

IMPACT OF HEALTH EDUCATION ACTIVITIES  
ON HOSPITALIZATION OF DIABETIC MEMBERS IN AN HMO

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A THESIS  
SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS  
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IN THE GRADUATE SCHOOL OF THE  
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COLLEGE OF HEALTH SCIENCES

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Date




To the Dean for Graduate Studies and Research:

I am submitting herewith a thesis written by Deborah Burke, entitled "Impact of Health Education Activities on Hospitalization of Diabetic Members in an HMO." I have examined the final copy of this thesis for form and content and recommend that it be accepted for partial fulfillment of the requirements for the degree of Master of Science, with a major in Health Education.



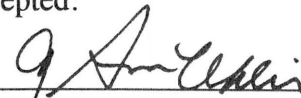
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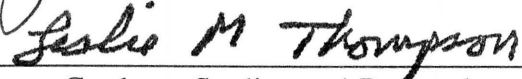
  
  


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I believe that quality health care at affordable costs should be available to all individuals. This belief started me on my path toward my graduate degree and my thesis topic. I wanted to learn more about managed health care and to examine the ways it could be more effective. I could not have accomplished this without the support of:

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Critical to the success of the Health Maintenance Organization (HMO) model is the belief that the practice of preventative health care will reduce or control the medical costs associated with the treatment of chronic illness. The purpose of this study was to determine if one component of this preventative care, specifically health or patient education activities and services, did impact the use of costly medical care (i.e. hospitalization) among members of an HMO who were diagnosed as diabetic.

Focusing on a branch of a large national HMO located in north Texas, this study examined the frequency of hospitalizations of diabetic members ( $n = 2,515$ ) of the HMO membership in relationship to their participation in health or patient education activities, with additional analysis of the sample by age and gender. Analysis of the data using Chi-square techniques indicated that diabetic members who were in contact with a health or patient educator were hospitalized at a significantly lower than expected rate when compared to those diabetic members who were not in contact with a health or patient educator. Additionally, this relationship held true for older diabetic members in general and for older female members in particular.

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## CHAPTER I

### INTRODUCTION

Since the 1970s, Health Maintenance Organizations (HMOs) have become a significant force as alternative health care delivery systems designed to provide more cost-effective health care than the traditional fee for services systems (Deeds & Mullen, 1981). However, medical treatment and health care for chronic illnesses, such as diabetes and asthma, challenge the inherent structure of the HMO model (Geffner, 1992), for this type of treatment and health care can be extremely costly.

A recent study conducted by Kaiser Permanente Medical Care Program, one of the largest and oldest HMOs in the United States, ascertained that its Northwest Region devoted over three times the resources for its diabetic members than for its non-diabetic members. Moreover, 11.8% of the Region's total expenditures were charged to certain costly medical treatment (i.e., hospitalization, emergency room ) for diabetic members. (Brown, Glauber, & Nichols, in press).

Critical to the success of the HMO model is the belief that if members of the HMO practice preventative health care, the medical costs associated with the treatment of these chronic illnesses could be significantly reduced and controlled. Although most HMOs monitor the costs of their services, they have rarely

investigated the cost savings tied to their preventative interventions, such as health and patient education and promotion activities or the health benefit for their member population with chronic illnesses (Geffner, 1992).

### Statement of the Problem

The problem of this study was, therefore, to determine if, in an HMO setting, there existed a relationship between members with chronic illnesses, who participated in health education activities, and the subsequent use of certain costly medical services. Because of the scope and complexity of the treatment of chronic illnesses, coupled with the size of the membership of the HMO, the study focused specifically on one chronic illness: diabetes.

### Purposes of the Study

The main purpose of the study was to assess how health education activities, primarily the one-on-one instruction between diabetic members and health/patient educators, impact the utilization of certain costly medical services by those members. Additionally, the study was to examine the overall cost relationship and possible cost savings related to the utilization of those medical services by diabetic members.

### Hypothesis

The following null hypothesis was tested at the 0.05 level of significance:

Participation by members in HMO-sponsored diabetes education activities does not impact the frequency of hospitalization when controlled for age and gender.

### Definition of Terms

For the purpose of this study, the following terms were defined:

1. Health Maintenance Organization X: A non-profit provider of health care services in the Dallas-Ft. Worth area, offering a comprehensive range of basic and supplemental health maintenance and treatment services to a defined, voluntarily enrolled population in return for a fixed, predetermined annual fee.
2. Members: Individuals, both male and female, who have health insurance coverage from the HMO in this study.
3. Diabetes Education Activities: Either structured classes and/or small group or individualized meetings conducted by health education or patient education professionals, with content focusing on information that will help diabetic members learn preventative self-care practices to control the acuity of their illness.
4. Participation: At least one contact with HMO health/patient educator to discuss diabetes self-care between January 1, 1992 and December 31, 1992. A synonym for participation will be contact.

5. Non-participation: No contact with HMO health/patient educator to discuss diabetes self-care between January 1, 1992 and December 31, 1992. A synonym for non-participation will be no contact.

### Assumptions

For the purpose of this study, the following assumptions applied:

1. The data collected from the HMO are reliable.
2. The HMO in this study offers regularly scheduled diabetes education activities and meetings with health/patient educators.
3. The diabetic condition of each member is coded on his/her individual chart, out-patient visit record, and other medical records.
4. Members are able to understand the information presented in diabetes education activities or meetings conducted by the health or patient educators.
5. Members in this study have already been identified as diabetic.
6. The HMO in this study will accurately report information on the diabetes education activities or meetings it sponsors and information on the medical services utilized by its members.
7. Contact in diabetic education activities can be voluntary and initiated with or without a referral from the member's physician.
8. Costly medical care issues other than illness occur on an equal basis between the diabetic and normal population.



9. Members, once identified or confirmed as diabetic, are referred to health/patient educators.

### Limitations

For the purpose of this study, the following limitations applied:

1. The HMO in this study would be the only source to provide information relevant to the study. No direct observation would be used.
2. The type and quality of diabetes education activities offered by the HMO in this study varied in some degree.
3. There would be no control for accuracy or completeness of data provided by the HMO.

### Significance of the Study

With the emerging importance of managed, cost-controlled health care in the United States, the value of preventative care and health education will be scrutinized intensely. Health care providers will have to demonstrate that they can deliver quality care while controlling costs. One alternative for these providers to accomplish this is to link their preventative care efforts not only to lives saved but also to dollars saved. This study may offer to those providers a model to follow in documenting that link.

Other implications that may result from this study are:

1. This study may influence diabetes health education and planning in the HMO in this study and in other HMOs.
2. This study may influence diabetic members to participate in more health education and promotion activities.
3. This study may encourage more HMOs to assess the effectiveness of not only their diabetic but also their other health education and promotion activities.
4. This study may demonstrate a correlation between HMO-sponsored diabetic education and promotion activities and subsequent behavior and health status of members participating in those activities as demonstrated by fewer hospital visits.
5. This may be a baseline study that merits further research to determine if the hypothesis holds true for other medical offices and other types of health education activities in the HMO in this study.

## CHAPTER II

### REVIEW OF LITERATURE

To provide a foundation and framework for this study, a review of literature was conducted to ascertain the influence and impact of health education activities on the subsequent use of hospitalization by members of health maintenance organizations (HMOs). Three areas were examined to support this research. The first two areas examined involved HMOs, their development and growth over the last 70 years, and the various types of health education and promotion activities they have historically sponsored. The third area examined involved the specific linkage between the utilization of medical services and the participation in health education activities by diabetics. Research in this area proved to be substantial and information from HMOs and non-HMO health care providers relative to this topic was studied.

#### Development and Growth of HMOs

While traditional "fee-for-service" health care has been the historical model in the United States, the concept of "prepaid, fixed cost" health care is not new. In the 1920s, HMO-like organizations were beginning to be established, with a few of these early pioneers of managed health care still in operation today. Falkson (1980) stated that the success of these prototypes more than validated the opinion that group

health care services offered at fixed costs could be effective as well as economical. However, it was not until the 1970s that health maintenance organizations emerged as seriously regarded competitors for the health care dollar. In 1973, with the passing of the Health Maintenance Act by Congress, HMOs now had what Birnbaum (1976) labeled as official federal approval, which would ensure controllable health care costs, and, therefore, should assure exponential growth for the HMO health care delivery model.

Birnbaum's prediction proved to be correct. In 1971 there were 39 HMO-like organizations in the United States, with a membership of 3.5 million people; by 1980, there were 236 HMOs with a membership of 9.03 million people. This represented an increase of over 158% in HMO membership growth (United States Department of Human Services, 1980). This phenomenal growth was linked (a) to the HMO Act and the financial incentives it provided to HMOs and (b) to employers' willingness to use HMOs as their health care providers and insurers (Luft, 1978). Geffner (1992) further substantiated Luft's assertions, in that by the end of 1987, there were 650 HMOs with a membership of 29.3 million people.

Financial assistance, especially in strategic planning and development, was provided to those HMOs which were willing to organize and operate according to guidelines established in the HMO Act. Consequently, a working model for HMOs to follow was established. With this model in place, HMOs' management needed only to staff, find locations, furnish them, send out marketing information, and build

a membership. The federal government further assisted HMOs to attract new members by providing financial incentives to employers who used HMOs as their health providers (Luft, 1978).

The federal government, nevertheless, could not guarantee that every HMO would continue to grow or retain its membership. Luft (1978) believed that a combination of factors would determine an HMOs' success. These factors included quality of care, credibility and competence of staff, and the ability to meet the needs of its membership. Moreover, he stated that if HMOs could keep members healthy, then there would be fewer expensive medical treatments and fewer hospitalizations. Health care costs would subsequently be controlled. The key, Luft concluded, was tied to the maintenance or preventive aspects of health care.

#### Health Education and Promotion Activities Sponsored by HMOs

The Health Maintenance Organizations Act of 1973 and the Health Maintenance Organization Regulations, published in 1974, stipulate that HMOs must "provide its members with instruction in personal health care measures and information about its services" (Birnbaum, 1976, p. 52). The act and regulations are not overly prescriptive as to which health education or promotion activities HMOs should offer; consequently, there is extensive diversity in programs and services among HMOs (Wilson, Rudmann, & Snyder, 1989).

As might be expected, much has been written by health educators on what

programs should be offered. In their 1981 study, Reilly, Sorenson, and Saward divided health education activities into five programs areas: patient education, health promotion, subscriber information, marketing information, and professional education for clinical staff. HMOs, as well as other health care providers that sponsor health education activities, appear to offer a mix of these activities to their patients.

In an effort to define what health education and promotion was specifically in the HMO setting, Mullen and Zapka (1981) identified what they believe to be the four goals of health education and promotion in HMOs and stated that all programs and services should be tied directly to these goals, if HMOs were to be effective advocates of health education. These goals were: "(1) promoting appropriate use of services and understanding of plan procedures and operations; (2) encouraging member participation and involvement in advisory, policy making, and other voluntary service roles; (3) improving participation in the clinical process; and (4) helping prevent disease and promote well-being" (p. 295).

In addition, surveys conducted by non-HMO health care insurers have provided more insight into the types of health education and promotion activities offered by HMOs. One of the most comprehensive of these surveys was conducted by the Metropolitan Life Insurance Company in 1980, in which 54% of the HMOs sampled responded. Of these, 89% stated that they offered health education and promotion activities, including programs on obesity, prenatal care, nutrition, breast self-examination, smoking cessation, birth control, exercise, stress management,

accident prevention, and dental care (Metropolitan Life Insurance Company, 1980).

These studies addressed both the theory and the opinions as to what types of health education and health promotion activities should be offered by HMOs.

However, there are many other resources that document the delivery of actual health education and promotion activities. They range from research studies on individual programs, such as Mullen's 1973 study on health education for heart patients in crisis, to multiple programs such as Cordell's 1980 study of health education in the workplace, involving an HMO and one of the largest American automobile manufacturers. Additionally, several large and mature HMOs, such as CIGNA, Kaiser Permanente Medical Care Program, and Group Health Cooperative of Puget Sound, have published studies of their health education and promotion programs. These HMOs have offered health education and promotion activities that include programs on nutrition and weight control, stress management, prenatal care, hypertension, smoking cessation, and diabetes (Center for Health Promotion, 1982).

In a few cases, these health education and promotion activities have been focused on a specific chronic disease, such as diabetes. Two of the larger HMOs, CIGNA Healthplans and Kaiser Permanente, with a combined membership of over 10 million people, offer educational programs, counseling, and interventions (Geffner, 1992; Stelling, 1993) for their diabetic members. At both of these HMOs, members who are identified as diabetics are usually referred immediately by their primary care physician to a health/patient educator and/or a nutritionist. Each organization offers

to their members one-on-one instruction and counseling as well as classes. Members also have unlimited access at little or no additional costs to meet with health/patient educators to learn more about their illness and what they can do to control it. The objective is to involve diabetic members as early as possible in taking an active role in controlling their diabetes. Geffner (1992) asserted that members who attend diabetic education programs or who meet with a health/ patient educator or a nutritionist are less likely to be hospitalized and undergo fewer outpatient procedures which "may lead to fewer long-term complications, improved health status, and a better quality of life" (p. 47).

Once members have been identified as diabetic by their primary care physician, they are usually scheduled to meet with a patient/health educator or a registered dietitian. Depending on the type and stage of diabetes, members may receive instruction concerning medication needs and techniques, urine testing, foot care, or nutritional requirements. Both CIGNA and Kaiser Permanente attempt to follow-up with these members during subsequent office visit or through phone calls after the initial contact. This is done to ensure that members both understand and follow the recommendations of their physician as well as those of the health/patient educator and nutritionist.

Kaiser Permanente, in several of its regions throughout the United States, has begun to study the impact of diabetes education on their diabetic members. One region that conducted a survey of their diabetic members concluded that "members



who had an experience with an educator had more positive responses on blood sugar monitoring, checking feet, following a meal plan, exercising, and had less hypoglycemic problems" (Stelling, 1993, p.1).

As noted earlier, the underlying mission for HMOs to be cost effective providers of quality health care relies on their ability to keep membership healthy. One of the most proactive ways HMOs have been able to contribute to their members' health has been through health education programs and related activities. From diabetes counseling to smoking cessation, HMOs are presently providing a variety of educational services for their members. However, the question still to be answered is how those services impact cost effectiveness. If an HMO can minimize the utilization of secondary and tertiary services (e.g., emergency room and hospitalizations) by its members, then that mission can be achieved.

#### Utilization of Medical Services and Diabetic Education Activities

Diabetes affects approximately 1 out of 20 Americans (Wood, 1989), and if left unchecked and uncontrolled, it can also be an extremely debilitating disease. As such, diabetes is associated with extremely high rate of utilization of more costly hospital services. As Malone (1989) stated "in 1980, direct hospital costs for diabetic care exceeded \$200 million. In 1987, direct and indirect costs of diabetes exceeded \$20.4 billion a year" (p. 520). There is also the very real possibility of utilization rates going even higher because the American population

is living longer and needing more frequent medical intervention. This aging population will probably benefit from new technology, new drugs, and new treatment protocols, all of which may continue to be very expensive (Geffner, 1992).

Given that utilization of hospital and other acute care services by diabetics is frequent and costly, many studies over the last 20 years have shown that well-planned diabetes education interventions can make the difference in the utilization of those services. This not only helps reduce overall health costs but also helps contribute to an improved health status for the diabetic (Stelling, 1993). For example, one study (Malone, 1989) on preventing foot amputation due to complications from diabetes concluded that education made a dramatic difference in the incidence of hospitalization and major surgery; the "only significant distinguishing feature was a one hour education course" (p. 522). The study demonstrated a 67% reduction in the incidence of amputation in education and no education sub-groups, which would put the direct dollar savings at between \$411 and \$551 annually.

If the above assumption on the relationship between educational interventions and the subsequent utilization of certain, more costly medical services is valid, there should be fewer hospital readmissions and significantly fewer emergency room visits for diabetic patients who participate in diabetes education program. Jacobson, O'Rourke, and Wold (1983) reported that diabetic patients who attended a 15 hour class on self-care had an overall decrease in hospital admissions and a decrease in average length of stay by one day. Likewise, Runyan's study (1975) reported a

decrease in hospital days by patients who received nutritional and counseling services. Davidson, Alogna, Goldsmith, and Borden's 1981 study, which involved over 8,000 diabetics in a comprehensive education and treatment program, reported not only a decrease in hospital days but also a reduction in oral medication, improved blood glucose ratings, and fewer surgical procedures.

### Summary

HMOs have become a viable force in the delivery of quality health care over the last 70 years. More importantly, especially in consideration of President Clinton's recent initiatives on managed health care, HMOs are becoming recognized as viable options in controlling health care costs. Part of that quality and cost control is linked to the HMO's ability to provide health education and promotion activities to their members, again on the premise that healthy members have less need to access and utilize the more costly medical services. For HMOs with a large membership with chronic diseases, such as diabetes, this link is even more significant because of the duration and potential acuity of the disease.

## CHAPTER III

### METHODOLOGY

This chapter presents the methodology used in this nonparametric study. The setting, the population, the sample, the procedures used in selecting the sample, the procedures used for collecting the data, and the statistical tests used to treat the data are explained.

#### Setting

This study was conducted in the medical offices of a HMO located in Dallas and Tarrant counties in north central Texas. The HMO has a membership of approximately 123,000, an employee base of 1,100, 9 medical offices, and 1 regional administrative office. Permission to conduct this study at this HMO was obtained in writing prior to data collection (see Appendices A and B).

Each of the medical offices offers comprehensive out-patient services, including laboratory tests, x-rays, pharmacy scripts, and health education services, in addition to diagnostic examinations and treatments by physicians and/or other health care professionals (e.g. physician assistants, nurse practitioners, optometrists). Members usually identify one of these offices as their "home" facility and can access any or all of the above services, if needed, during any visit to the

medical office.

Members are provided with an orientation to the facility and the services offered in the facility. During their initial visit to the facility, most members choose one physician as their primary care doctor. Members are encouraged by the HMO to establish this relationship fairly soon after they join the HMO. It is usually the primary care physician who is the first contact in identifying a member with a chronic illness or condition.

Each time a member visits the facility, an entry is made into the member's file, recording the date, time, purpose of the visit, any examination or treatment, medications, and referrals to a health/patient educator or to a physician specialist, if needed. This visit record is a data-entry process that documents the utilization of medical services by members, including those members with diabetes.

### Population and Sample

The population in this study is composed of the 123,000 members belonging to the HMO from January 1, 1992 through December 31, 1992. The population includes adult and pediatric males and females. The sample was comprised of the 2,515 individuals who were diabetic. The members in the sample population were confirmed as diabetics by their HMO physicians, with their condition recorded on their official medical records. The sample included males and females, ranging in age from newborn to 80+ years. Identification of the sample population was by

computer analysis of their medical records and visit record numbers. The personal identity of the members was not requested and was not accessible to the researcher at any time during the study.

### Procedures

The initial procedure in this study involved sorting the large population of the HMO membership in order to identify the sample population of diabetics. This was accomplished by reviewing member visit record data. The visit record identifies reasons for the members visit to the HMO, diagnoses, treatment, medications, and other pertinent information, such as chronic illnesses including diabetes. Doing so generated a sample population of 2,515 individuals who were confirmed diabetics.

Next, the researcher cross-referenced the members of the sample with patient education referrals which were recorded on each member's visit record. This process provided the two groups examined in this study, the diabetic members who had contact with health/patient educators and those who had no contact with such educators.

Finally, the researcher examined the utilization of certain costly medical services by each of these groups. This was accomplished by cross-referencing utilization and visit record data. For the purpose of this study, the designation as a diabetic member discharged from hospital care was used as the indicator of the use of costly medical care.

### Instrumentation

Permission was requested and obtained (see Appendices A and B) to use data available from the HMO's records on utilization of certain costly medical services, including hospitalization. These data included information needed for a demographic analysis of the sample by gender and age, historical information on the meetings with health/patient educators, and finally, the frequency of hospitalizations.

### Treatment of the Data

The data collected were examined to document and correlate the utilization of costly medical services to health education efforts by the diabetic member population. Several tables were developed to provide an analysis of this information. The first table identifies by age and gender the number of diabetic members as part of the total HMO membership. The second table provides a comparison on the utilization of out-patient services by the sample and general populations. Although out-patient medical services are not considered costly, this data was included in the study because it is in the out-patient setting that all members, diabetic and non-diabetic, usually meet with the health/patient educators. The third table examines the utilization of the most costly medical service, in-patient hospitalization, by the sample population. The fourth table provides a comparison on the frequency of in-patient hospitalization by the diabetic sample population who had contact/no contact with health/patient educators.

Finally, Chi square analysis at a significance level of .05 was used to

determine the goodness of fit and to test the null hypothesis. Four more tables were developed to display the relationships between in-patient hospitalization and education, when controlled for age and gender in the sample population.



## CHAPTER IV

### ANALYSIS OF DATA

The purpose of the study was to assess how health education activities impacted the utilization of costly medical services by diabetic members in an HMO and any subsequent cost savings that might result. Consequently, data were collected first on the participation by members in diabetes education activities and second on the utilization of the most costly of medical services, hospitalization. This chapter presents an analysis of the data provided to the researcher by HMO X.

#### Description of the Sample

The sample in this study consisted of 2,515 diabetic members, including adult and pediatric males and females, belonging to the HMO from January 1, 1992 through December 31, 1992. This sample was part (2.05%) of a total population in HMO X of 122,995 members. From the data provided in Table 1: in the sample population the gender breakdown was 52.52% male and 47.48% female; the age breakdown was 98.17% over age 19 and 83.69% over age 40. Also from the data provided in Table 1: in the total population the gender breakdown was 47.28% male and 52.92% female with the age breakdown was 68.29% over age 19 and 67.59% over age 40.

Table 1

HMO Membership: Total Population and Sample by Age and Gender

Age	Total population		Diabetic sample	
	Male	Female	Male	Female
<01	854	778	1	1
01-09	9,498	8,979	6	0
10-19	9,698	9,191	25	13
20-29	7,932	6,625	34	57
30-39	11,663	13,780	127	146
40-49	8,837	10,505	324	324
50-59	5,334	5,841	246	328
60-69	3,046	3,448	314	227
70-79	1,151	1,336	133	81
80 +	130	214	11	17
Totals:	58,153	64,842	1,321	1,194
	122,995		2,515	

### Findings

Based on the data in Table 1, Chi square tests for the goodness-of-fit of the sample to the total population were calculated independently for both age and gender. With reference to age, the obtained Chi square = 2,454.2,  $df = 17$ , exceeded the expected value (27.59) at the 0.05 level. The age distribution of the sample differed significantly from that of the population. This is most apparent at the 0-19 age level, where the sample has few members. As for gender, the obtained Chi square = 27.53,  $df = 1$  (corrected for continuity) also exceeded the expected value (3.84), indicating the gender distribution of the sample was statistically significantly different from that of the population. The sample had 6% more males than the total population and had 6% fewer females than the total population.

In Table 2, a comparison of the utilization by the sample and the total population of out-patient visits per member per year is provided. Analysis of the data using mean frequency indicated that the diabetic members utilized out-patient services two to three times more often than the non-diabetic members (2.8% for males and 2.3% for females in the sample population).

In Table 3, a subset of the sample population ( $n = 599$ ) is displayed according to the members' contact with a health/patient educator and the frequency of hospitalization. Based on the information in this table, diabetic members who had contact with a health/patient educator were hospitalized less often (14.39%) than the diabetic members who had no contact with a health/patient educator (29.42%).

Table 2

Out-patient Visits for Total Population and Sample by Age and Gender Per Member  
Per Year

Age	<u>Mean frequency of visits per member per year</u>			
	<u>Total population</u>		<u>Diabetic sample</u>	
	Male	Female	Male	Female
<01	15.1	14.1	7.0	18.0
01-09	4.2	6.1	9.0	0.0
10-19	2.2	3.2	7.7	9.6
20-29	2.1	5.5	7.1	14.1
30-39	2.7	5.4	8.2	13.9
40-49	3.3	4.9	8.9	10.8
50-59	4.2	5.3	10.0	10.5
60-69	6.1	6.6	10.7	12.5
70-79	9.1	8.1	12.9	13.5
80 +	18.8	10.5	22.4	10.5
Mean frequency	3.5	5.0	9.8	11.7

Table 3

Hospitalization Rates of Sample By Contact/No Contact with Educator

Contact with educator	Total members in sample	Members in sample hospitalized	Hospitalization rates
Contact	938	135	14.39%
No contact	1,577	464	29.42%
Total	2,515	599	23.81%

Tables 4 through 8 represent the Chi square analyses of the sample population of members who were hospitalized for diabetes-related illnesses during the period January 1 - December 31, 1992. As discussed earlier, hospitalization data were used as an indicator of a significant and costly medical service. The hospitalized subset of the sample ( $n = 599$ ) was also analyzed using Chi square tests of significance as related to age and gender.

In Table 4, the sample population ( $n = 2,515$ ) is displayed according to contact with a health/patient educator and frequency of hospitalization. As the table indicates, 938 members of the sample population (37.29%) were in contact with a health/patient educator. Out of the 938 members, 135 were subsequently hospitalized. Next, 1,577 members of the sample (72.71%) had no contact with a health/patient

educator. Of the 1,577 members, 464 were subsequently hospitalized, over three times the hospitalization rate of the members who had contact with a health/patient educator. The obtained Chi square of 72.39, with  $df = 1$  (corrected for continuity), was significant at the 0.05 level ( $X^2 = 3.84$ ). The calculation of the correlation coefficient yielded a  $\phi' = 0.16$ , indicating a fairly weak degree of association between the variables. The results indicated that the rate at which members who were in contact with a health/patient educator and who were hospitalized was less than expected, whereas those who had no contact with a health/patient educator were hospitalized at a higher than expected rate.

In Table 5, the members of the sample population who were hospitalized during the calendar year of this study ( $n=599$ ) are displayed according to their contact with a health/patient educator and their age. As the table indicates, the majority of the sample who were hospitalized (76.79%) were  $\geq 40$  years old. The obtained Chi square of 10.82, with  $df = 1$  (corrected for continuity), was significant at the 0.05 level ( $X^2 = 3.84$ ). The calculation for the correlation coefficient yielded a  $\phi' = 0.13$ , indicating a fairly weak degree of association between the variables. The results indicated that for members who were hospitalized, those who were young ( $\leq 39$  years old) were more likely to have had contact with a health/patient educator. Conversely, those who were older ( $\geq 40$  years old) and who had no contact with a health/patient educator were represented at a higher than expected rate.

Table 4

Hospitalization Frequency of Sample by Contact/No Contact with Educator

Contact with educator	Hospitalization	No hospitalization	Total
Contact	135 (223.4) *	803 (714.6)	938
No contact	464 (375.6)	1,113 (1201.4)	1,577
Total	599	1,916	2,515

\*Note: The numbers in parenthesis here and in subsequent tables represent expected frequency.

Table 5

Hospitalization Frequency of Sample by Age and Contact/No Contact with Educator

Contact with educator	$\leq$ Age 39	$\geq$ Age 40	Total
Contact	46 (31.3)	89 (103.7)	135
No contact	93 (107.7)	371 (356.3)	464
Total	139	460	599

In Table 6, members of the sample population who were hospitalized during the calendar year of this study ( $n = 599$ ) are displayed according to their contact with a health/patient educator and their gender. Males represented a majority of those hospitalized (50.75%). The obtained Chi square of 3.097, with  $df = 1$  (corrected for continuity), was not significant at the 0.05 level ( $X^2 = 3.84$ ).

Table 6

Hospitalization Frequency of Sample by Gender and Contact/No Contact with Educator

Contact with educator	Males	Females	Total
Contact	59 (68.5)	76 (66.5)	135
No contact	245 (235.5)	219 (228.5)	464
Total	304	295	599

In Table 7, the male members of the sample population who were hospitalized during the calendar year of this study ( $n = 304$ ) are displayed according to their



contact with a health/patient educator and their age. As the table indicates, the majority (88.81%) of these males were  $\geq 40$  and the majority (80.59%) had no contact with an health/patient educator. The obtained Chi square of 1.167, with  $df = 1$  (corrected for continuity), was not significant at the 0.05 level ( $X^2 = 3.84$ ).

Table 7

Hospitalization Frequency of Males in Sample by Age and Contact/No Contact with Educator

Contact with educator	Males $\leq 39$	Males $\geq 40$	Total
Contact	9 (6.6)	50 (52.4)	59
No contact	25 (27.4)	220 (217.6)	245
Total	34	270	304

In Table 8, the female members of the sample population who were hospitalized during the calendar year of this study ( $n=295$ ) are displayed according to their contact with a health/patient educator and their age. As was true with the male

group in Table 7, the majority (64.40%) of these females were  $\geq 40$  and the majority (74.23%) had no contact with an health/patient educator. The obtained Chi square of 6.826, with  $df = 1$  (corrected for continuity), was significant at the 0.05 level ( $X^2 = 3.84$ ). The calculation of the correlation coefficient yielded a  $\phi' = 0.15$ , indicating a fairly weak degree of association between the variables. The results indicated that for females who were hospitalized, those who were young ( $\leq 39$  years old) were more likely to have had contact with a health/patient educator. Conversely, those who were older ( $\geq 40$  years old) and who had no contact with a health/patient educator were represented at a higher than expected rate.

Table 8

Hospitalization Frequency of Females in Sample by Age and Contact/No Contact with Educator

Contact with educator	Females $\leq 39$	Females $\geq 40$	Total
Contact	37 (27.1)	39 (48.9)	76
No contact	68 (77.9)	151 (141.1)	219
Total	105	190	295

### Discussion of Findings

The null hypothesis, that participation in diabetes education activities does not impact the frequency of hospitalization, was tested initially, as was the participation rates of hospitalized members in diabetes education activities by gender and by age. Using Chi square tests of independence, the data in Tables 4 - 8 were analyzed at a significance level at the 0.05 level ( $X^2 \geq 3.84$ ,  $df = 1$ ).

1. To test the null hypothesis in regards to overall relationship between the frequency of hospitalization and participation in diabetes education activities by the sample, a Chi square was calculated, as displayed in Table 4. The results ( $X^2 = 72.39$ ,  $df = 1$ ) indicated that the hospitalization frequency of the sample population exhibited a significant difference when compared to participation rates in diabetes education activities. Within the sample, those members who had contact with an educator were hospitalized at a lower than expected rate, while those who had no contact were hospitalized at a significantly higher rate. Although the correlation coefficient indicated a weak association ( $\phi' = .16$ ) between education and hospitalization, the null hypothesis was rejected.

2. To test the null hypothesis in regards to the age of the sample, a Chi square was calculated, as displayed in Table 5. With the sample divided into younger ( $\leq 39$ ) and older ( $\geq 40$ ) segments, a significant difference was found ( $X^2 = 10.82$ ,  $df = 1$ ) in the hospitalized population by age, with the older members who had no contact with an educator being overly represented in the sample. Although the

correlation coefficient indicated the association to be a weak one ( $\phi' = 0.13$ ), the null hypothesis was rejected.

3. To test the null hypothesis in regards to the gender of the sample, a Chi square was calculated for the male and female subsets of those hospitalized, with regard to their participation rates in diabetes education activities. As displayed in Table 6, the result ( $X^2 = 3.097$ ,  $df = 1$ ) revealed no significant difference by gender within the sample. The null hypothesis was not rejected.

4. To test the null hypothesis in regards to gender and age, Chi squares were calculated, as displayed from the data in Tables 7 - 8. Additionally, the male and female subsets were analyzed using the same age guidelines as used in Table 5. In the case of younger and older males, as displayed in Table 7, no significant difference was found in participation rates among males by age ( $X^2 = 1.167$ ,  $df = 1$ ); consequently, the null hypothesis was not rejected. However, the same results cannot be stated for the subset of female members who were hospitalized. As Table 8 indicates, the participation rates for younger and older females were found to be significantly different ( $X^2 = 6.826$ ,  $df = 1$ ), with more older females having no contact with an educator being represented at a rate higher than would be expected. Again, although the correlation coefficient indicated this was a weak association ( $\phi' = 0.15$ ), the null hypothesis was rejected.

## CHAPTER V

### SUMMARY OF THE STUDY

This chapter presents a summary of the study, a discussion of the findings, conclusions from those findings, and finally, recommendations for future studies.

#### Summary

With national attention on health care reform and on the delivery and costs of quality care and services, it will become more and more essential for HMOs and other managed health care organizations to focus their efforts on keeping their members healthy. One of the means of accomplishing this may be to use the preventative model of health care which contains a proactive health education component. However, at this time, the relationship between proactive health education and the control of costly medical care in HMOs is untested.

Consequently, this descriptive, casual-comparison study was undertaken to examine that relationship. Because of the scope of health education activities and the range of medical services offered by HMO X, the study focused on a specific population in the HMO, diabetic members, and their utilization of diabetic education activities and a specific costly medical service, hospitalization.

The sample population of 2,515 was composed of the diabetic members of HMO X, with medical clinics and administrative offices in the Dallas/Ft. Worth metroplex. The data on the sample population used in this study were taken from existing records provided by HMO X, and as such, included demographic information on the age and gender of the sample population, the verification of referral to health/patient educators, the verification of contact with health/patient educators, and the utilization frequency of hospitalization. Although other medical services, including out-patient and emergency room visits by the sample population were reviewed, for the purpose of this study, data on hospitalization were used exclusively because hospitalization is the most costly medical service. Finally, non-parametric analyses of the data using Chi square were conducted to determine the significance, if any, of the relationship between participation by members of the sample population in diabetic education activities and the frequency of hospitalization.

### Discussion

The results of this study support the rejection of the null hypothesis, that the frequency of hospitalization when controlled for age and gender is impacted when HMO members participate in HMO-sponsored diabetes education activities. However, the results should be interpreted as implications rather than conclusive statements. The discussion on the following pages examines these implications.

Again, the results of this study essentially implied a relationship between reduced rates of hospitalization for members in the sample population who participated in health education activities. Consequently, the first area to be examined was the direct relationship between participation and hospitalization. Although HMO X did not provide specific information regarding the admitting diagnoses of the diabetic members who were hospitalized or specific information on the type of health education activities members participated in, a significant difference was still found in hospitalization rates for those members who had some type of contact with a health/patient educator. The assumption can be made that these members practiced self-management and self-care of their diabetes and related complications. Assumptions similar to this have been tested and supported many times in other clinical settings, with the relationship between participation in diabetes-related health education activities and lower rates of hospitalizations remaining very strong.

However, an examination of the specific reasons for participation in diabetes-related health education activities and hospitalization trends might have provided more insight into the relationship. Issues such as the quality and content of the education activities, the scheduling and frequency of classes and meetings, the availability of the health/patient educator, or the expertise and credibility of the health/patient educator may have had considerable influence on participation. Issues such as the current impetus to hospitalize less, either for cost containment reasons or to control

unnecessary hospitalizations may also have had considerable influence on hospitalization rates.

The second area to be examined in this study was the relationship between hospitalization and participation in health education activities, when controlled for age of the diabetic member. A significant difference was also found in a lower hospitalization rate for those members older than 40 (both males and females) who participated in diabetes-related health education activities. Again, this study did not examine the reasons as to why older members participated more in diabetes-related health education activities; however, the reasons may be related to the socio-economic profile of the individuals in those age groups. Generally, each group's characteristics tend to be markedly different from the other. In general, individuals in the over 40 age group tend to be more mature, more settled, more literate, more cautious about their health problems, and have more time and money to seek care for those health problems than their younger counterparts.

The third area to be examined in this study was the relationship between hospitalization and participation in health education activities, when controlled for gender of the diabetic member. While the findings of the study supported the assertion that there was no significant difference in participation rates between male and female members, there was a significant difference when the female subset was examined independently. More specifically, females in general were hospitalized more than males in the sample population, and of those females, those who had no



female differed from the male subset, one possible issue, related solely to gender, may have had considerable impact: pregnant female diabetics are at greater risk because of their disease and its life threatening complications.

A fourth area, although not examined extensively in this study, that may indirectly support the relationship between hospitalization and participation in health education activities is the high utilization of out-patient services by the sample population. The assumption, as supported from data in Table 2, is that individuals with chronic diseases like diabetes will utilize less costly, out-patient medical services more frequently than individuals without chronic diseases. This is relevant in that it is during the out-patient visit that the HMO has an opportunity to educate members on self-care and management of their chronic disease. Since the out-patient visit is one of the least expensive medical services, it is to the benefit of the HMO to have more frequent contact with the diabetic member in this setting than in other settings such as the emergency room or in-patient hospital care.

### Conclusions

The following null hypothesis was tested at the .05 level of significance and was rejected:

Participation by members in HMO-sponsored diabetes education activities does not impact the frequency of hospitalization when controlled for age and gender.

The results from this study imply that there is a relationship between health education activities and the reduction of costly medical services associated with the treatment of chronic diseases. The findings of this study are encouraging to those who believe that HMOs can reduce and control the costs of health care, especially the more costly medical services, for their members with a chronic illness like diabetes, if a proactive, preventative self-care education component is included as part of treatment protocols and follow-up. It should be noted, however, the possibility of selection bias may represent the greatest threat to the validity of the relationship within this study. That is, members who participated in diabetic education activities may be different as a group from the members who chose not to participate; they may be more inclined toward self-help, and consequently, more prone to self-management of their own health care.

Finally, the findings of this study may be somewhat discouraging to those who believe that participation in health education activities is widely supported, especially by individuals with chronic diseases. The fact remains, that for whatever reasons, 62.7% of the sample population had no contact with a health/patient educator. What are the costs of the "no contacts" to the HMO? What are the costs to the diabetic members? One of the realities of a chronic disease such as diabetes, when left uncontrolled and without sufficient self-management, is an earlier death. When examined from this perspective, participation in health education activities could make a difference.

### Recommendations

The following are recommendations for future research based on this study:

1. Repeat the study, controlling for specific types of diabetes education activities and including a survey instrument given to diabetic members to gather data on other variables that might impact their utilization of costly medical services.
2. Repeat the study, tracking the causes and costs of hospitalizations.
3. Repeat the study, expanding the definition of costly medical services to include member visits to the emergency room and urgent care centers.
4. Replicate the study with a stratified random sample and with a control group and an experimental group assigned to meet with health/patient educators.
5. Replicate the study for another chronic disease, such as asthma, which also involves utilization of the more costly medical services and/or has greater frequency in the HMO population.

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## REFERENCES

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## APPENDICES

**Appendix A**  
**Letter to Agency**



November 15, 1993

HMO X  
Attn.:  
Title  
Address  
Dallas, Texas 75XXX

Dear Mr. :

I am a graduate student in the master's program in Health Studies at Texas Woman's University. I am beginning to collect information relevant to my thesis, which is focused on validating the relationship between members who attend diabetes education activities sponsored through your HMO and those members subsequent use of medical services. Consequently, I am requesting permission from [HMO X] for me to review existing data to determine the validity of this relationship.

I strongly believe that [HMO X] would find the results of this study of value in assessing the cost effectiveness of the health education and promotion activities and the utilization of medical services.

I have attached for your review an "agency permission" form. Please complete this form according to the terms you wish me to follow in collecting data from your members. I have also attached a pre-addressed, stamped envelope for you to return the form to me. I would appreciate receiving your response by December 6, 1993.

Thank you for your assistance. I look forward to working on this project with [HMO X]. Please contact me if you have any questions or concerns.

Yours truly,



Deborah Burke  
9730 Kilarney  
Dallas, Texas 75218  
(214) 328 - 0767

## **Appendix B**

### **Agency Permission For Conducting Study**

TEXAS WOMAN'S UNIVERSITY  
COLLEGE OF HEALTH SCIENCES, DEPARTMENT OF HEALTH STUDIES

AGENCY PERMISSION FOR CONDUCTING STUDY

THE HMO X

GRANTS TO Deborah Burke

a student enrolled in the master's program in Health Studies at Texas Woman's, the privilege of its facilities/data in order to study the following problem:

In the health maintenance organization (HMO) setting, is there a relationship between members who participate in diabetes education activities and the subsequent use of medical services?

The conditions mutually agreed upon are as follows:

1. The agency (may) (may not) be identified in the final report.
2. The names of consultive or administrative personnel in the agency (may) (may not) be identified in the final report.
3. The agency (wants) (does not want) a conference with the student when the report is completed.
4. Other \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

12/6/93  
Date

[Signature]  
Signature of Agency Personnel

Deborah Burke  
Signature of Student

Susan Ward  
Signature of Thesis Committee Chair