

# The Effectiveness of Nurse Clinicians' Service Delivery

BEVERLY C. FLYNN, MS, PhD

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*The effectiveness of nurse clinicians was compared with that of physicians with regard to health status of the patients, time spent with the health provider, and time spent in the clinic.*

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## Introduction

The practices in the delivery of health services are being reorganized to permit a variety of personnel to provide elements of care usually provided by select groups of professionals after years of education and experience. These practices are in response to problems of the critical shortage and maldistribution of health manpower which face our country today. As training programs evolve to prepare professionals for an extended role in the delivery of health services, increasing consideration is being given to the evaluation of the effectiveness of these professionals' service delivery.

The research presented in this paper pertains to the evaluation of one such training program, a nurse clinician program. This program was a 1-year demonstration project which developed out of the needs of a county hospital's medicine clinic at a midwestern medical center\* in 1970. The program was sponsored by the school of medicine, school of nursing, and a research organization, the institute. There were three broad goals identified for the program. These goals were related to preparing nurse clinicians,

improving the quality of patient care, and utilizing all health personnel effectively. These broad goals were originally intended to have an impact on the medicine clinic. Although objectives for the nurse clinicians' knowledge, skills, and attitudes were written by the program director prior to the enrollment of the trainees, these objectives were flexible due to the evolving nature of this demonstration project. In essence, the program prepared four registered nurses for an extended role in internal medicine. The curriculum combined didactic teaching with the physician preceptor relationship in several patient care settings. These settings were the county hospital's medicine clinic, the neighborhood health center, and three private group practices. The evaluation of the nurse clinician program was planned as an integral part of the program.

Early in the program's development the investigator set out to identify the major aspects of the program to be researched by reviewing the broad goals for the program, the objectives for the nurse clinicians, and the literature. Most of the research documented in the literature was carried out after training on the practicing professionals' extended roles rather than on aspects of training programs. In spite of these research deficiencies, the investigations focused on the effectiveness<sup>1-4</sup> and acceptance<sup>5-8</sup> of the extended role practitioners.

The investigator identified four major aspects of the program to be researched. These areas were a description of the nurse clinician program, the effectiveness of the program in terms of the knowledge and skills attained and the attitudes held by the nurse clinicians, the effectiveness of the nurse clinicians' service delivery, and the acceptance of the nurse clinicians. In the evaluation of the program, the investigator was interested in delineating a general

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Dr. Flynn is Assistant Professor, Indiana University School of Nursing and School of Medicine, Department of Community Health Sciences, Indianapolis, Indiana. This research was completed, in part, for a PhD in Social Welfare, University of Wisconsin, Madison, Wisconsin, July, 1972, under the supervision of Professor Martin B. Loeb. Address requests for reprints to Dr. Flynn at Indiana University, School of Medicine, Department of Community Health Sciences, 960 Locke Street, Indianapolis, Indiana 46202.

\*Actual names of individuals, organizations, and places have been omitted in order to maintain anonymity of persons involved in this investigation.

approach to examining these major aspects as well as effective measurement devices to be utilized. The research that is presented in this paper incorporates the major area of the effectiveness of the nurse clinicians' service delivery.

The literature review pointed out that there were three research areas relevant to the effectiveness of the nurse clinicians' service delivery. The first area was the health status of patients.<sup>3,9,10</sup> The second area was the quantity of health services delivered patients,<sup>10</sup> and the third was the efficiency with which health services are delivered.<sup>3,4,11</sup>

The investigator was able to identify three hypotheses related to the effectiveness of the nurse clinicians' service delivery. These hypotheses were: (1) there will be no difference in the health status of the experimental and control patients; (2) the experimental patients will spend more time with the health care provider than the controls; and (3) the experimental patients will spend less time in the medicine clinic than the controls.

## *Methodology*

### **Selection and Description of the Samples**

Several samples were selected for this investigation. Patients, who were referred to the nurse clinicians through the medicine clinic at the county hospital, were randomly assigned to either experimental or control groups. Two-thirds of the first 60 patients referred were placed in the experimental group and were cared for by the nurse clinicians. The remaining 20 patients were returned to the physicians for their care and comprised the control group. The patient population groups were similar to each other, being comprised of persons who were elderly, female, nonwhite, separated from their spouse, educated at the eighth grade level or lower, and receiving some form of public assistance for their medical care.

Another group of patients was utilized for comparison with the nurse clinicians. This group consisted of all patients seen by physicians, not including the attending physicians in their work with nurse clinicians, at the county hospital's medicine clinic during April 5-9, 1971, and May 3-7, 1971.

### **Methods Used to Collect the Data**

A variety of measurement techniques were utilized in the evaluation of the effectiveness of the nurse clinicians' service delivery. A patient interview was developed to assess patient health knowledge and behavior, or health status, as perceived by the patient. The evaluator utilized questionnaires developed by Schwartz et al.<sup>12</sup> and Lewis<sup>3</sup> in preparing the interview. The interview was pretested in two ways. First, the instrument was shared with each of the three attending physicians, who supervised the nurse clinicians' work with patients, to obtain a measure of consensual validity. Then, the instrument was pretested by

the investigator on five patients, selected at random, in the medicine clinic. It should be noted these patients were not in the samples studied in relation to the nurse clinician program. From this pretesting, the instrument was assumed to have face validity and reliability. Control and experimental patients were interviewed at the time of a return visit appointment to the medicine clinic, at least 6 months after the nurse clinicians started their work with patients, during the months of May, June, July, or August, 1971. The investigator conferred with the nurse clinicians and the physicians caring for the controls, at the time of the patients' interviews, to check their medical record notations. Patients' diagnoses and problems and the activities, diet, and medications ordered for patients were checked. This process was thought to increase the reliability of data collected.

Hospital record review was utilized to measure the quantity of health services received by the control and experimental patients. To systematically collect the data, a patient summary sheet was developed to document the nurse clinicians' and physicians' services to patients. Both the director of the nurse clinician program and the nurse clinicians were helpful in the development of the instrument. Each of the nurse clinicians and the evaluator pretested the instrument, utilizing patients' hospital records, to provide a measure of the instrument's reliability. At the end of the training program, the nurse clinicians completed a patient summary sheet for each of the 40 patients assigned to the experimental group. The investigator completed the 20 control patient summary sheets utilizing the patients' hospital records. To promote observer and instrument reliability the investigator rechecked all the patient summary sheets utilizing the hospital records.

Efficiency of the nurse clinicians' service delivery was measured by time and motion studies, which had been conducted routinely in the county hospital's medicine clinic since October, 1970. Time and motion studies were originally designed by a consulting firm.<sup>13</sup> In order to measure the timing and flow of patients in the clinic, printing time clocks were installed at strategic locations throughout the outpatient department. Times were recorded in the medicine clinic when the patient entered the clinic, when the patient entered the examining room, when the physician picked up the patient's chart to begin his work with the patient, when the physician finished with the patient's chart to complete his work with the patient, and when the patient left the clinic. Each patient had a card attached to his chart which was stamped by the health personnel at each location. All health personnel were trained in the importance of recording the appropriate times for each patient. The utilization of this method of data collection with the nurse clinicians was a simple matter. During the last 3 months of the program, the nurse clinicians' patients also had times recorded as they passed through these locations. Comparisons of the various time categories were made with the physicians' patients and the nurse clinicians' patients.

**TABLE 1—Patients' Knowledge of Their Special Exercise or Activities**

	Nurse Clinician Patients (n = 38)	Control Patients (n = 19)	Chi Square
	%	%	
Knowledge of Special Exercise			
Yes	52.6	15.8	7.143 with 1 df*
No	47.4	84.2	
Response to Special Exercise			
Correct	84.2	84.2	Not valid
Incorrect	15.8	15.8	
Knowledge of What Special Exercise Includes			
Not applicable	44.7	84.2	Not valid
Knowledge	47.4	10.6	
No knowledge	7.9	5.3	

\*Significant ( $p < 0.01$ ).

## *The Effectiveness of the Nurse Clinicians*

### Health Status of Medicine Clinic Patients

The results of the patient interviews delineated similarities and differences between the experimental and control patient groups on a variety of indicators relevant to patient health status. These indicators were measures of: patients' knowledge of their disease, effects of their illness on activities of daily living, patients' knowledge of their special exercises or activities; patients' nutritional behavior, patients' special diet behaviors and knowledge, patients' medication-taking behavior and knowledge, and patients' use of other medical care.

The results of the patient interviews did not support the hypothesis that there would be no difference in the health status of the experimental and control patients in the medicine clinic. It should be noted that there frequently were insufficient data to yield an accurate chi square statistic. As a result, some of the data were compared by percentages. There were two indicators of patient health status that were found to have statistically significant relationships. The first indicator was patients' knowledge of their special exercises or activities and Table 1 presents these findings.

There were significantly more of the nurse clinicians' patients than the controls who responded that they were to do special exercises or activities. The majority of both groups, 84 per cent, answered the question about doing special exercises correctly. Even though special activities were not ordered for 84 per cent of the control group, it was interesting to note that there were no essential differences, less than 8 per cent of each group, who lacked knowledge of what the special exercises included. Almost 50 per cent of the nurse clinician patients were found

knowledgeable of what their special exercises included. These findings suggested that the nurse clinicians focused more of their teaching and counseling on patient activities and exercises than the physicians who provided care to the control group.

The second indicator of patient health status which had a statistically significant relationship was patients' use of other medical care. Table 2 presents these findings. These results indicated that there were significantly more of the nurse clinicians' patients using other medical care than the controls ( $p < 0.05$ ). The places where patients received other medical care were specialty clinics, private eye doctors, neighborhood health centers, and hospitals. All nine of the clinics mentioned by patients were located at county hospital and were part of the same outpatient department clinic system as the medicine clinic. All hospitalizations occurred at county hospital. These findings showed that medical care delivered in the outpatient clinics at county hospital was quite specialized, in that patients received care from such a wide array of clinics and were still seen regularly at the medicine clinic.

Other indicators did not yield statistically significant relationships but demonstrated some differences in the health status characteristics of the two groups. Eighty-two per cent of the nurse clinicians' patients compared to 68 per cent of the controls were knowledgeable of the complications of their disease. There were some differences between the two patient groups in adhering to a nutritionally balanced diet, or the basic four food groups. Fifty-three per cent of the experimental patients compared to 32 per cent of the controls had milk-deficient diets. In addition, 18 per cent of the experimental patients compared to 32 per cent of the controls had bread-deficient diets. Both patient groups together showed the greatest deficiencies in the milk, vegetable, and fruit food groups,

**TABLE 2—Patients' Use of Other Medical Care**

	Nurse Clinician Patients (n = 38)	Control Patients (n = 19)	Chi Square
	%	%	
No	26.3	52.6	3.851 with 1 df*
Yes	73.7	47.4	

\*Significant ( $p < 0.05$ ).

which were found comparable to other studies of similar populations.<sup>14,15</sup> It was also found that 90 per cent of the nurse clinicians' patients compared to 68 per cent of the controls reported having been ordered a special diet. There was a greater proportion of the experimental patients (84 per cent) taking medications correctly than the controls (63 per cent). Of the medication errors noted, slightly more of the experimental patients took medications that were not ordered, and the control patients tended to omit medications that were ordered and took their medications at the wrong time. It was also found that 24 per cent of the experimental patients compared to 11 per cent of the controls were hospitalized during the time of the study.

It should be clarified that there were no statistical differences between the two patient groups in demographic characteristics and the three diagnoses (hypertension, diabetes, and organic heart disease) which were delineated in the criteria for patient referral to the nurse clinicians. The investigator concluded that there were differences in the health status of the two patient populations and these differences were thought to be related to differences in the care provided patients. An examination of the findings from the hospital record review, which will be discussed next, provided additional insights into these deficiencies.

#### The Quantity of Health Services Delivered Medicine Clinic Patients

An analysis of the data collected by hospital record review provided evidence of significant differences in several indicators of the quantity of health services delivered the two patient groups. The first indicator was the types of laboratory studies ordered for the two patient groups. Table 3 presents these results.

The nurse clinicians ordered significantly more electrocardiogram studies, bacteriology studies, urinalysis studies, and minor X-rays than the physicians caring for the controls ( $p < 0.02$ ). One could speculate that the nurse clinicians were insecure in their new role and depended on external laboratory studies to assist them in decision-making related to patient care. Lewis, in his study of nurse clinics, found that nurses ordered routine laboratory tests 3 times more frequently than the physicians.<sup>16</sup> He commented that these tests were not ordered by insecure nurses who lacked clinical judgment, but these studies were part of comprehensive care.<sup>17</sup> However, these findings raised issues on the necessity of subjecting patients to these

procedures, costs in terms of the patients' time, and costs in terms of fees for medical care. These issues must be weighed against the actual benefit to patients, as a result of performing laboratory studies.

The second indicator was the therapeutic diets ordered for patients. These results are presented in Table 4. These findings provided an additional insight into one of the findings from the patient interviews. This was that a greater proportion of the nurse clinician patients were aware that they were to eat a special diet. These results showed that there was a relationship between what the nurse clinicians ordered patients and patient awareness of these orders.

The third indicator was special activities or exercises ordered for patients. These data may be found in Table 5. Significantly more of the nurse clinician patients, than the controls, were ordered to increase their activities ( $p < 0.01$ ). In addition, there were 18 per cent more of the nurse clinician patients than the controls who were ordered to decrease their activities. These results were also documented in the findings from the patient interviews, that experimental patients were significantly more aware they were ordered special activities or exercises than the controls.

Other indicators did not yield statistically significant relationships but demonstrated some differences in the quantity of health services provided the two patient groups. An analysis of the number of patient visits to the medicine clinic indicated that the nurse clinicians saw their patients at much more frequent intervals during the time of the study. Of the controls, 63 per cent were seen by the physician only one or two times, whereas 68 per cent of the experimental group were seen between five and 10 times by the nurse clinician in the medicine clinic. It was speculated that the nurse clinicians had more time than the physicians to see patients so they scheduled more frequent appointments for their patients. In addition, the nurse clinicians might have been insecure in their new role and depended on frequent patient contact to assure themselves that they were providing appropriate patient care.

An analysis of medications ordered patients demonstrated little difference between the two groups in terms of types of medications ordered. On closer examination of the proportion of patients in each group ordered various types of medications, some differences were observed. The nurse clinicians' patients had been ordered more of all but two types of medications. These findings also supported those found with the patient interviews, that a greater proportion of nurse clinicians' patients took more medications per day than the controls.

In addition to these indicators, there were indicators of health service quantity for the experimental patients that were not available for the controls. These were: home visits were made by the nurse clinicians on three-quarters of their patients and patient referrals were made by the nurse clinicians to 16 community agencies.

In comparing the results of patients' health status with the quantity of health services, it was speculated that the differences in health status were a result of differences in the care provided patients. It was concluded that the nurse

**TABLE 3—Types of Laboratory Studies Ordered for Patients**

Types of Laboratory Studies	Nurse Clinician Patients (n = 40)	Control Patients (n = 19)	Chi Square
	%	%	
Electrocardiogram			
Not ordered	45.0	84.2	6.584 with 1 df, significant ( $p < 0.02$ )
Ordered	55.0	15.8	
Bacteriology			
Not ordered	32.5	89.5	14.528 with 1 df, significant ( $p < 0.001$ )
Ordered	67.5	10.5	
Urinalysis			
Not ordered	25.0	73.7	10.715 with 1 df, significant ( $p < 0.01$ )
Ordered	75.0	26.3	
Hematology			
Not ordered	7.5	52.6	Not valid
Ordered	92.5	47.4	
Minor X-rays (does not require preparation)			
Not ordered	45.0	89.5	8.796 with 1 df, significant ( $p < 0.01$ )
Ordered	55.0	10.5	
Major X-rays (requires preparation)			
Not ordered	92.5	100.0	Not valid
Ordered	7.5	0.0	
Cytology			
Not ordered	77.5	100.0	Not valid
Ordered	22.5	0.0	
Skin tests			
Not ordered	90.0	100.0	Not valid
Ordered	10.0	0.0	
Tonometry			
Not ordered	95.0	100.0	Not valid
Ordered	5.0	0.0	
Sigmoidoscopy			
Not ordered	95.0	100.0	Not valid
Ordered	5.0	0.0	
Pulmonary function			
Not ordered	100.0	94.7	Not valid
Ordered	0.0	5.3	

clinicians provided a greater quantity of health services to their patients than the physicians caring for the controls.

#### Efficiency of Health Service Delivery in the Medicine Clinic

Analysis of the time costs to patients, as a result of the nurse clinicians' delivery of care, was accomplished through

time and motion studies. The results of these studies indicated several differences in patient flow in the medicine clinic and are presented in Figure 1.

The physicians' patients waited approximately 72 min compared to 34 min for the nurse clinicians' patients before they entered an examining room. Once patients entered the examining room there was only a short wait before the

**TABLE 4—Therapeutic Diets Ordered for Patients**

Diet	Nurse Clinician Patients (n = 40)	Control Patients (n = 19)	Chi Square
	%	%	
Diabetic			
Not ordered	65.0	63.2	0.019 with 1 df, not significant
Ordered	35.0	36.8	
Low salt			
Not ordered	35.0	63.2	4.144 with 1 df, significant ( $p < 0.05$ )
Ordered	65.0	36.8	
Restricted calories			
Not ordered	70.0	68.4	0.015 with 1 df, not significant
Ordered	30.0	31.6	
Bland			
Not ordered	95.0	100.0	Not valid
Ordered	5.0	0.0	
Other			
Not ordered	97.5	100.0	Not valid
Ordered	2.5	0.0	

**TABLE 5—Special Activities or Exercises Ordered for Patients**

Activities	Nurse Clinician Patients (n = 40)	Control Patients (n = 19)	Chi Square
	%	%	
Increase			
Not ordered	55.0	94.7	9.316 with 1 df, significant ( $p < 0.01$ )
Ordered	45.0	5.3	
Decrease			
Not ordered	82.5	100.0	Not valid
Ordered	17.5	0.0	
Other			
Not ordered	90.0	78.9	Not valid
Ordered	10.0	21.1	

nurse clinician or physician began care. After care was initiated, the nurse clinician spent almost 1 hr in patient care activities compared to physicians, who spent about 40 min in these activities. There appeared to be little difference in the time patients spent waiting before they left the clinic. The two patient populations waited about 30 min before they left the clinic.

Two time periods in these studies are misleading, the time spent waiting before entering an examining room and the time spent with the health care provider. It should be noted that the nurse clinicians scheduled appointments at specified times with patients, whereas the physicians'

patients all came to the clinic at the same time, at the beginning of the session. Due to this scheduling, it was not surprising that the nurse clinicians' patients waited less time than physicians' patients.

The finding that the nurse clinicians spent more time with patients compared to physicians could be related to the assumption that the physicians were more skillful in providing care and, therefore, took less time. It should also be noted that the physicians had a larger caseload of patients to care for during the clinic sessions so they might have felt the pressure of time to complete all patient care before the clinic session ended. It was also speculated that the nurse clinicians spent more time with patients due to their focus on teaching and counseling patients in relation to their health problems. The nurse clinicians' patients were found to have more knowledge about the complications of their diseases, more awareness that they were to eat special diets, and more correct behavior in taking their medications than the control patients.

These data provided support for two of the hypotheses which were delineated, that the experimental patients would spend more time with the health care provider than the controls and that the experimental patients would spend less time in the medicine clinic than the controls. However, because the work for the nurse clinicians and physicians was not similar, these results are misleading.

These findings also had other implications. Although it could be stated that since the experimental patients had more contacts with the health care provider and spent less time in the clinic than the controls, the overall costs to patients in terms of time differed by patient group. In other words, these data suggested that costs to the nurse clinicians' patients were much more economical than to the controls. However, other services provided patients by the nurse clinicians implied increased costs to the experimental patients as they experienced more frequent clinic visits, more laboratory studies, and home visitations by the nurse clinicians.

### Summary and Conclusions

The research that is presented in this paper focused on the effectiveness of the nurse clinicians' service delivery. The general approach and evaluative measures utilized in examining these areas should be applicable in the study of the effectiveness of other health care providers. The investigator found patient interviews effective in obtaining information of patients' perceived health status. The patient questionnaire or similar patient interviews should be administered to patients in other studies to obtain information about their knowledge and behavior relevant to service delivery. Record review was found somewhat difficult as there was lack of standardization in recorded data. Patient records need to be revised and standardized so that data collection relevant to patient indicators are reliable. The efficiency with which services are delivered should be studied in other training programs. However, comparisons with other health care providers should be

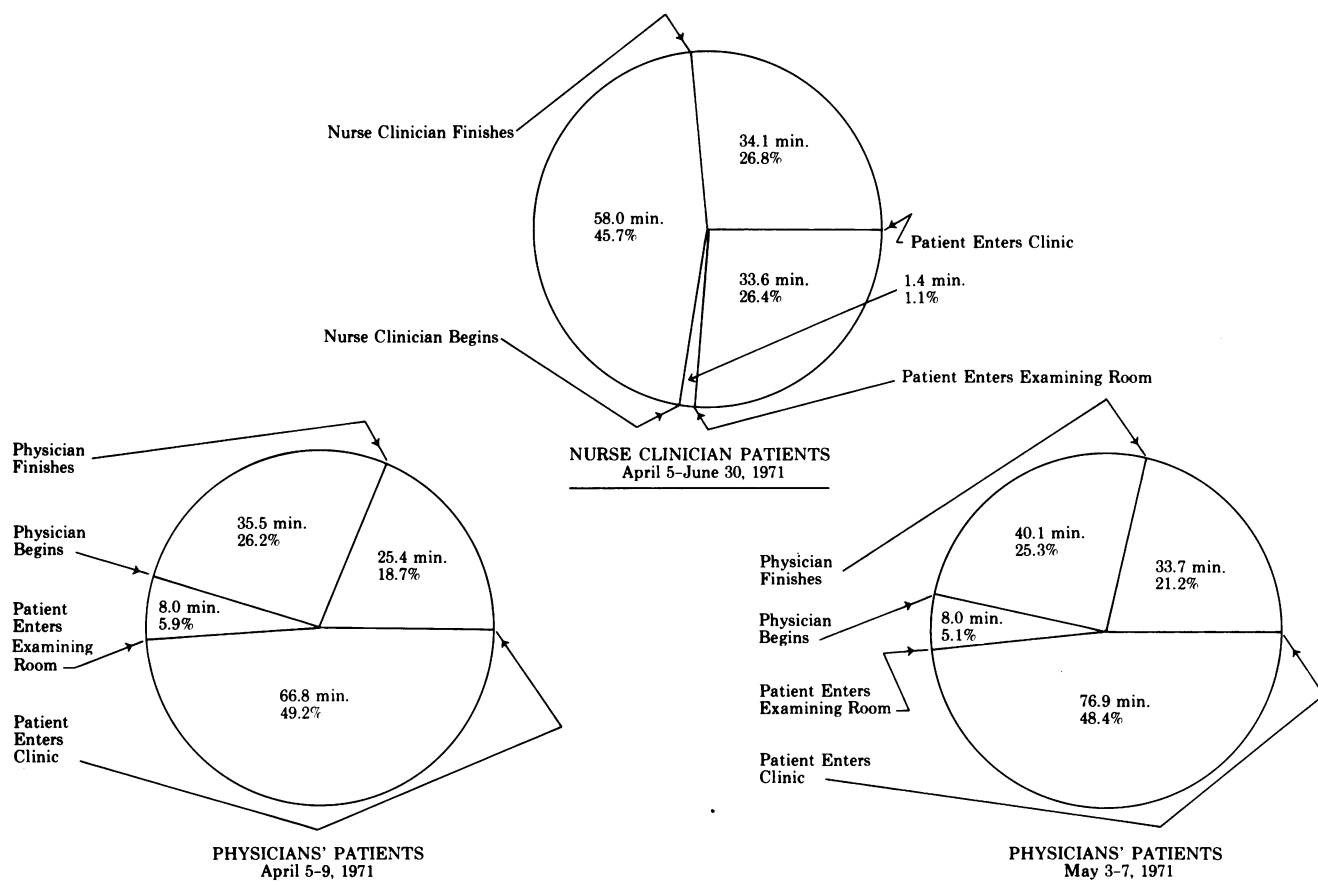


FIGURE 1 Time and motion studies in the medicine clinic.

based on similar work circumstances. Cost analysis of service delivery, which was not researched in this investigation, should be employed in other studies of the effectiveness of health care providers.

The findings relevant to the effectiveness of the nurse clinicians' service delivery did not support the hypothesis that there would be no difference in the health status of the experimental and control patients. It was found that significantly more of the patients cared for by the nurse clinicians than the controls reported that they had been told to follow special exercises or activities and reported utilizing other medical care.

Several indicators provided evidence of significant differences in the quantity of health services delivered the two patient groups. The nurse clinicians ordered significantly more laboratory studies for their patients than physicians caring for the controls. In addition, the nurse clinicians ordered significantly more low salt diets and increased activities or exercises for their patients. Other indicators were not statistically significant but demonstrated an increased quantity of health services for the nurse clinicians' patients. These were: the experimental patients had more frequent clinic visits, they were ordered more of all but two types of medications, and they were visited in their homes by the nurse clinicians.

Since patients were randomly assigned to control and experimental groups and there were no statistical

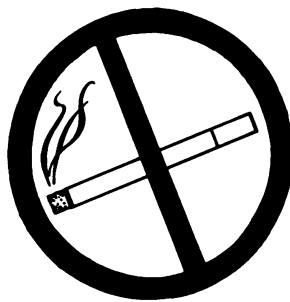
differences in demographic characteristics or the three diagnoses delineated in the criteria for patient referral to the nurse clinicians, it was speculated that the differences in health status were a result of differences in the care provided patients. It was also concluded that the nurse clinicians provided a greater quantity of health services to their patients than physicians caring for the controls.

Time and motion studies provided misleading support to the hypotheses that the experimental patients would spend more time with the health care provider and less time in the clinic than the controls. Other services provided patients by the nurse clinicians implied increased costs to these patients, or decreased efficiency of health service delivery.

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## HOW I STOPPED SMOKING . . .

*(Excerpts from letters received by the APHA Smoking and Health Project from former smokers.)*

### COLD TURKEY

"I started smoking at the age of 18—I am now 55 years of age. I smoked cigarettes almost exclusively, increasing from an occasional pack . . . to a chain-smoking drudgery which rarely amounted to less than two and a half packs a day.

"I was concerned about the health effects of smoking but never felt that any of it pertained to me. About 10 years ago I began to be envious of people who didn't smoke—particularly those who had stopped. I made many unsuccessful attempts to quit, but I didn't really get serious about it until I was challenged by a high school student who respected me for my stands on environmental issues, etc., and who asked me, 'How can you expect young people to respect your leadership in health matters when they see you slowly destroying yourself with smoking?' After that, my conscience began to bother me, but the attempts to quit were still futile.

"I came to the APHA Annual Meeting in San Francisco in 1966. I thought I would try something new, since trying to stop in the ordinary milieu of life wasn't working. When I got on the train in Omaha, I threw my cigarettes away—cold turkey. I haven't had a smoke of any kind since.

"No formula—no program—just cold turkey. APHA in San Francisco in 1973 was my seventh anniversary of having kicked the habit."

*Donald E. Olson, MPH  
Chief, Division of Environmental Health  
Omaha-Douglas County Health Dept.  
Omaha, NE 68105*