and Utilization

Example: Family 8235

Family Members	Expected Contact Rate	Observed Contact Rate
8235 01	0.82	0
8235 02	1.71	0
8235 03	0.77	0
8235 04	1.32	4
8235 05	3.35	8
	7.97 ÷ 5 = 1.59	12 ÷ 5 = 2.4

Utilization is equal to observed contact rate over expected contact rate, ie, 2.4/1.59 = 1.5

indicate that their regular physician is at the Family Medical Center. Five hundred and sixty-four families were registered with the practice. Single member families were removed from the study, leaving 405 families with two to nine members.

A *family* is defined as all those people who eat together and live under the same roof for more than six months of the year. The records for each family are kept in a single chart, which is identified by a four-digit number with each individual being identified by an additional two digits. The practice uses family folders which contain a separate section for each family member. A family demographic sheet is contained in each folder, and each patient has his own problem list. For each visit, a progress note is recorded in the problem-oriented format, and an encounter sheet detailing patient and diagnostic information is completed. The latter is coded and stored on computer tape for later analysis and retrieval.

For this study, a computer printout was obtained listing visits by families and individuals during the six-month period of June 1 to November 30, 1972. A *visit* was defined as a face-to-face meeting between a patient and any member of the practice, which included physician, practice nurse, social worker, or public health nurse. Usually, on one visit only one contact was recorded although the patient may have seen more than one health-care professional.

An expected contact rate was established for each member of the family. An *individual's expected contact rate* was defined as the average number of contacts for all individuals of the same age and sex in the practice population (Table 1). The basic information for this procedure was obtained by computer printout.

Once an expected contact rate was established for individuals of a specific age-sex group, it was possible to derive the expected contact rate for a family. Comparison among families was possible, since the expected family contact rate allowed for differences in age and sex composition in families. The *family's expected contact rate* was the sum of the individual family members expected contact rates divided by the number of registered family members.

A family's expected contact rate

Table 3. Illustration of Binomial Expansion Used to Compute Expected Utilization Patterns of Three-Member Families Under the Null Hypothesis

Possible Family Utilization Patterns	Binomial Expansion		Expected Proportion of 3-Member Families*		Number of 3-Member Families		N† (Expected)*
Families in which all 3 members are above expected utilization	p^3 =	$(0.32)^3$	= 0.03	X	92	=	3
Families in which 2 members are above expected utilization	$3p^2q$ =	$3 \times (0.32)^2 \times 0.68$	= 0.20	X	92	=	19
Families in which 1 member is above expected utilization	$3pq^2$ =	$3 \times 0.32 \times (0.68)^2$	= 0.44	X	92	=	41
Families in which all members are below expected utilization	q^3 =	$(0.68)^3$	= 0.31	X	92	=	29

*All products have been rounded.

†N is determined by multiplying the expected proportion by the number of three-member families (92) and represents the number of families expected of that utilization pattern.

was then compared to the family's observed contact rate. The family's *observed contact rate* was the sum of the actual number of contacts made by family members during the study period divided by the number of registered family members (Table 2).

A family's *utilization rate* was expressed as a ratio of the family's observed contact rate to its expected contact rate. An observed to expected ratio of two or greater was chosen as high utilization, since most families with a ratio of this magnitude were usually described as high users by the practice physician or nurse. The high utilization families were identified for the study group, and a randomly selected control group of 45 families not included in the study group was also chosen. The control group was not matched for size of family or age-sex distribution.

The null hypothesis that "high utilization individuals are randomly distributed among families" was established. This situation was tested through the use of binomial expansion made specific for family size, as shown in the following illustration.

Using the three-member family as an example, the following is an illustration of how binomial expansion was applied. There were 92 three-member families or 276 individuals.

Eighty-eight individuals or 32 percent had more contacts than would have been expected based on their age and sex, ie,

$$p = \frac{\text{High utilization individuals}}{\text{All individuals}}$$

$$= \frac{88}{276}$$

$$= 0.32.$$

Likewise, the proportion of individuals with an observed level less than or equal to the expected utilization rate is q in the binomial or .68, ie,

$$q = \frac{\text{All ind. minus high util. ind.}}{\text{All individuals}}$$

$$= \frac{276 - 88}{276}$$

$$= 0.68.$$

In other words, p is equal to the proportion of individuals who had more contacts than expected, and q is equal to n−p÷n, or the proportion of individuals who had as many as or fewer than the number of expected contacts.

The null hypothesis is portrayed by the distribution of utilization patterns in Table 3, there being one more possible pattern than number of members in the family. (See Table 3.)

The number of families *expected* to conform to each utilization pattern was compared to the number of families *observed* to conform to that pattern, and a chi-square test of significance was then performed.

After the high utilization families were identified, their charts were reviewed with a special reference to the problem list and were compared with the problem lists of the control group. The problems were categorized and counted. Five main categories of problems were identified as follows: medical problems, social problems, behavioral-emotional problems, economic problems, and health maintenance problems (eg, prenatal, well-baby). A problem was counted each

Table 4. High Utilization According to Family Size							
Family Size	2	3	4	5	6	7+	Total
Number of families	149	92	69	56	27	13	405
Number of families with utilization greater than two times that expected	15	9	9	7	4	3	47
Percentage of families that demonstrated high utilization	9.9	9.8	13.0	12.5	16.0	23.0	

time it appeared on the problem list. A contact made during the study period was not necessarily related to any of the listed problems. It was possible for a problem, such as depression, to appear more than once in one family. However, the problem labeled marital conflict was counted only once per family, although it by nature involved more than one family member.

Results

Individual expected contact rates differ for males and females, but show a similar progression to increased utilization with advancing age (Table 1). The highest mean contact rate for both sexes occurred in those under one year of age.

Infants were seen frequently during the first year of life for well-baby examinations, immunizations, etc. Individual females, in general, had higher utilization rates than males. The mean contact rates for females were higher than the rates for the corresponding age group of males in all age groups except that between 6 and 15 years.

Of the 405 families in this study 47, or 11.6 percent, were found with a utilization rate greater than or equal to two, thus falling into the classification of high utilization families. The percentage of high utilization families increased with increasing size of family (Table 4).

A chi-square analysis was used to test for statistical significance of family tendency toward high utilization. Except for families of only two members, differences between observed and expected numbers of high utilization families attained statistical significance. For families of three, four, and five members, the difference was statistically significant at the 0.001 level. Families of six members

showed statistically significant differences at the 0.005 level. It was concluded from these data that the null hypothesis was not supported, and that families of three, four, five, and six members were not composed of high and low utilization individuals by chance.

Statistical significance was also established when an overall test was carried out (Table 5), and again the evidence pointed to high utilization as a familial tendency.

The types of problems recorded and the frequency with which each problem appeared on the problem lists are shown in Table 6. The most common problem encountered among the high utilization families was marital conflict. Depression, anxiety, alcoholism, and drug abuse were other frequently encountered problems in the study group. In the medical problem category, obesity was the problem that was listed most commonly. This was followed by allergies, including hay fever, eczema, and dermatitis.

From Table 7 it is noted that there were more problems per 100 patients in the study group as compared to the control group. The largest differences were found in the categories of economic problems (six-fold increase in the study group), social problems (two-fold increase), and health maintenance problems (two-fold increase). The two groups were similar in size and age-sex composition except for the age groups less than one year and one to five years. There were more individuals of these ages in the study group. However, these individuals accounted for only 11 of the total 229 problems listed for the families in the study group. The study and control groups were similar in that each contained approximately the same number of families of each size.

Discussion

Previous studies concerning medical services utilization have concentrated on utilization by individuals. This study was intended to be a study of utilization by the family as a whole. A method for identifying high utilization families and comparison between one such group of families and a control group has been presented here.

A family's high utilization could be due to various patterns of use by its members. The high utilization could be due to one or two family members being high users with other family members being low or normal users, or the pattern of high utilization could be distributed throughout all members of the family. The null hypothesis stated that families are composed of chance combinations of high and low utilization individuals. This hypothesis was not supported. Using an expected contact rate, it was possible to show that such an entity as "high utilization family" does exist, and that it is possible to identify this family. High utilization families are composed of clusters of high utilization individuals. The method has the advantage of being relatively uncomplicated in its application.

Characteristics of high utilization

Table 5. Test for Familial Tendency for High Utilization

	Observed	Expected
Total number of families in which all members were above expected	41	21
Total number of families in which all members were below expected	142	111
Total of all remaining families in which some members were above expected	209	260

$x^2 = 36.7$, 2 df, $P < 0.001$

Table 6. Types of Problems and Frequencies from Problem List of Study Families

Type of Problem	Frequency	Total
Medical Problems		
Obesity	12	
Allergies	11	
Genitourinary disorders	12	
Cardiovascular disorders	12	
Gastrointestinal disorders	10	
Others	49	
		106
Health Maintenance Problems		
Pregnancy	8	
Allergy desensitization	4	
Well-baby exams	4	
Contraceptive advice	3	
		19
Economic Problems	7	
		7
Social Problems		
Marital conflict	17	
Alcoholism and/or drug abuse	10	
Other (Illegitimacy, single parent, etc)	9	
		36
Behavioral-Emotional Problems (Mental Illness)		
Depression	14	
Anxiety	13	
Childhood Behavioral Problems (Acting-out, School Phobia, Enuresis, etc)	13	
Others	21	
		61

Table 7. Comparison of Study and Control Groups		
	Study Group	Control Group
No. of Families	47	45
No. of Individuals	173	154
No. of Problems	229	153
No. of Problems/100 Patients	132.4	99.4
No. of Medical Problems/100 Patients	61.3	59.7
No. of Health Maintenance Problems/100 Patients	11.0	4.6
No. of Economic Problems/100 Patients	4.0	0.7
No. of Social Problems/100 Patients	20.8	9.1
No. of Behavioral-Emotional Problems/100 Patients	35.3	25.3

families were discussed only with respect to the types and frequencies of various problems listed on their charts. Other variables of interest might be the distance the family lives from the medical center, the family's involvement with other community agencies, or the way a family behaves when one of its members is ill. In subsequent studies, it is important to match control and study groups for family size and age-sex composition. It would also be worthwhile to have two control groups, one composed of intermediate users and another composed of low or non-users.

The study reported here involved 405 families during a period of six months. A greater time period, such as two years, would allow clusters of contacts for such problems as episodic illnesses, well-baby visits, and life crises to become more evenly distributed.

Another question brought to light with this study is the role of the team members in high utilization. This study did not attempt to differentiate between contacts initiated by the patient and contacts initiated by various members of the health-care team. Health-care professionals may make families high users by asking them to return repeatedly. This may be very positive if marital problems are being resolved or if depression is being alleviated. On the other hand, increased utilization of medical services may be a patient's compensation for other deficiencies in his life.

Residents and students were involved with the care of these families throughout the study period. Some additional influence on utilization may have been caused by the practice being situated in a teaching setting, and this factor should be taken into consideration.

References

1. Brotherston JH, Chave SP, Cledywin-Davis A, et al: General practice on a new housing estate. Br J Prev Soc Med 10:200, 1965
2. Picken B, Ireland G: Family patterns of medical care utilization: Possible influence of family size, role, and social class and illness behavior. J Chronic Dis 22:181, 1969
3. Laughton KB, Buck CW, Hobbs GE: Socioeconomic status and illness. Milbank Mem Fund Q 36:46, 1958
4. Williams J, Wanklin J: Health care experiences of urban families in London, Ontario. Presented at the Canadian Sociology and Anthropology Association Annual Meeting, Kingston, Ontario, May, 1973