AD-A070 923 ACADEMY OF HEALTH SCIENCES (ARMY) FORT SAM HOUSTON TX--ETC F/G 6/5
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Report HCSD #79-001-D

A COMPARATIVE EVALUATION OF THE TRADITIONAL VERSUS A SYSTEMS APPROACH FOR HYPERTENSIVE PATIENT EDUCATION

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August 1977

Final Report

Prepared for:

UNITED STATES ARMY HEALTH SERVICES COMMAND (HSPA-A)
Fort Sam Houston, Texas 78234

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER (14) HCSD-[redacted]79-001-D	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) (6) A COMPARATIVE EVALUATION OF THE TRADITIONAL VERSUS A SYSTEMS APPROACH FOR HYPERTENSIVE PATIENT EDUCATION.		5. TYPE OF REPORT & PERIOD COVERED (9) Final Report. Sep 74-Dec 77 [redacted] 1977
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) (10) Deloros H. Kucha, Ph.D., LTC, ANC, USA		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Health Care Studies Division (HSA-CHC) Academy of Health Sciences, US Army Fort Sam Houston, Texas 78234		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS (12) 178p.
11. CONTROLLING OFFICE NAME AND ADDRESS Commander, US Army Health Services Command ATTN: HSPA-A Fort Sam Houston, Texas 78234 (11)		12. REPORT DATE August 1977
		13. NUMBER OF PAGES 180
14. MONITORING AGENCY NAME & ADDRESS *(if different from Controlling Office)*		15. SECURITY CLASS. *(of this report)* Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*
Approved for Public Release; Distribution Unlimited

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*
Active Army; Medical; Education; Survey; Patient Education; Instructional Systems Design

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*
The purpose of the investigation was to evaluate the traditional method (physician, nurse) versus a systems approach method of providing health education. The objectives were: to identify cost-effective and feasible ways of delivering patient education; to guarantee an important resource for the professional in fulfilling his/her patient education responsibilities with economy and efficiency; to help minimize the medical workload; to assure medical accountability in the patient education area; to improve medical management; to decrease patient recidivism; to enhance patient satisfaction; to assist the patient consumer to

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408 688

19. and External Scale; Nelson-Denny Form A Reading Test; Patients' Opinion Toward the System Approach; Six month assessment; Cost Analysis.

20. be an effective self-care agent. The sample consisted of 502 diagnosed adult essential hypertensive patients derived from the active duty, retired, and dependent population of two outpatient clinics. A two-group experimental design was used. Personal characteristics, measures of comprehension and retention, measures of compliance behavior, locus of control, and reading level were the main categories of patient variables. Major conclusions were that all of the data indicated a need for a more effective, efficient, cost-effective method of providing patient education than now exists in the AMEDD health care delivery system. More specifically, this study demonstrated and effectiveness of the systems approach methodology in the areas of comprehension, retention, behavioral compliance, and cost-effectiveness.

SUMMARY

1. INTRODUCTION.

This is the report of the major phase of the research project: PACOMED--Patient and Community Health Education--which began in September 1974 and was terminated in December 1977. While education for the hypertensive patient was only one of eight conditions for which learning packages were developed, hypertension was the only one chosen for comparative evaluation.

Hypertension was selected because of its prevalence as the major health challenge in America today, with large numbers of the military population suffering from it, and a corresponding amount of medical resources directed toward detection, treatment, education, and follow-up of this chronic condition. Since prevention and control can be strongly affected by behavioral modification, the importance of proper patient education cannot be overemphasized.

2. PURPOSE.

The purpose of this investigation was to evaluate the traditional method (physician or nurse) versus a systems approach method of providing health education, to include engineering the educational environment, the use of a non-professional paramedic as health education, the development of validated health education information.

3. OBJECTIVES.

The overall objectives of the investigation, as stated in the original PACOMED protocol, were:

a. To identify cost-effective and feasible ways of delivering patient education.

b. To guarantee an important resource for the professional in fulfilling his patient education responsibilities with economy and efficiency.

c. To help minimize the medical workload.

d. To assure medical accountability in the patient education area.

e. To improve medical management.

f. To decrease patient recidivism.

g. To enhance patient satisfaction.

h. To assist the patient consumer to be an effective self-care agent.

4. METHODOLOGY.

a. The USAMEDDAC, Fort Belvoir, Virginia, was selected as the test site. In September 1974, the developmental phase of the study was begun and by July 1975 it was completed. This study was conducted from October 1975 until March 1977.

b. A pilot study using thirty diagnosed adult hypertensive patients was conducted for four months to validate the prototype systems approach strategies, materials, evaluation tools, and feasibility of data collection methods.

c. For the definitive study, the clinical setting was the Internal Medicine Outpatient Clinic at Andrew Rader, US Army Health Clinic, Fort Myer, Virginia, for the control, and the Internal Medicine Outpatient Clinic at DeWitt Army Hospital, Fort Belvoir, Virginia, for the experimental group. Each was staffed with physicians and nurse clinicians and each had a caseload of approximately 250 hypertensives a month among their patients, mostly returnees for prescription refill, blood pressure readings, patient education, etc.

(1) The sample consisted of 502 diagnosed adult essential hypertensive patients derived from the active duty, retired, and dependent population of the two outpatient clinics. The T (Traditional), or control group, had 250 and the SA (Systems Approach) group had 252.

(2) A two-group experimental design was used. The T group received the traditional health teaching (doctor or nurse to patient on a one-to-one basis). The SA group received their health teaching by viewing a validated instructional program via a video cassette administered by a non-professional paramedic in the patient learning center. Patients were placed in a control or experimental group, but were not told of the existence of two groups. All agreed to participate.

d. Patient measurements.

(1) Personal characteristics, measures of knowledge, measures of compliance behavior, locus of control, and reading level were the main categories of patient variables. The initial interviews were based on structured and multiple choice questionnaires and included data on demographic and socioeconomic characteristics, historical features of the patient's hypertension, education provided in reference to length of time as a hypertensive, identity of health care provider, and instructions provided by a physician or nurse clinician. Patients completed a multiple choice questionnaire (pre-test) based on specific learning objectives for desired achievement in the areas of knowledge of their disease, low sodium diet objectives, and medications objectives.

(2) After the educational intervention, the patients completed another multiple choice questionnaire (post-test) of parallel design to determine the extent of comprehension of the learning objectives after

completing the learning experience. A post-test only was given to 50 patients from each group in order to check for sensitization of the subjects by use of the pre-test.

(3) Six months later the same test was administered to determine retention. Also, tests for behavioral compliance, locus of control (Rotter I/E), and reading level (Nelson-Denny, Form A, Reading Test), were given at six months.

(4) The experimental (SA) group was given the Lickert scale response form to elicit opinions pertaining to the system approach learning process.

5. FINDINGS AND RELATED DISCUSSION.

a. Clinic patient population for the initial encounter. Of the 502 diagnosed adult hypertensive patients who were the initial subjects, all but the 100 who were in a post-test only group (analyzed separately), completed the instructional series; 250, or 62 percent, completed the six month follow-up.

b. Patient comprehension after instruction. The patients who participated in the systems approach scored higher on a criterion test of their comprehension of hypertension information than those who had the traditional mode of instruction. This held true for all of the three-part test (general hypertension information, sodium restricted diet, and medications). Neither group reached the criterion level (80 percent or above) on the pre-tests. On the post-tests, 81 percent of the patients in the SA group reached the criterion level compared with only 8.5 percent in the T group.

c. Findings for the post-test only group. Fifty patients from each group were given the post-test only in order to ascertain whether the "before" measures were sensitizing the subjects to the measurement instruments, causing changes in scores due solely to the effect of retesting. The data distribution showed that the pre-tests were not cueing the patients to any measurable extent.

d. Findings for the six-month retention assessment.

(1) For the 250 patients who completed the six month assessment, there was a marked loss of knowledge in both groups. However, there was a measurable and a statistically significant level of increased retention in the SA group.

(2) Both groups showed some similar improvement in blood pressure.

(3) Neither group showed any improvement in behavior as measured by weight loss.

(4) Patients in both groups demonstrated an increased knowledge of drugs and reported better behavior in regard to adhering to low sodium diet, decrease in coffee consumption, decrease in tension and an increase in physical activity. The SA group did better than the T group in knowledge of drugs, adherence to low sodium diet and decreased coffee drinking.

e. Results of the Rotter's Internal and External Scale (Locus of Control). There were more internally controlled individuals in both groups.

f. The results of the Nelson-Denny reading scale indicated an above 9th grade reading level for 86 percent of the T group tested and 76 percent of the SA group tested.

g. One hundred and eighty of the 202 patients in the experimental group filled out the Lickert scale response form. The patients were extremely receptive of the SA teaching methodology.

h. Cost analysis for program evaluation, a comparison of the traditional and systems approach groups in relation to research and development, investment, and operating costs.

(1) Research and development costs for the traditional method are nil.

(2) For investment costs, no cost for the T method; $11,030 for the SA method, $6,933.00 of which are non-expendable equipment and furnishings which can be used for other learning systems as well.

(3) Operating costs soon recoup the expense of establishing the SA system as is seen below:

		Traditional Approach	Systems Approach
1 patient :	Physician	$ 17.85	$ 6.20
	Nurse	9.45	
10 patients:	Physician	178.50	7.01
	Nurse	94.50	
250 patients:	Physician	4,462.50	175.25
	Nurse	2,362.50	
3,000 patients:	Physician	53,550.00	$2,103.00
	Nurse	$ 28,350.00	

6. CONCLUSIONS.

a. There is a need for a more effective, efficient, and cost-effective method of providing patient education than now exists in the AMEDD health care delivery system.

b. The systems approach to a patient education program was demonstrated to have the following advantages or attributes when compared to the traditional approach.

(1) Better comprehension of the information and concepts presented.

(2) Better retention although both groups had a marked loss after six months.

(3) The patients in both groups reported improved behavior after six months. There was a greater gain in the systems approach group. Neither group showed any improvement in the objective measurement of behavioral change, i.e., weight loss.

(4) The SA system is shown to be more economical of critical professional manpower resources than the traditional system.

c. The traditional system of patient education with the practitioner instructing the patient could be improved. The individual physician and nurse practitioner would be more effective if they were trained in educational techniques and strategies. The traditional system will always be profligate of professional manpower when compared to the SA system but it could be improved so the man hours used were more effective.

d. The Systems Approach methodology described here should not be restricted to patient education programs. It could be used effectively for such things as worker safety and occupational health, preventive medicine, school health education, self-help programs, nutrition, etc.

6. RECOMMENDATIONS.

a. In view of the demonstrated efficiency in the areas of comprehension, retention, behavioral outcomes, and cost-effectiveness of the SA approach compared to the T approach it would appear very desirable to institute this type of patient education program.

b. Consideration should be given to providing intensive in-service or continuing education to physicians and nurses in the area of educational methodology to make the time they spend in patient education more productive.

c. Additional research should be encouraged with the following goals.

(1) To determine requirements for reinforcing education as to quantity and time intervals for maximum retention.

(2) Long term follow-up studies of patients who are adequately educated to determine if there are permanent changes in behavior or life style.

(3) Population studies to determine if adequate patient education can be measured in changing disease patterns, lowering of rates of avoidable sequelae, or lessening of dependence upon medical treatment facilities.

PREFACE

The firm direction for the "accountability" movement seems to center around the very reasonable concern that the health care system find ways to relate dollars to output. The traditional method of assessing total health care cost has been primarily based on the establishment of the relationship between dollars and health care input. Of course, most health care systems can't even provide that cost information except in gross terms. In short, the present need is clearly seen to be a measure of the quality of health care output; and it is in this arena that the new trend toward "accountability" for the taxpayer's dollars must be met if the health care system is to continue as it is known.

There is an increasing realization that technical virtuosity is not necessarily synonymous with effective care. A better balance is needed between therapeutic medicine and health education. And above all accountability should be inherent in the health care delivery system, especially in the area of Consumer Health Education.

It is hoped that this study will send the readers away with thoughts of rethinking and restructuring their patterns of presenting consumer health education, to reassess their use of time spent in consumer health education, and to reappraise their own instructional role, performance, and the cost of that performance.

ACKNOWLEDGEMENTS

A great deal of effort has been expended by many friends and colleagues to ensure the success of this study.

The personnel at DeWitt Army Hospital, Fort Belvoir, Virginia and the U.S. Army Andrew Rader Clinic, Fort Myer, Virginia were unfailingly helpful and cooperative.

Dr. Douglas Tang, Ph.D., Department Chief, Department of Biostatistics, Division of Biometrics and Medical Information Processing, Walter Reed Army Institute of Research, Washington D.C. assisted with the statistical analysis.

I am especially grateful to SFC Benjamin F. Dawson and SP5 Rodney P. Pittam of the PACOMED staff for their consistent superior performance in all stages of the project to include: developing the patient learning center, formative evaluation of the hypertension learning system, the pilot study, program planning, collection and tabulation of data, typing, graphics, proof-reading, and reproduction work.

A special word of praise is due to Dr. Everett C. Rompf, Ph.D., Education Specialist Project Officer, 1st Development Division, Directorate of Training Development, Fort Belvoir, Virginia, Major John A. McAuliffe, M.C., Assistant Chief, Family Practice, DeWitt Army Hospital, Fort Belvoir, Virginia, Colonel William G. Peard, M.C., Commander, U.S. Army MEDDAC, Fort Polk, Louisiana, and Colonels Madeline L. Bluemle, ANC, Assistant Chief, Nursing Research Service, Department of Nursing, Walter Reed Army Medical Center, Washington D.C. and Jessie W. Bynum (ret) ANC for their editing assistance.

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A COMPARATIVE EVALUATION OF THE TRADITIONAL VERSUS A SYSTEMS APPROACH FOR HYPERTENSIVE PATIENT EDUCATION

1. INTRODUCTION.

Hypertension (high blood pressure) is the major health challenge in America today; it is the greatest single cause of death. More than 24 million people in this country have it and what is worse, fewer than half of them know they have it. It affects men, women, and children of every national origin and there are usually no symptoms.[1]

Finding the hypertensives, the millions of unsuspecting people whose health and life expectancy are so vulnerable, is only one part of the challenge. Solely to have the patient know they have high blood pressure solves nothing. Treatment for patients who "feel fine" is the message that must be gotten across to the patient consumers. This can be accomplished only if the patient understands his/her total health problem and actively does his/her part to help.[2]

Recently, overworked health care personnel and administrators of health care facilities have recognized the benefits of patient education in terms of shorter hospital stays, reduced patient bills, better patient compliance with treatment regimens, and few patient readmissions.[3]

The importance of health education in the overall system of health care is well recognized by professionals in the field. Moreover, consumers of health services are becoming increasingly vocal in stating their desires for more knowledge about health concerns. The question is not about the desirability of health education; the problems center around means and methods of disseminating health information and education.[4]

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[1]Galton, Lawrence, The Silent Disease: Hypertension (New York, Crown Publishers, 1973), 1-11.

[2]Woods, James W., High Blood Pressure (Chapel Hill, North Carolina Memorial Hospital Patient Education Center, 1974), 1-9.

[3]Health Education of the Public, A Statement of Public Policy (Lansing, MI, Prepared by State Health Planning Advisory Council and the Office of Health and Medical Affairs, September, 1976), 45-53.

[4]Green, H. G. and Buchan, B. J., "The Clinic Waiting Room: Environment for Health Education Via Television," The Journal of Biocommunication, August, 1976, 3:2, 4-7.

Demands on health workers are such that the number of health educators and others who are professionally qualified to do this work cannot meet the need. It is virtually impossible to give comprehensive patient care to every patient that should have it under the existing modes of health care delivery. There are not even enough physicians and nurse clinicians for all primary care areas; how then can they realistically expand their already overburdened roles to give quality patient education to every consumer that has a need and a right to it? They cannot. If by some fluke of the imagination one would say they could, the cost would be prohibitive. In the past decade the cost of health care has risen over 400 percent. Solutions must be found to give as good or a higher quality of patient care at a lower cost.[5]

a. Purpose.

The purpose of this investigation as the third of a planned series of five studies was to: revalidate a model (Kucha's Original OHIMS Model) based on a systems approach for hypertensive patient education; to include engineering the educational environment, use of a non-professional paramedic as health educator, development of validated health education information (that utilized the instructional systems design method), to evaluate the traditional method (physician or nurse) versus a systems approach method of providing health education, and to provide information to the Health Services Command for use in planning future hypertensive patient education programs to military care eligible beneficiaries.

b. Background.

Health care personnel in clinical settings have not incorporated accountability concepts into their patient education practices. A patient may be diagnosed, treated, and sent home with a minimum of information, at best, on how to manage their illness. Nowhere in the health care system are there specified means of responsibility for patient education to insure that the patient or family member receives the proper information.[6] To further compound this problem, more times than not, the patient education that was done lacked individualization

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[5]Kucha, Deloros H., Two Year Progress Report (Health Care Studies Division, Academy of Health Sciences, FSHTX, November, 1976), 40.

[6]Kucha, Deloros H., "An Evaluation of Traditional and Programmed Instruction to Teach Medical Management to Patients and Their Families," Educational Technology Research, 1971, 50:1-20.

in the instructional strategy.[7] Also, there was no follow-up to insure that learning was achieved by patients and family members.[8] It was evident that a need existed to develop a method of effective health education that was acceptable to the patient consumers and at the same time would not impinge greatly on, but enhance, the ongoing efforts to deliver health care.[9]

In addition, the resources of an increasingly sophisticated and effective educational technology have not been applied to the task of meeting the needs of patient information and management.[10]

The importance of adequate education for the patient cannot be over estimated, nor can the importance of the educational responsibility of the health team be overlooked.

To date, there has been no full-scale application or empirical validation and evaluation of hypertensive health education in the Army's health setting.[11,12,13]

Studies of a different conceptual framework in the civilian sector have been conducted. However, nothing definitive has been published

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[7]Kucha, Deloros H., The Design, Development, and Evaluation of an Empirical Model of an Outpatient Health Information and Management System (Unpublished Doctoral Dissertation, The Catholic University of America, 1973), 16.

[8]Ibid.

[9]Kucha, Deloros H., Systematic Assessment of Consumer Health Education Needs of DeWitt MEDDAC, Fort Belvoir, Virginia (Phase 1, Project: PACOMED, Health Care Studies Division, Academy of Health Sciences, FSHTX, October 1974-March 1975).

[10]Kucha, Deloros H., Guidelines for Implementing An Ambulatory Consumer Health Information System: A Handbook for Health Education (San Antonio, Published under the auspices of the Army-Baylor University Graduate Research Series, 1974), 6-14.

[11]Ibid.

[12]Kennedy, Eunice J., "Managing the Hypertensive Patient: Report of a Study," Military Medicine, November, 1975, 795-796.

[13]Soper, M. R., Knight, C. C., and Morgan, W., "Evaluation of a New Nurse Practitioner Role in a Medical Clinic," Military Medicine, November, 1975, 772-776.

using the tools and techniques of educational technology or the systems approach in the area of hypertensive health education.[14,15,16,17,18]

2. OBJECTIVES.

The overall objectives of the investigation, as stated in the original PACOMED protocol, were:

a. To identify cost-effective and feasible ways of delivering patient education.

b. To guarantee an important resource for the professional in fulfilling his patient education responsibilities with economy and efficiency.

c. To help minimize the medical workload.

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e. To improve medical management.

f. To decrease patient recidivism.

g. To enhance patient satisfaction.

h. To assist the patient consumer to be an effective self-care agent.

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[14]Inui, T. S., Yourtee, E. L., and Williamson, J. W., "Improved Outcomes in Hypertension After Physician Tutorials: A Controlled Trial," Annals of Internal Medicine, 1976, 84: 646-651.

[15]Caldwell, J., et al, "The Dropout Problem in Anti-hypertensive Treatment," Journal of Chronic Diseases, 1970, 22: 579-592.

[16]Bernheimer, E. and Clever, L., Experiences Implementing Patient Education in an Outpatient Clinic (San Francisco, St. Mary's Hospital and Medical Center, Report submitted to California Regional Medical Program for period covering October 1, 1974 - September 30, 1975).

[17]Green, L. W., "Toward Cost-Benefit Evaluations of Health Education: Some Concepts, Methods, and Examples," Health Education Monographs, 1974, 2: 34-64.

[18]Simonds, S. K., Current Issues in Patient Education (New York, Published by American Association of Medical Clinics and Core Communications in Health, 1974).

3. METHODOLOGY.

a. Overview.

(1) While the literature does not conclusively provide a specific framework for the problem investigated in this study in patient education, the definition of technology goes beyond any particular medium or device. In this sense, technology is more than the sum of its parts; it is a systematic way of designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives, based on research in human learning and communication, and employing a combination of human and nonhuman resources to bring about more effective instruction. It was this definition, the process, that was given emphasis throughout the developmental phase of the study. (The basic process of all technologies is the same; it is the systems approach.)[19,20,21]

(2) The U.S. Medical Department Activity, Fort Belvoir, VA, was selected as the test site. A patient learning laboratory was developed in the ambulatory setting adjacent to the Family Practice Clinic in the DeWitt Army Hospital (DAH).

(3) In October 1974 the developmental phase of the study was begun and by July 1975 it was completed. In October 1975, approval for the comparative evaluation, A Sub-Protocol: A Systems Approach for Hypertensive Patient Education, was received from the Ambulatory Division, Health Services Command. The data for the evaluative phase of the study was collected from October 1975 until March 1977.

b. Procedures.

(1) Operational Definitions.

(a) Baseline Data: Behavioral measures taken prior to beginning a new learning experience (i.e., blood pressure reading, weight, etc.).

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[19]Galbraith, J. K., The New Industrial State (Boston, Houghton Miffin Co., 1967), 12-13.

[20]Corrigan, R. E. and Kaufman, R. A., A Systems Approach for Solving Educational Problems: Operations PEP (San Mateo County, CA, Superintendent of Schools, 1967), 35.

[21]Culbertson, J., Designing Education for the Future (New York, Citation Press, 1966), 266.

(b) Behavioral Changes: The amount of change in the direction of desired behavioral outcomes (i.e., takes medication, diets (if indicated) low sodium, etc.)) possessed by patients six months after the termination of a method of teaching.

(c) Comprehension: The amount of hypertension information (general information, sodium restricted diet, medications) possessed by patients immediately after the termination of a method of teaching.

(d) Criterion-Referenced Measures: Measures used to ascertain an individual's status with respect to some criterion, i.e., performance standard. It is because the individual is compared with some established criterion, rather than other individuals, that these measures are described as criterion-referenced.

(e) Educational Technology: The application of science-based or science-derived concepts and techniques in a systematic way to the practical task of education.

(f) Medical Advice: Giving a limited, unstructured explanation or directions using professional knowledge or intuition on some aspect of health care or behavior.

(g) Non-professional Paramedic: A graduate of the 91C20, clinical specialist course, a civilian licensed practical nurse, or a 91 B20 who has had prior clinical experience.

(h) Norm-Referenced Measures: Measures used to ascertain an individual's performance in relationship to the performance of other individuals on the same measuring device.

(i) Patient Health Education: Using structured information with scientific assessment and teaching strategies. Those strategies encompass the cognitive, psychomotor, and affective domains to alter an individual's attitudes and behavior in favor of improved health.

(j) Patient Information: Showing a film, distributing pamphlets, giving classes or counseling patients, etc., about a given health area, service or problem without regard to prespecified terminal objectives in the cognitive, psychomotor or affective domains. The emphasis is on unstructured information without utilization of scientific assessment and teaching strategies.

(k) Post-Test: A set of criterion questions identical to those given on the pre-test, administered to determine the extent of the patient's comprehension of desired information after completing a new learning experience.

(l) Pre-Test: A set of criterion questions directly related to the content of the learning experience administered to

determine the extent of the patient's comprehension of desired information prior to beginning a new learning experience.

(m) Retention: The amount of hypertension information (general information, sodium restricted diet, medications) possessed by patients six months after the termination of a method of teaching.

(n) Systems Approach: A devised and designed regular or special method or plan or methodology or procedure; the organization of hardware, software, and people for cooperative operation to complete a set of tasks for desired purposes. It is denoted as SA in the remainder of this report.

(o) Traditional Health Teaching: Planned sequence of didactic and demonstration instruction with supplemental handouts (with the exact teaching objectives as the systems approach method) given by a physician or nurse clinician. It is denoted as T in the remainder of this report.

(p) Validated Instruction: Instruction that does in fact accomplish that for which it was designed; that causes the learner to demonstrate the performance at the mastery level consistently.

(2) Hypothesis. The following null hypothesis was tested: There will be no difference in the Systems Approach (SA) taught group and the Traditionally (T) taught group in behavioral change, comprehension, retention or cost of instruction.

(3) Pilot Study. A pilot study was conducted for a period of four months to validate the prototype systems approach strategies, materials, evaluation tools, and feasibility of data collection methods. Thirty diagnosed adult hypertensive patients on an outpatient status from DeWitt Army Hospital, Family Practice, were the subjects. The Family Practice Residency Program served as the main resource for coordinating the information needed to develop the patient education learning system and evaluation tools. It was found that due to the small number of family panels and the probability of sensitizing the potential subjects, it would not be possible to use the Family Practice population for the definitive study.

(4) Definitive Study.

(a) Setting.

1 The clinical setting for the study was the Internal Medicine Outpatient Clinic at the Andrew Rader US Army Clinic, Fort Myer, VA, for the control group and the Internal Medicine Outpatient Clinic at DeWitt Army Hospital, Fort Belvoir, VA, for the experimental group. Andrew Rader US Army Clinic internal medicine staff consisted of two physicians and one nurse clinician, with a mean patient case load of 400 patients per month and approximately 220 to 240 hypertensives per month.

2 DeWitt Army Hospital's internal medicine staff consisted of six physicians and two nurse clinicians, with a mean patient caseload of 900 patients per month and approximately 250 to 260 hypertensives per month.

3 Most of the hypertensive patients in both groups were not newly diagnosed but returnees for prescription refills, blood pressure readings, patient education, and follow-up visits.

(b) Sample.

1 Five hundred and two diagnosed adult essential hypertensive patients on an outpatient (Internal Medicine Clinic) basis derived from the active duty, retired military, and dependent population of the DeWitt Army Hospital and the Andrew Rader US Army Health Clinic.

2 The initial breakdown was "walk-in" selection of the two groups; the T group had 250 patients and the SA group had 252 patients. Fifty in each group were in a post-test category.

3 Informed consent was obtained from all patients. Initially there were no refusals to participate in the study.

(c) Design. A two group experimental design was used with assignment of subjects to either a control or an experimental group. The T group received the traditional health teaching. The SA group received their health teaching by viewing a validated instructional program via a video cassette (3/4 inch U-matic format) administered by a non-professional paramedic in a patient learning center.

1 Patient Measurements.

a The main categories of patient variables were: (1) personal characteristics, (2) measures of knowledge, (3) measures of compliance behavior, (4) locus of control, and (5) reading level. After their regular visit to either a physician or nurse clinician, patients were placed in a control or experimental group. They agreed to participate in the research project and were not told of the existence of two groups (traditional and systems approach). The initial interviews of the groups were based on structured and multiple choice questionnaires. Data elicited included demographic characteristics (age, sex, place of residence), socioeconomic characteristics (marital status, type of employment, rank, education), historical features of the patient's hypertension and education provided in reference to length of time as a hypertensive, health care provider, if had prior instruction, time of prior instruction, instructions provided by a physician or nurse clinician.

b In the same interview, additional questions were asked to determine a patient's baseline behavior. Items queried

or measurements obtained included: blood pressure, weight, complies with the laboratory and/or ancillary test, takes medication, knows drugs and action, adheres to low sodium diet, number of cups of coffee per day, number of cigarettes per day, degree of tension experienced, type and frequency of physical activity.

c Additionally, the patients completed a multiple choice questionnaire (pre-test) to determine their knowledge in reference to the following learning objectives (the objectives were identified by a physician consultant as feasible achievements for all patients participating in the study):

GENERAL INFORMATION OBJECTIVES

Upon completion of this program the patient will be able to:

- Define blood pressure
- Define systolic pressure and diastolic pressure
- Define hypertension and give some indication of the range of blood pressure in which it falls
- Define borderline hypertension and indicate the pressure range in which it falls.
- List several diseases hypertension is directly related to
- Explain the implications of high blood pressure
- Tell whether hypertension is controllable with medication
- Tell what the hypertensive patient's attitude toward smoking should be
- Tell what the goal of hypertension treatment is for the patient's health
- Explain why the doctor may require regular visits as part of the patient's treatment
- State what the hypertensive patient can look forward to with his/her disease under control

LOW SODIUM DIET OBJECTIVES

Upon completion of this program the patient will be able to:

- Explain that sodium is a mineral found in salt
- Explain why salt intake should be reduced
- Explain in simple terms the effect of sodium on blood volume
- Explain the function of the kidneys in relationship to blood volume
- List at least two methods that may be used so the patient may eat the same food the family does
- List several foods or spices in which high concentrations of sodium are found.

- Name several foods to avoid because they are heavily salted.
- Select from a sample menu foods that are low in sodium and can be eaten in restaurants and at food counters
- Select sample menus for making lunch to eat at school or work
- Describe the policy to follow on using salt substitutes
- Describe several ways to cover up the lack of sodium in the diet by using spices and herbs
- List several sources of recipes that may be used in preparing a low sodium diet.
- State the average number of sodium grams to eliminate from a simple low sodium diet
- Describe the adjustments that may need to be made if the doctor recommends a specific level of sodium each day

MEDICATIONS OBJECTIVES

Upon completion of this program the patient will be able to:

- Recognize from a complete list of medications, his/her medications and describe their use
- Explain the importance of taking medication as prescribed
- Recognize what rules the patient should follow when on medication
- Explain the importance of and how to fill out a medication record sheet
- Explain the importance of not taking another persons medication
- Explain why medications should not be taken in front of children
- Explain why it is important to tell the physician about the medications the patient is taking that do not need a prescription
- Explain what effect alcoholic beverages can have on some medications
- Tell what to do with medications no longer being used
- Explain allergic reactions that may occur from prescribed medications
- Tell how many days' medication the patient should have on hand prior to having the prescription refilled
- Tell why the patient should take his/her medication at the prescribed time

d After the educational intervention, the patients completed another multiple choice questionnaire (post-test) to determine the extent of the patient's comprehension of the learning objectives after completing the learning experience.

e Six months later the data was collected by individual patient visits and personal interviews. The measurements were: behavioral compliance, retention test (amount of information possessed six months after the termination of a method of teaching), locus of control (Rotter I/E), reading level (Nelson-Denny, Form A, Reading test).

f Following is a chart showing the amount of time spent on each encounter for both groups.

CONTROL GROUP		EXPERIMENTAL GROUP	
Initial Encounter:			
Collect Behavioral Baselines and Pre-Test	20 mins	Collect Behavioral Baselines and Pre-Test	20 mins
Physician or Nurse Clinician Provided Instruction	1 hour	Validated Instructional Mode	1 hour
Post-Test	10 mins	Post-Test	10 mins
Six Month:			
Collect Behavioral Follow-up, Retention Test, Rotter IE Scale, Nelson Denny Reading Test	50 mins	Collect Behavioral Follow-up, Retention Test, Rotter IE Scale, Nelson Denny Reading Test	50 mins
After collection of data, reinforcement by physician or nurse clinician	10 mins	After collection of data, reinforcement by non-professional paramedic	10 mins

g In addition there were 50 patients from each group who only had a post-test. This was done to eliminate any suspicion of sensitizing the subjects ("before" measures may sensitize subjects to the measurement instrument and cause a change in scores due solely to the effect of retesting).

h The experimental subjects were given one additional measurement, a Lickert scale response form reflecting the

patient's opinion pertaining to the Systems Approach learning process. The process evaluation included opinions on the following: viewing time, content interest, questions on topic, pace, content uniqueness, content value, non-professional paramedical health educator's style, learning center, preference for instruction, freedom to learn by audiovisual compared to usual instructions by professional health workers, personal responsibility for learning by audiovisual compared to usual instruction by health workers, patient's attitude toward audiovisual modes for health education, patient's viewing of commercial television in hours.

i The data for both groups were collected by two non-professional paramedics who had the education and preparation to assume the data collection role.

2 The Treatment Variables.

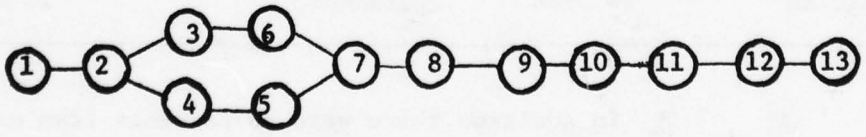
a Traditional Health Teaching. The Traditional Approach consisted of a planned sequence of didactic and demonstration instruction with supplemental handouts (with the exact teaching objectives as the Systems Approach method), given by either a physician or nurse clinician.

b The Systems Approach methodology took the form of a validated instructional program (via a video cassette) administered by a non-professional paramedic in a patient learning center.

(1) The essence of a validated instructional program is validating the learning systems until the patients who use the systems as planned meet the learning objectives.

(2) Instructional design is a logical, step by step, preparation of the instructional strategy, which, when validated, will teach predetermined objectives.

(3) The following is a diagram of the event identification and narration of the systems approach that was used:



1. Topic Selection
2. Meeting with content consultant to ascertain tasks (Task Analysis)
3. Development of behavioral objectives
4. "Real World" search for existing educational software
5. Evaluation of existing educational software
6. Development of criterion measures
7. Design of the instructional system
8. Formative evaluation
9. Data collection
10. Revision
11. Physician evaluation
12. Cost analysis
13. Final staff evaluation

(4) A point was reached when no further improvements were likely. It was then that the instructional package was subjected to the comparative evaluation.

(5) Another facet of the Systems Approach methodology was to utilize a non-professional paramedic to administer the instructional program. This could be accomplished because the validated learning system had accompanying directions and flow charts for their administration (the tasks involved in operating the learning center were minimal and elementary in nature). In addition the non-professional paramedic performed the functions of counselor, records manager, and coordinator. See Appendix F, page 143, Non-Professional Paramedic as Health Educator.

(6) The learning center offered a specialized learning area that probably facilitated the activities for patient learning. See Appendix G, page 155, Physical Facilities.

(7) Use of the learning center as the focus of the instructional effort was based upon a family of assumptions such as would be articulated in a systems approach to learning. These assumptions include the application of technology to learning for achieving instructional efficiency and effectiveness. See Appendix E, page 131, Communications Media.

(d) Reliability and Validity of Evaluation Tools.

1 The pre-post test and retention measures were criterion-referenced rather than norm-referenced measurements. Criterion-referenced tests were devised to make decisions both about individuals and treatments, e.g., instructional programs. In the case of decisions regarding patients a criterion-referenced test was administered which ascertained if a set of instructional objectives were achieved by a replicable instructional sequence. Also, whether the patient mastered the criterion which was considered to be prerequisite to commencing the next sequence of instruction. By administering the criterion-referenced

measure to the patients after they had completed the instructional sequence, a decision could be made regarding the efficacy of the sequence (treatment).

2 It is well known from the study of classified test theory that when the variances of test scores is restricted (criterion-referenced), correlational estimates of reliability and validity will be low. It was clear that the classical approaches to reliability and validity estimation needed to be interpreted more cautiously or discarded in the analysis of the criterion-referenced tests.

3 A correct response analysis was conducted during the developmental stage. (See Strategy for Instructional Systems Design Process and Formative Evaluation and Appendix 1, pp. 1-12.)

4 The commercial Nelson-Denny Reading Test comprehension portion used has a reliability of .81. The Rotter I/E scale has been administered to numerous samples. An internal consistency coefficient (Kuder-Richardson) of .70 was obtained from a sample of 400 college students (Rotter, 1966). The literature did indicate that there were individual differences in perception about one's control over one's destiny and that the Rotter scale was sensitive to these differences.

(e) Analysis of Data. All data were checked, scored, and coded separately by two coders according to the categories established. The data were entered on IBM cards and the cards were verified for accuracy. Data were analyzed by automatic data processing equipment and a variety of statistics were computed.

(f) Cost-Effective Analysis. Cost-effective analysis is often viewed as an alternative to evaluation research, but essentially it is a logical extension of it. In order to affix dollar values to the benefits of a program, first there has to be some evaluative evidence of what kinds and how much benefit there has been. Documentation was obtained for research and development, investment, and operating costs to include personnel, instructional materials, space, and administrative costs.[22]

4. FINDINGS AND RELATED DISCUSSION.

The findings for each of the data collection procedures will be presented followed by the discussion related to the specific finding.

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[22]Weiss, C. H., Evaluation Research: Methods of Assessing Program Effectiveness (Englewood Cliffs, New Jersey, Prentice-Hall, Inc., 1972), 32.

a. Clinic Patient Population for the Initial Encounter.

(1) Findings.

(a) Five hundred and two diagnosed adult hypertensive patients were the initial subjects. All completed the instructional series. One hundred of the 502 subjects were in a post-test only group and were analyzed separately. Of the remaining 402 subjects (200 in one group and 202 in the other group) 250 completed the six month follow-up (124 in the T group and 126 in the SA group) or 62 percent of the test population.

(b) Of the 76 dropouts from the six month follow-up in the SA group, four were deceased, 10 retired and moved to another area, and six had a permanent change of station. The remaining 56 simply didn't want to continue. Reasons ran the gamut from inclement weather conditions, "not interested," "didn't have the time," to "don't call us, we'll call you."

(c) In the T group the dropout reasons were the same. Ten subjects had a permanent change of station and five retired and located in another section of the country. The remaining 51 gave reasons similar to those of the SA group.

(d) Both groups had similar populations (see Table 1, p. 16, Demographic and Socioeconomic Characteristics of Hypertensive Patients in Relation to Method of Instruction: Initial Encounter), with only 3.5 percent of the total population active duty, the smallest proportion. The largest group represented was the dependent wives comprising 61.5 percent of the total population. Next came the retiree population which had the remaining 35 percent. The sex distribution was 61.5 percent female and 38.5 percent male. The majority of the subjects (91 percent) were 40 years old and over. Ninety percent were married. The most common educational levels were high school graduate and 1-3 years of college. Sixty-seven percent were in one or the other of those levels. In the occupation categories 72 percent were unemployed, retired, a housewife, or an administrative worker.

(e) The history (see Table 2, p. 18, Historical Features of Hypertensive Patients Illness and Education Provided: Initial En-Counter), of the illness showed that the time since diagnosis, for 12 percent, was less than three months; 18 percent, one to two years; and 56 percent, more than two years. The health care provider for 46 percent was a physician, and for 54 percent, a nurse clinician. Sixty-eight percent of the population had prior instruction and 32 percent did not. The time of prior instruction was 18 percent, less than three months; 13 percent, four to six months; five percent, seven to 12 months; 22 percent, one to two years; and 42 percent, more than two years. Instructions were provided to 53 percent by a physician and 47 percent by a nurse clinician.

TABLE 1

DEMOGRAPHIC AND SOCIOECONOMIC CHARACTERISTICS OF HYPERTENSIVE PATIENTS IN RELATION TO METHOD OF INSTRUCTION: INITIAL ENCOUNTER

Demographic and Socioeconomic Variables	All Patients (N=402) %	T Group (N=200) %	SA Group (N=202) %
RANK OF MILITARY			
Active Enlisted			
E-1 thru E-6		1	.5
E-7 thru E-9		1	1.5
Active Officer			
Company Grade		.5	.5
Field Grade		0	2
	3.5		
Retired Enlisted			
E-1 thru E-6		2	3.5
E-7 thru E-9		7.5	9
Retired Officer			
Company Grade		4	2
Field Grade		21	21
	35		
RANK OF SPONSORS OF DEPENDENTS			
Active Enlisted			
E-1 thru E-6		1.5	1
E-7 thru E-9		2.5	2
Active Officer			
Company Grade		0	4
Field Grade		5.5	11
Retired Enlisted			
E-1 thru E-6		4.5	2
E-7 thru E-9		16.5	15
Retired Officer			
Company Grade		4	2
Field Grade		28.5	23
	61.5		

TABLE 1 continued

Demographic and Socioeconomic Variables	All Patients (N=402) %	T Group (N=200) %	SA Group (N=202) %
SEX			
Male	38.5	36.5	41
Female	61.5	63.5	59
AGE			
less than 30	1	.5	1
30-39	8	6.5	9
40-49	25	17.5	33
50-59	42	43	42
60-69	20	29.5	11
70 and older	4	3	4
MARITAL STATUS			
Married	90	91.5	89
Widowed	6.5	5.5	7
Single	1.5	1	2
Engaged	0	0	0
Divorced	1	1.5	0
Separated	1	.5	2
EDUCATION COMPLETED			
Elementary (grades 1-6)	2	1.5	2.5
Junior High (grades 7-8)	4	4	3.5
High School (grades 9-12)	38	38.5	37
1-3 Years College	29	30	28
Baccalaureate	18	15.5	21
Master's Degree	8.5	9	8
Doctor's Degree	.5	1.5	0
OCCUPATION			
Unemployed or Retired	12	16.5	10
Housewife	41	40	43.5
Administrative (office work)	19	18.5	19
Technical Specialist (mechanical)	7	4.5	9
Professional (non-medical)	11	13	8
Combat Related (line groups)	1	0	2
Student (full time)	1	.5	1
Blue Collar Work (custodial)	3	2.5	3
Medical Professional (RN,MD,DDS)	2	1	2
Other	3	3.5	2.5

TABLE 2

HISTORICAL FEATURES OF HYPERTENSIVE PATIENTS ILLNESS AND EDUCATION PROVIDED: INITIAL ENCOUNTER

Historical Features	All Patients (N=402) %	T Group (N=200) %	SA Group (N=202) %
TIME SINCE DIAGNOSIS			
Less Than 3 Months	12	4.5	20
4 to 6 Months	8	4.5	10
7 to 12 Months	6	5.5	6
1 to 2 Years	18	22.5	14
More Than 2 Years	56	63	50
HEALTH CARE PROVIDER			
Physician	46	30.5	62
Nurse Clinician	54	69.5	38
HAS HAD PRIOR INSTRUCTION			
Yes	68	84.5	49.5
No	32	15.5	50.5
	(N=269) %	(N=169) %	(N=100) %
TIME OF PRIOR INSTRUCTION			
Less Than 3 Months	18	8	34
4 to 6 Months	13	15.5	9
7 to 12 Months	5	5.5	5
1 to 2 Years	22	21	24
More Than 2 Years	42	50	28
INSTRUCTION PROVIDED BY			
Physician	53	62	35
Nurse Clinician	47	38	65

b. Patient Comprehension for the Initial Encounter.

(1) Findings.

(a) Table 3, p. 20, Percentage of Patients That Achieved the Criterion Level by Type of Instruction for the Initial Encounter, compares the percentage of patients achieving the criterion level by type of instruction for the initial encounter. Typically, when using criterior-referenced tests, interest is in the proportion of subjects who meet a criterion level of performance.[23] The data was reported in increments to provide a better picture of where the scores were falling. Neither group reached the criterion level on the composite pre-test. On the composite post-test, 81 percent of the patients in the SA group reached the criterion level compared to only 8.5 percent in the T group.

(b) The difference in test scores between the groups was statistically significant at the $p < .0001$ level. See Appendix A, p. 99, Technical Tabular and Graphic Data Pertaining to Summary Statistics of Test Scores.

(2) Discussion.

(a) The SA & T groups were demographically comparable except that the T group had a greater representation in the under age 50 (43 percent), than the SA group (24.5 percent).

(b) In the area of history of their hypertension there were some differences. The SA group had a larger proportion of relatively new cases (less than six months, 30 percent) than the T group (less than six months, 9 percent). Also, the T group had 84.5 percent who had received prior instruction while the SA group had 49.5 percent.

(c) The null hypothesis that there would be no difference in the SA & T groups on comprehension is not confirmed. The Systems Approach group showed a significant increase in comprehension.

c. Clinic Patient Population for the Initial Encounter: Post-Test Only Group.

(1) The pre-test measures may sensitize subjects to the measurement instrument and cause a change in scores due solely to the effect of retesting. To guard against this, a group of 100 were not pre-tested, but given either the SA or T instruction and then tested for comprehension.

[23] Popham, J., Evaluation in Education: Current Applications (Berkeley, CA, McCutchan Publishing Corporation, 1974), 240.

TABLE 3

PERCENTAGE OF PATIENTS THAT ACHIEVED THE CRITERION LEVEL BY TYPE OF INSTRUCTION FOR THE INITIAL ENCOUNTER

GROUPS		0–29%	30–49%	50–69%	70–79%	Criterion Level 80–100%
COMPOSITE SCORES						
Pre-Test:	T Group (N=200)	1.5	21	63.5	14	0
	SA Group (N=202)	2	26	61	11	0
Post-Test	T Group	0	9.5	49	33	8.5
	SA Group	1	1	5	12	81
GENERAL INFORMATION						
Pre-Test	T Group	5	14.5	38.5	24	18
	SA Group	0	17	43	23	17
Post-Test	T Group	1	10.5	29.5	27	32
	SA Group	1	3	14	22	60
LOW SODIUM DIET						
Pre-Test	T Group	19.5	49	31	.5	0
	SA Group	17	45	37	1	0
Post-Test	T Group	7	30	53	8	2
	SA Group	0	4	9	14	73
MEDICATIONS						
Pre-Test	T Group	0	9.5	20	32	38.5
	SA Group	2	3	7	33	55
Post-Test	T Group	0	5	17	26	52
	SA Group	1	0	2	4	93

TABLE 4

DEMOGRAPHIC AND SOCIOECONOMIC CHARACTERISTICS OF HYPERTENSIVE PATIENTS IN RELATION TO METHOD OF INSTRUCTION: POST-TEST ONLY

Demographic and Socioeconomic Variables	All Patients (N=100) %	T Group (N=50) %	SA Group (N=50) %
RANK OF MILITARY			
Active Enlisted			
E-1 thru E-6		0	2
E-7 thru E-9		4	0
Active Officer			
Company Grade		0	0
Field Grade		0	4
	5		
Retired Enlisted			
E-1 thru E-6		4	0
E-7 thru E-9		22	10
Retired Officer			
Company Grade		2	0
Field Grade		30	16
	42		
RANK OF SPONSORS OF DEPENDENTS			
Active Enlisted			
E-1 thru E-6		0	2
E-7 thru E-9		0	4
Active Officer			
Company Grade		2	2
Field Grade		0	10
Retired Enlisted			
E-1 thru E-6		2	4
E-7 thru E-9		4	20
Retired Officer			
Company Grade		4	2
Field Grade		26	24
	53		

TABLE 4 continued

Demographic and Socioeconomic Variables	All Patients (N=100) %	T Group (N=50) %	SA Group (N=50) %
SEX			
Male	46	62	30
Female	54	38	70
AGE			
less than 30	3	0	6
30-39	2	0	4
40-49	29	30	28
50-59	40	38	42
60-69	20	20	20
70 and older	6	12	0
MARITAL STATUS			
Married	88	88	88
Widowed	9	10	8
Single	1	0	2
Engaged	0	0	0
Divorced	1	2	0
Separated	1	0	2
EDUCATION COMPLETED			
Elementary (grades 1-6)	1	0	2
Junior High (grades 7-8)	3	0	6
High School (grades 9-12)	35	34	36
1-3 Years College	26	28	24
Baccalaureate	20	26	14
Master's Degree	14	10	18
Doctor's Degree	1	2	0
OCCUPATION			
Unemployed or Retired	13	16	10
Housewife	36	28	44
Administrative (office work)	25	30	20
Technical Specialist (mechanical)	5	6	4
Professional (non-medical)	7	6	8
Combat Related (line groups)	0	0	0
Student (full time)	0	0	0
Blue Collar Work (custodial)	3	4	2
Medical Professional (RN,MD,DDS)	0	0	0
Other	11	10	12

TABLE 5

HISTORICAL FEATURES OF HYPERTENSIVE PATIENTS ILLNESS AND EDUCATION PROVIDED: POST-TEST ONLY

Historical Features	All Patients (N=100) %	T Group (N=50) %	SA Group (N=50) %
TIME SINCE DIAGNOSIS			
Less Than 3 Months	8	0	16
4 to 6 Months	4	2	6
7 to 12 Months	2	2	2
1 to 2 Years	15	20	10
More Than 2 Years	71	76	66
HEALTH CARE PROVIDER			
Physician	30	4	56
Nurse Clinician	70	96	44
HAS HAD PRIOR INSTRUCTION			
Yes	71	90	52
No	29	10	48
	(N=71) %	(N=45) %	(N=26) %
TIME OF PRIOR INSTRUCTION			
Less Than 3 Months	49.2	60	38.4
4 to 6 Months	16.4	28.9	3.9
7 to 12 Months	2	0	3.9
1 to 2 Years	7.9	4.4	11.5
More Than 2 Years	24.5	6.7	42.3
INSTRUCTION PROVIDED BY			
Physician	53	62	35
Nurse Clinician	47	38	65

(2) Table 4, p. 21, Demographic and Socioeconomic Characteristics of Hypertensive Patients in Relation to Method of Instruction: Post-Test Only: and Table 5, p. 23, Historical Features of Hypertensive Patients Illness and Education Provided: Post-Test Only, revealed that for the most part the population category percentages paralleled the main group.

(3) Findings. Table 6, below, Percentage of Patients That Achieved the Criterion Level by Type of Instruction for the Initial Encounter: Post-Test Only Group. The post-test only sample had the following success in reaching criterion level: T group, zero percent, SA group, 68 percent. While both are lower than the "pre-and post-test" sample (T - eight percent, SA 81 percent), the overwhelming preponderance of success of the SA instruction in both samples validates that the significant factor is the difference in instruction, not the "pre-test."

TABLE 6

PERCENTAGE OF PATIENTS THAT ACHIEVED CRITERION LEVEL BY TYPE OF INSTRUCTION FOR THE INITIAL ENCOUNTER: POST-TEST ONLY GROUP

GROUPS	0-29%	30-49%	50-69%	70-79%	80-100%
					Criterion Level
COMPOSITE SCORES					
POST-TEST					
T Group (N=50)	0	16	76	8	0
SA Group (N=50)	0	0	10	22	68

d. Clinic Patient Population for the Initial Encounter and Six Month Assessment.

(1) Findings. See Table 7, p. 25, and Table 8, p. 27. The characteristics of the 250 patients who completed the six month assessment was essentially the same as the original total sample of 402. Both the SA and the T groups were comparable to the original large group in both demographic and disease history characteristics.

TABLE 7

DEMOGRAPHIC AND SOCIOECONOMIC CHARACTERISTICS OF HYPERTENSIVE PATIENTS IN RELATION TO METHOD OF INSTRUCTION FOR THE INITIAL ENCOUNTER AND SIX MONTH ASSESSMENT

Demographic and Socioeconomic Variables	All Patients (N=250) %	T Group (N=124) %	SA Group (N=126) %
RANK OF MILITARY			
Active Enlisted			
E-1 thru E-6		0	0
E-7 thru E-9		1	1
Active Officer			
Company Grade		0	0
Field Grade		0	2
	2		
Retired Enlisted			
E-1 thru E-6		3	2
E-7 thru E-9		7	8
Retired Officer			
Company Grade		4	3
Field Grade		24	24
	37.5		
RANK OF SPONSORS OF DEPENDENTS			
Active Enlisted			
E-1 thru E-6		0	0
E-7 thru E-9		2	1
Active Officer			
Company Grade		3	4
Field Grade		0	9
Retired Enlisted			
E-1 thru E-6		6	2
E-7 thru E-9		14	15
Retired Officer			
Company Grade		6	4
Field Grade		30	25
	60.5		

TABLE 7 continued

Demographic and Socioeconomic Variables	All Patients (N=250) %	T Group (N=124) %	SA Group (N=126) %
SEX			
Male	39.5	39	40
Female	60.5	61	60
AGE			
less than 30	1.5	0	3
30-39	4.5	4	5
40-49	21.5	13	30
50-59	48	50	46
60-69	20.5	29	12
70 and older	4	4	4
MARITAL STATUS			
Married	91	91	91
Widowed	5.5	5	6
Single	1	1	1
Engaged	0	0	0
Divorced	1	2	0
Separated	1.5	1	2
EDUCATION COMPLETED			
Elementary (grades 1-6)	2	2	2
Junior High (grades 7-8)	2.5	3	2
High School (grades 9-12)	34.5	35	34
1-3 Years College	30	30	30
Baccalaureate	20.5	18	23
Master's Degree	9	9	9
Doctor's Degree	1.5	3	0
OCCUPATION			
Unemployed or Retired	12.5	17	8
Housewife	43	39	47
Administrative (office work)	18.5	16	21
Technical Specialist (mechanical)	5.5	3	8
Professional (non-medical)	10.5	15	6
Combat Related (line groups)	.5	0	1
Student (full time)	1.5	1	2
Blue Collar Work (custodial)	2.5	3	2
Medical Professional (RN,MD,DDS)	2	2	2
Other	3.5	4	3

TABLE 8

HISTORICAL FEATURES OF HYPERTENSIVE PATIENTS ILLNESS
AND EDUCATION PROVIDED
FOR THE INITIAL ENCOUNTER AND SIX MONTH ASSESSMENT

Historical Features	All Patients (N=250) %	T Group (N=124) %	SA Group (N=126) %
TIME SINCE DIAGNOSIS			
Less Than 3 Months	12.5	3	22
4 to 6 Months	5.5	2	9
7 to 12 Months	5.5	5	6
1 to 2 Years	17.5	21	14
More Than 2 Years	59	69	49
HEALTH CARE PROVIDER			
Physician	43.5	23	64
Nurse Clinician	56.5	77	36
HAS HAD PRIOR INSTRUCTION			
Yes	69	86	52
No	31	14	48
	(N=173) %	(N=107) %	(N=66) %
TIME OF PRIOR INSTRUCTION			
Less Than 3 Months	22.5	5	39
4 to 6 Months	11.5	13	8
7 to 12 Months	4.5	2	6
1 to 2 Years	19.5	16	20
More Than 2 Years	42	50	27
INSTRUCTION PROVIDED BY			
Physician	52	63	41
Nurse Clinician	48	37	59

(2) Discussion. No relationships for noncompliant behavior could be drawn on the basis of sex, age, educational background, or that the patients with the most complex regimens were the least likely to comply. The literature does indicate that at least 25 percent of the patients never comply no matter what tactics are used.[24,25,26,27,28]

e. Patient Comprehension and Retention For The Initial Encounter and Six Month Assessment.

(1) Findings. See Table 9, p. 29 and Appendix A.

(a) The demographic and disease history of the groups that took the six month assessment were essentially the same as the total SA & T groups from which they came. Statistical comparison of the initial composite examination results (pre-test) showed the SA & T groups to be a common population in this regard.

(b) The "post-test" results were of the same magnitude of difference as in the total sample with the SA group having 87 percent reaching the 80 percent criterion level while only 10 percent of the T group did.

(c) Retention as measured by six month retesting was rather poor in both groups if the 80 percent criterion level is compared

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[24]Sackett, D. L., et al, "Randomised Clinical Trial of Strategies for Improving Medication Compliance in Primary Hypertension," The Lancet, 31 May 1975, 1205-1207.

[25]Tagliacozzo, D. M. and Ina, K., "Knowledge of Illness as a Predictor of Patient Behavior," Journal of Chronic Disease, (Pergamon Press, Printed in Great Britain), 1970, 22:765-775.

[26]Gillum, R. F. and Barsky, A., "Diagnosis and Management of Patient Noncompliance," Journal of American Medical Association, June 17, 1974, 228:1563-1567.

[27]"Noncompliant Patients are Seen as 'Forceful, Opinionated' Persons," US Medicine, March 15, 1977, 13:2,9.

[28]Tagliacozzo, D. M., et al, "Nurse Intervention and Patient Behavior: An Experimental Study," American Journal of Public Health, 1974, 64: 596-603.

TABLE 9

PERCENTAGE OF PATIENTS THAT ACHIEVED THE CRITERION LEVEL
BY TYPE OF INSTRUCTION FOR THE
INITIAL ENCOUNTER AND SIX MONTH ASSESSMENT

GROUPS		0-29%		30-49%		50-69%		70-79%		80-100%	
COMPOSITE SCORES											
Pre-Test:	T Group N=124 %	1		19		69		11		0	
	SA Group N=126 %		1		14		64		18		3
Post-Test:	T Group	0		2		56		32		10	
	SA Group		0		.5		3.5		9		87
6 Mo Ret:	T Group	1		7		69		18		5	
	SA Group		1		5		40		42		12
GENERAL INFORMATION											
Pre-Test:	T Group	1		14		44		23		18	
	SA Group		5		15		40		24		16
Post-Test:	T Group	0		8		35		23		34	
	SA Group		1		1		13		25		60
6 Mo Ret:	T Group	2		8		44		35		11	
	SA Group		2		6		28		42		22
LOW SODIUM DIET											
Pre-Test:	T Group	15		52		33		0		0	
	SA Group		15		47		36		2		0
Post-Test:	T Group	4		10		39		31		16	
	SA Group		0		5		5		13		77
6 Mo Ret:	T Group	6		35		51		8		0	
	SA Group		.5		19.5		60		17		3
MEDICATIONS											
Pre-Test:	T Group	0		11		18		33		38	
	SA Group		.5		1.5		7		32		59
Post-Test:	T Group	0		5		19		24		52	
	SA Group		1		0		0		5		94
6 Mo Ret:	T Group	0		5		19		32		44	
	SA Group		0		1		14		18		67

to the post-test results. However, we should be more interested in the difference in retention in the two groups from their level of knowledge prior to instruction. To make this comparison the criterion level cannot be the divider of success and failure because of the small numbers involved and because to do so would cause loss of other valid comparative data. When comparison is made of the spectrum of test results at the six month interval compared to pre-test results, it is seen that both the T & SA group showed significant increase in knowledge as measured by the test. If the same comparison is made between the SA & T groups six month results, the SA group has significantly greater retention than the T group ($p < .001$).

(d) The null hypothesis that there would be no difference in retention between the SA & T groups is rejected. The SA taught group had better retention.

(2) Discussion. This phenomenon raises some interesting questions about educational design, methodology, and patient interaction.

(a) Educational Design.

1 In the area of educational design, it could be an indication that the instructional strategy should be designed in a more rigid operant conditioning theoretical framework, with more reinforcement for the initial learning and a variable-ratio schedule of reinforcement for the following instructional strategies. For example, a programmed instruction format initially followed by an ideational or concept scaffolding format for reinforcement.[29]

2 Germane is the traditional reinforcement theory, which predicts that the most rapid learning occurs if every correct response is reinforced. It also predicts that learning is slower under fixed-ratio reinforcement; that is, if every other, third, or every tenth response, for example, is reinforced. The corollary prediction is that learning is slowest under variable-ratio reinforcement; that is, if there is no regularity with which correct responses are reinforced.[30,31]

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[29]Gagne, R. M., The Conditions of Learning (New York, Holt, Rinehart, and Winston, Inc., 1970), 273-276.

[30]Bigge, M. L., Learning Theories for Teachers (New York, Harper and Row, 1964), 134.

[31]Hilgard, E. R. and Bower, G. H., Theories of Learning, Third Edition, (New York, Appleton-Century-Crofts, 1966), 156-180.

3 The following propositions are related to the learned material.

a People tend to retain more of what they learn when the material is more organized, meaningful, and related;

b The retention rate goes up rapidly as material is "overlearned." That is, learning the same material several times, even though it may appear wasteful at that time, produced more lasting learning in most circumstances.

4 Traditional reinforcement theory predicts that once learning has taken place and reinforcement ceases, the learning is maintained longest by individuals learning under a variable-ratio schedule of reinforcement. Learning is maintained only briefly by individuals learning under continuous reinforcement, and for an intermediate length of time under a fixed-ratio schedule.[32]

5 On the other hand, recent research on human learning has focused on how people think rather than how they respond to stimuli. This research has generated a body of theory that explains how people take in information and how they organize information in memory. These activities of assimilating and arranging information are known collectively as information processing.

6 By and large, researchers agree that human perception and human memory impose rigorous organization on what is learned and on how it is learned. Concepts are not stored randomly, but rather are related to other similar concepts in clusters, which in turn are related to other similar concepts in clusters. The whole forms a logical and often measurable structure. In addition, it is generally agreed that cognitive structures are changed when new concepts are learned, and also that they in turn act upon those new concepts to make them more congruent with existing structures. What we learn changes what we know and what we know changes what we learn.[33]

7 This research suggests a few general principles that are important for instructional designers. The following propositions give an indication of how:

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[32]Ausubel, D. P., "A Subsumption Theory of Meaningful Learning and Retention," Journal of General Psychology, 1962, 66:213-224.

[33]Winn, W., "How People Process Information," Audiovisual Instruction, November, 1976, 57-58.

a Research into the use of "advance organizers" has shown that students learn better if they are told in advance how the content to be learned is organized.

b There is ample evidence that verbal information is processed differently from visual information. Generally, verbal information is structured sequentially and pictural information is structured spatially.

c There is evidence that different instructional strategies produce different types of cognitive structure. Not only do different methods affect the way concepts within a given conceptual domain are structured, but they also affect the way in which these same concepts are related to other new structures beyond the domain in question.[34]

(b) Educational Methodology.

1 The questions involving educational methodology are: in view of the marked loss shown in the six month retention scores, when should patients be reinforced; two, four, six months, in order to sustain retention? If they were reinforced, would that have a direct effect on their behavioral outcomes?

2 To date there has been little, if any, empirical evidence in the literature with which to compare the results of this study.[35,36]

(c) Patient Interaction. Retention of knowledge is related to how much one used it, how often, and how soon after learning. One may not be able to diagram a sentence accurately six months after having learned how, but one should be able to speak or write more correctly. So, too, with patients. One would be better able to follow a low sodium diet but might not remember the exact number of milligrams

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[34]Clark, R. E., "Constructing a Taxonomy of Media Attributes for Research Purposes," AV Communications Review, 1975, 23:197-215.

[35]Adams, S. A., Human Memory (New York, McGraw Hill, 1967).

[36]Ausubel, D. P., "The Use of Advance Organizers in the Learning and Retention of Meaningful Verbal Material," Journal of Educational Psychology, 1960, 51:267-272.

of sodium in a teaspoon of salt. In other words, it is a loss of fine memory, but behavioral modification has already taken place.[37,38]

f. Patient Baseline and Behavioral Outcomes for the Initial Encounter and Six Month Assessment.

(1) Findings.

(a) For behavior to be practiced as it should, a foundation of comprehensive, properly arranged cognitive knowledge is needed. The following presents the patients' baseline behavior prior to the educational intervention and six months after.

(b) Table 10, p. 34, gives a Comparison of Baseline and Behavioral Outcomes Before Instruction and Six Month Assessment. In most of the behavioral outcomes, there was a positive gain in the desired direction for both groups.

(c) Blood Pressure.

1 In order to detect any effect of the educational intervention on blood pressure levels, systolic and diastolic readings were recorded when patients reported for instruction and at six month assessment appointments. The pressures of 140 mm Hg systolic and 90 mm Hg diastolic were used as the limits of acceptability.

2 Both groups showed a larger percentage of the population with an acceptable blood pressure reading after six months (see Table 10). There is no difference between SA & T group results.

(d) Weight.

1 For each patient weight was recorded as measured in pounds on the day of entering one of the two groups, and again six months later.

2 The mean weight of both groups was the same at the beginning and at the end of the study.

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[37]Ausubel, D. P. and Blake, E., "Proactive Inhibition in the Forgetting of Meaningful School Material," Journal of Educational Research, 1958, 52:145-149.

[38]Postman, L., "Short-Term Memory and Incidental Learning in A. W. Melton (Ed)," Categories of Human Learning (New York, Academic Press, 1964), 75-100.

TABLE 10

COMPARISON OF BASELINE AND BEHAVIORAL OUTCOMES
BEFORE INSTRUCTION AND SIX MONTH ASSESSMENT

OUTCOMES	BEFORE INSTRUCTION T GROUP N=124 %	BEFORE INSTRUCTION SA GROUP N=126 %	SIX MONTH ASSESSMENT T GROUP N=124 %	SIX MONTH ASSESSMENT SA GROUP N=126 %
BLOOD PRESSURE				
Systolic				
≤ 140	65	50	74	66
> 140	35	50	26	34
Diastolic				
≤ 90	73	75	88	83
> 90	27	25	12	17
WEIGHT IN POUNDS				
Mean Weight	164	164	165	165

Frequency of Weight Gain/Weight Loss

	LOSS-%				GAIN-%		
LBS.	11+	6-10	1-5	0	1-5	6-10	11+
T Group (N=124)	3	10	23	9	34	15	6
SA Group (N=126)	4	7	29	11	34	12	3

Range of Weight Gain and Weight Loss

LBS.	LOSS	GAIN
T Group (N=124)	-22	+20
SA Group (N=126)	-27	+17

TABLE 10 continued

COMPARISON OF BASELINE AND BEHAVIORAL OUTCOMES
BEFORE INSTRUCTION AND SIX MONTH ASSESSMENT

	BEFORE INSTRUCTION		SIX MONTH ASSESSMENT	
OUTCOMES	T GROUP N=124 %	SA GROUP N=126 %	T GROUP N=124 %	SA GROUP N=126 %
NO. CIGARETTES PER DAY				
0	72	69	71	70
1-10	6	10	6.5	11
11-20	13	12	11	16
21-40	8.5	9	11	2
41+	.5	0	.5	1
DECREASE IN TENSION				
Yes	48	66	50	53
No	52	34	50	47
TYPE OF PHYSICAL ACTIVITY				
0	54	45	23	14
Sedentary	0	0	0	1
Light	13	10	7	4
Moderate	22	12	42	32
Vigorous	11	25	27	40
Strenous	0	8	1	9
FREQUENCY OF PHYSICAL ACTIVITY				
Daily	60	75	79	83
Twice Weekly	33	15	17	13
Weekly	7	10	4	4

TABLE 10 continued

COMPARISON OF BASELINE AND BEHAVIORAL OUTCOMES
BEFORE INSTRUCTION AND SIX MONTH ASSESSMENT

OUTCOMES	BEFORE INSTRUCTION T GROUP N=124 %	BEFORE INSTRUCTION SA GROUP N=126 %	SIX MONTH ASSESSMENT T GROUP N=124 %	SIX MONTH ASSESSMENT SA GROUP N=126 %
COMPLIES WITH LAB AND ANCILLARY TESTS				
Yes	96	99.5	97	99.5
No	4	.5	3	.5
TAKES MEDICATION				
Yes	96	86	94	96
No	2	4	.5	2
N/A	2	10	5.5	2
Don't Know	0	0	0	0
KNOWS DRUGS AND ACTIONS				
Yes	55	70	81	91
No	45	30	19	9
ADHERES TO LOW SODIUM DIET				
Yes	64	64	86	93
No	18	25	10	7
N/A	18	11	4	0
NUMBER OF CUPS OF COFFEE PER DAY				
0	15	25	29	42
1	16	17	15	21
2	18	16	23	15
3	23	15	15	11
4	17	10	12	6
5-9	9	11	6	2
10-19	2	6	0	2
20+	0	0	0	1

3 When considered individually, however, there was much variation in body weight in the six month period. If the original weight ± five pounds is considered as no change, then 82 (66 percent) of the T group and 93 (74 percent) of the SA group remained the same. Sixteen individuals of T group and 14 of the SA Group lost weight while 26 of the T and 19 of the SA gained.

4 No matter how it is measured this is not a great success. Neither group did well. This lack of success is more telling by the fact that 92 percent of the group were considered overweight. A perusual of the scientific literature indicates, from a cross section of methodologies, that other programs haven't been successful in long lasting weight reduction results.[39-47]

(e) Additional Baseline Measures.

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[39]Stare, J. F., "Comments on Obesity," World Wide Abstracts, 1963, 6:8.

[40]Alexander, M. M. and Stare, J. F., "Overweight, Obesity, and Weight Control," California Medicine, 1967, 106:437.

[41]Hammar, S. L., Campbell, M. M., and Campbell, V. A., "An Intercisciplinary Study of Adolescent Obesity," Journal of Pediatrics, 80:373, 1972.

[42]Mayer, J., Overweight (Englewood Cliffs, NJ, Prentice-Hall, Inc., 1968), 28-30.

[43]Jolliffe, N., Reduce and Stay Reduced on the Prudent Diet (New York, Simon and Schuster, Inc., 1963).

[44]Fletcher, A. P., "Effect of Weight Reduction Upon Blood Pressure of Obese Hypertensive Women," Quarterly Journal of Medicine, 1954, 23:331.

[45]Seltzer, C. C. and Mayer, J., "A Simple Criterion of Obesity," Postgraduate Medicine, 1965, 38:101.

[46]Stunkard, A. and Bert V., "Obesity and the Body Image," American Journal of Psychiatry, 1967, 123:1433.

[47]Craddock, D., Obesity and Its Management (Edinburg, E. and S. Livingston, Ltd., 1969).

1 Findings.

a The measurements of known drugs and their actions and the behavioral findings of complies with laboratory tests, takes medication, adheres to low sodium diet, number of cups of coffee, number of cigarettes per day, additional tension, and type of frequency of physical activity were, according to the patients report, all very high in positive compliance at the outset of the study.

b In two of the categories, complies with laboratory tests and takes medication, the patients in both groups initial report was so near total compliance that there was no possibility of measurable improvement.

c The number of patients who reported themselves as non-smokers at the onset of the study was high, 70 percent of the SA group and 71 percent of the T group. Although more of the smokers reported they were smoking less than reported an increase, there was no dramatic change and no difference between the two groups.

d In the categories decrease in tension and in both level and frequency of physical exercise there was a significant improvement in behavior in both groups. There was no difference in outcome between the SA & T groups.

e The measure of knowledge of drugs and their actions as well as the behavioral outcomes of adherence to a low sodium diet and the amount of coffee drunk, all showed that both the T and SA groups had highly significant improvement. When compared between groups by chi-square testing there was no apparent difference between the two groups. However, by doing comparison of match proportions[48] it was shown that the SA group did report a significantly better improvement than the T group.

f See Appendix B, p. 113, for tables of baseline and six month reports on the behavioral measures.

2 Discussion.

a To date most medical experts agree that the mechanisms of hypertension are still a mystery. However, most agree, that living patterns and genetic predisposition can determine whether a person will have hypertension. If fact, most medical experts agree

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[48]Fleiss, J. L., Statistical Methods for Rates and Proportions (New York, John Wiley & Sons, 1973), 72-80.

2 X 2 TABLES OF RAW SCORES PRIOR TO CONVERSION: KNOWLEDGE OF DRUGS

SA Group

Initial \ 6 Months	Yes	No	
Yes	77	3	80
No	24	7	31
	101	10	111

T Group

Initial \ 6 Months	Yes	No	
Yes	57	8	65
No	36	13	49
	93	21	114

Figure 1

2 X 2 TABLES OF RAW SCORES PRIOR TO CONVERSION: ADHERENCE TO A LOW SODIUM DIET

SA Group

Initial \ 6 Months	Yes	No	
Yes	78	3	81
No	27	5	32
	105	8	113

T Group

Initial \ 6 Months	Yes	No	
Yes	78	1	79
No	13	9	22
	91	10	101

Figure 2

that specific aspects of behavior do relate to hypertension: salt intake, obesity, stress, and sedentary life style.[49,50]

b Both groups showed significant levels of improvement in their knowledge of drugs and in the change of behavior that they reported. With the total sample having a good result the SA group

[49]Ostfeld, A. M.,and Fries, E., "Life Style Influences Hypertension," U.S. Medicine, 1 May 1977, 13:1.

[50]Leonard, J. N., Hofer, J. L., and Pritikin, W., Live Longer Now (New York, Grosset & Dunlap, 1974), 64-72.

had an even better result than the T group in knowledge of drugs as well as adherence to a low sodium diet and reducing the amount of coffee drunk.

c In the one objective measurement of behavioral change over the six months, weight loss, there was no improvement in either group.

d The study protocol only had a six month follow-up assessment. This may have been a premature measurement. Perhaps if the measurements could have been taken over a longer period of time, one to five years, ultimately the combination of success variables pointed out above would have had an effect on lowering the patients' weight. Further, it could have been documented as to what combination would yield the most optimum outcomes. For example, if a patient had greater comprehension initially and frequent reinforcement to maintain retention over the long haul (one-five-ten years), would they have even greater behavioral gains in the crucial areas of decreasing salt intake, obesity, stress, and sedentary life style?

g. Patient Supplemental Variables for the Six Month Assessment.

In addition to the measures of retention and behavioral compliance the subjects were given an Internal-External Control Scale (Rotter, 1966), to measure their locus of control and the Nelson-Denny Form A, Reading Test, to measure their reading level.

(1) Rotter's Internal and External Scale.

(a) Findings. Table 11, p. 41, Results of the Rotter's Internal and External Scale (Locus of Control) for the Six Month Assessment, indicates that there were more internally controlled individuals in the SA group than the T group, although both groups scored high on internally controlled, 61 percent for the T group, and 74 percent for the SA group that were tested.

(b) Discussion.

1 After almost a decade of research involving the locus-of-control construct, the validity and usefulness of the distinction made by Rotter (1966) between an internal and an external person is widely accepted. Those who believe that they are in control of their lives and who provide their own reinforcement have been called "internals;" on the other end of the continum are the "externals," believers in the influence of events and factors outside of their control.

2 Many things are presently known about how learning, teaching, or aspects of instructional materials, are affected by locus of control. The problem is that both learning and locus of control can be measured with considerably more accuracy than "teaching."

TABLE 11

ROTTER'S INTERNAL AND EXTERNAL SCALE
(LOCUS OF CONTROL) FOR THE SIX MONTH ASSESSMENT

SCALE	T GROUP N=121 %	SA GROUP N=121 %
INTERNAL	61	74
EXTERNAL	39	26

TABLE 12

NELSON-DENNY READING SCALE
FOR THE SIX MONTH ASSESSMENT

SCALE	T GROUP N=81 %	SA GROUP N=101 %
8th GRADE AND BELOW	14	24
9th - 16th GRADE	86	76

Many differing kinds of teaching situations have been identified, but common measurable elements of these have not yet been discovered (Clark, 1975).[51] Using the instrument developed by Rotter (1966), many researchers have reported that as students perceive themselves as being more "in control" (internals) of their own reinforcement, they will perform better with materials and courses that emphasize a student's freedom to work at his/her pace.[52,53] This suggests that internally controlled patients would be much more receptive to the SA approach than externally controlled patients.

3 Generally, internals achieve higher levels than externals. In courses where a contract is required, internals will contract for, and ultimately receive, higher grades.[54] Perhaps this is one insight as to why the SA group had higher comprehension and retention levels than the T study group.

4 Internals exhibit more persistence and initiative in seeking achievement goals (e.g., Gozali, Cleary, Walster, and Gozali, 1973).[55,56,57] This could explain why both study groups had such high behavioral baselines.

5 Almost all studies suggest a relationship to achievement with a task's format, design or structure (e.g., Allen, Gait,

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[51]Clark, R. E., "Constructing a Taxonomy of Media Attributes for Research Purposes," AV Communications Review, 1975, 23:197-215.

[52]Rotter, J. B., "Generalized Expectancies for Internal Versus External Control of Reinforcement," Psychological Monographs, 1966, 80: (1, whole No. 609).

[53]Allen, G. L., Giat, and Cherney, R., "Locus of Control, Test Anxiety and Student Performance in a Personalized Instruction Course," Journal of Educational Psychology, 1974, 66:968, 973.

[54]Mirels, H. L., "Dimensions of Internal Versus External Control," Journal of Consulting and Clinical Psychology, 1970, 34:226-228.

[55]Wolfe, R. N., "Perceived Locus of Control and Prediction of Own Academic Performance," Journal of Consulting and Clinical Psychology, 1972, 38:80-83.

[56]Gozali, H., Cleary, A., Walster, G. W., and Gozali, J., "Relationship Between the Internal-External Control Construct and Achievement," Journal of Educational Psychology, 1973, 63:9-14.

[57]Eisenmann, R. and Platt, J., "Birth Order and Sex Differences in Academic Achievement and Internal-External Control," Journal of General Psychology, 1968, 7k:279-285.

and Cherney, 1974).[58,59,60,61] Again, this aspect could be one contributing factor for the high achievement and behavioral scores for the SA group, the way the instructional strategy was designed.

6 The question of LOC's relationship to achievement may be found in the task structure of the instructional strategy. This aspect needs further examination. LOC might be a useful tool to detect personality types of patients (internal - external), to identify educational methodologies, or blends, to administer for optimum outcomes. Especially in degenerative illnesses where patient control is necessary (strength to change lifestyle), as in diabetes, hypertension, and atherosclerosis.[62]

(2) Nelson-Denny Reading Scale.

(a) Findings. See Table 12, p. 41, Nelson-Denny Reading Scale for the Six Month Assessment.[63] The results indicate an above 9th grade reading level for 86 percent of the population tested of the T group and 76 percent of the population tested of the SA group. Forty-three members of the T group and 25 of the SA group refused to take the 20 minute reading test.

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[58]Lefcourt, H. M., Lewis, L., and Silverman, I. W., "Internal vs. External Reinforcement and Attention to a Decision-Making Test," Journal of Personality, 1968, 36:663-682.

[59]Nord, W. R., Connally, F., and Daignault, G., "Locus of Control and Aptitude Test Scores as Predictors of Academic Achievement," Journal of Educational Psychology, 1974, 66:956-961.

[60]Johnson, W. G. and Croft, R. G. F., "Locus of Control and Participation in a Personalized System of Instruction Course," Journal of Educational Psychology, 1975, 67:416-421.

[61]Phares, E. G., "Differential Utilization of Information as a Function of Internal-External Control," Journal of Personality, 1968, 36:649-662.

[62]Lowery, B. J. and Ducette, J. P., "Disease-Related Learning and Disease Control in Diabetes as a Function of Locus of Control," Nursing Research,

[63]Nelson, M. J. and Denny, E. C., The Nelson-Denny Reading Rest Examiner's Manual (Boston, Houghton-Mifflin Company, 1974), p. 26.

(b) Discussion.

1 The high reading levels in and of themselves did not indicate anything except to validate the results found in other areas pertaining to educational attainment, occupation, etc.

2 Of those that took the reading test in comparison to those who did not, their Rotter's score indicated an internally controlled individual. It can be concluded that the greater percentage taking the reading test had more self confidence, thus were not intimidated by an additional "test."

3 The question might be raised that if the average reading level of the active duty soldier isn't as high, can you still use the SA approach methodology successfully? An unequivocal, yes. The instructional strategy would simple be designed to address the target population, whether the population had a fifth, eighth, or twelfth grade reading level.

h. Patients' Opinion Toward the Systems Approach.

(1) Findings.

(a) There were 202 patients in the total SA group; only 180 of the 202 patients filled out the Lickert scale response form.[64]

(b) See Table 13, p. 45, Patients' Opinion Toward the Systems Approach. The analysis of the opinion rating scale was as follows: viewing time; 91 percent felt it was ok; content interest, 38 percent felt it was ok, 61 percent found it fascinating; questions on topic, 23 percent said ok, 76 percent felt it really helped; pace, 84 percent responded ok, 13 percent felt it was too fast; content uniqueness, 43 percent said ok, 53 percent stated it was new; content value, 17 percent said ok, 83 percent said most valuable; non-professional paramedical health educator's style, 94 percent felt it was excellent; learning center, 88 percent responded excellent; preference for instruction, 49 percent preferred the audiovisual mode, 23 percent were neutral, and 10.5 percent preferred a live teacher; freedom to learn by audiovisual compared to professional health workers, 32 percent said equal, 66 percent felt more personal responsibility; patient attitude toward audiovisual modes for health education, 15 percent were neutral and 85 percent indicated an excellent attitude; patient viewing of commercial television in hours per day, 34 percent viewed less than one hour,

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[64]Adapted from "Scales to Determine Student Attitude About TeleTutorial Lessons," by Volker, Simonson, R., and Simonson, M., As appeared in Audiovisual Instruction, November 1975, p. 51.

PATIENTS' OPINION TOWARD THE SYSTEMS APPROACH

TOPIC AREA	OPINION RATING SCALE: N=180-%				
	1	2	3	4	5
VIEWING TIME	Too Short		OK		Too Long
	1	4	91	3	1
CONTENT INTEREST	Boring		OK		Fascinating
	1	0	38	39	22
QUESTIONS ON TOPIC	No Help		OK		Really Helped
	0	1	23	23	53
PACE	Too Slow		OK		Too Fast
	0	3	84	11	2
CONTENT UNIQUENESS	Old Stuff		OK		All New
	1	3	43	40	13
CONTENT VALUE	No Value		OK		Most Valuable
	0	0	17	21	62
NON-PROFESSIONAL PARAMEDICAL HEALTH EDUCATOR'S STYLE	Poor		OK		Excellent
	0	0	6	11	83
LEARNING CENTER	Poor		OK		Excellent
	0	0	12	17	71
PREFERENCE FOR INSTRUCTION	A/V Mode		Neutral		Live Teacher
	49	10.5	23	7	10.5
FREEDOM TO LEARN BY A/V COMPARED TO PROFESSIONAL HEALTH WORKERS	Less Freedom		Equal		More Freedom
	1	3	27	28	41
PERSONAL RESPONSIBILITY A/V COMPARED TO HEALTH WORKERS	Less		Equal		More
	2	0	32	29	37
PATIENT ATTITUDE TOWARD A/V MODES FOR HEALTH EDUCATION	Poor		Neutral		Excellent
	0	0	15	27	58
PATIENT VIEWING OF COMMERCIAL TV IN HOURS PER DAY	Less Than		Hours		More Than
	34	22	29	10	5

22 percent viewed two hours, 29 percent viewed three hours, 10 percent viewed four hours, and five percent viewed more than five hours per day.

(2) Discussion. The patients appeared to be extremely receptive. Scores were high in: content interest, uniqueness and value, the non-professional paramedical health educator's style, the learning center concept, audiovisual preference for instruction, more freedom to learn and greater personal responsibility for learning by audiovisual compared to usual instruction by professional health care workers. The patients' attitudes toward the audiovisual modes were excellent. The most serendipitous finding was the high patient acceptance of the non-professional health educator.

i. Comparison of a Traditional Sub-Group Having Had Two Years or More of Instruction with a Systems Approach Sub-Group Having no Prior Instruction.

(1) Introduction.

(a) In Section f., p. 33, Patient Baseline and Post Instruction Behavioral Outcomes it was pointed out that a six month assessment may have been a premature measurement. The postulation was that if measurements could have been taken over longer increments of time, a pattern of behavioral gain would have been seen in the SA group rather than the limited gains measured.

(b) A comparison was done of a group of patients who had had traditional instruction of at least two years previously, with expected reinforcement since, to an equal sized group of SA instructed patients who reported that they had received no previous instruction. This should put all the advantages to the T group.

(c) If both groups turned out to be equal in outcomes, or the SA group superior, then it could be inferred that the structural format of the SA approach does facilitate patient achievement.

(2) Clinic Patient Population for Sub-Group in Relation to Time of Instruction.

(a) Findings.

1 The breakdown of the 122 patients was as follows, (See Table 14, p. 47, Demographic and Socioeconomic Characteristics In Relation to Time of Instruction). Both groups had similar populations with only 2.5 percent of the total population active duty, again the lowest category represented. As with the other groups the largest group represented was the dependent wives comprising a little less than 60 percent female or a ratio of 2:3. The majority of the program participants were 40 years old and over, comprising over 95 percent of the population. Ninety-plus percent were married. The educational level

TABLE 14

DEMOGRAPHIC AND SOCIOECONOMIC CHARACTERISTICS
IN RELATION TO TIME OF INSTRUCTION

Demographic and Socioeconomic Variables	All Patients (N=122) %	Traditional (2 years or more) (N=62) %	*Systems Approach (no prior instruction) (N=60)* %
RANK OF MILITARY			
Active Enlisted			
E-1 thru E-6		0	0
E-7 thru E-9		2	0
Active Officer			
Company Grade		0	0
Field Grade		0	3
	2.5		
Retired Enlisted			
E-1 thru E-6		2	3
E-7 thru E-9		5	5
Retired Officer			
Company Grade		6	7
Field Grade		26	22
	38		
RANK OF SPONSORS OF DEPENDENTS			
Active Enlisted			
E-1 thru E-6		0	0
E-7 thru E-9		0	0
Active Officer			
Company Grade		0	3
Field Grade		3	10
Retired Enlisted			
E-1 thru E-6		2	0
E-7 thru E-9		16	15
Retired Officer			
Company Grade		6	5
Field Grade		32	27
	59.5		

TABLE 14 continued

Demographic and Socioeconomic Variables	All Patients (N=122) %	Traditional (2 years or more) (N=62) %	Systems Approach (no prior instruction) (N=60) %
SEX			
Male	41	40	42
Female	59	60	58
AGE			
less than 30	2.5	0	5
30-39	2	2	2
40-49	20	10	30
50-59	50	50	50
60-69	20	32	8
70 and older	5.5	6	5
MARITAL STATUS			
Married	90.5	88	93
Widowed	5.5	8	3
Single	2	2	2
Engaged	0	0	0
Divorced	1	2	0
Separated	1	0	2
EDUCATION COMPLETED			
Elementary (grades 1-6)	1.5	3	0
Junior High (grades 7-8)	3.5	5	2
High School (grades 9-12)	30.5	29	32
1-3 Years College	34.5	37	32
Baccalaureate	19.5	13	26
Master's Degree	9.5	11	8
Doctor's Degree	1	2	0
OCCUPATION			
Unemployed or Retired	12.5	18	7
Housewife	42.5	38	47
Administrative (office work)	15.5	16	15
Technical Specialist (mechanical)	6.5	3	10
Professional (non-medical)	11.5	16	7
Combat Related (line groups)	1	0	2
Student (full time)	2.5	2	3
Blue Collar Work (custodial)	2	2	2
Medical Professional (RN,MD,DDS)	2.5	3	2
Other	3.5	2	5

was high; the highest percentage of participants were in the high school through baccalaureate categories. In type of occupation the highest number represented was housewife and office worker. Both sub-groups were comparable in all the demographic and socioeconomic variables.

2 See Table 15, p. 50, Historical Features of Hypertensive Illness and Education Provided in Relation to Time of Instruction. In the figures seen in Table 15, the T group had a sub-group of 100 percent diagnosed two years or more ago, with 26 percent of the patients receiving care from a physician and 74 percent receiving their instruction from a physician, 87 percent. The SA group were diagnosed at various times, 30 percent less than three months; eight percent, four to six months; three percent, seven to 12 months; 14 percent, one to two years; and 45 percent, more than two years. Eighty-eight percent of the SA group received care from a physician, and 12 percent received care from a nurse clinician. None of these individuals had ever received instruction.

(b) Discussion. The demographic and socioeconomic variables and similarities of this sub-group to the total population were apparent.

(3) Patient Comprehension and Retention for Sub-Groups in Relation to Time of Instruction.

(a) Findings. Upon examining Table 16, p. 51, Comparison Scores for the Initial Encounter and Six Month Assessment in Relation to Time of Instruction, it was evident that both groups had approximately the same entry level on the pre-tests. Eighty-five percent of the SA group attained the criterion level compared to only 11 percent in the T group. Again, noteworthy, was the low number of participants in the T group, two percent, who scored within the criterion level for the low sodium diet.

(b) Discussion. See Table 16, p. 51. Even though the T group had prior instruction, the entry level of the participants wasn't any different from the SA group who had received no instruction before the intervention. Furthermore, the learning gains (post-test) and retention weren't very significant either. Consequently, one can infer from the data that the T group needs strengthening in either the area of methodology, design, patient interaction, or in all three areas, and that the SA group needs a follow-up learning strategy with a variable ratio schedule of reinforcement to heighten the patient retention levels.

(4) Patient Baseline and Behavioral Outcomes for the Sub-Groups in Relation to Initial Encounter and Six Month Assessment.

TABLE 15

HISTORICAL FEATURES OF HYPERTENSIVE ILLNESS
AND EDUCATION PROVIDED
IN RELATION TO TIME OF INSTRUCTION

Historical Features	All Patients (N=122) %	Traditional (2 years or more) (N=62) %	Systems Approach (no prior instruction) (N=60) %
TIME SINCE DIAGNOSIS			
Less Than 3 Months	15	0	30
4 to 6 Months	4	0	8
7 to 12 Months	1.5	0	3
1 to 2 Years	8.5	3	14
More Than 2 Years	71	97	45
HEALTH CARE PROVIDER			
Physician	57	26	88
Nurse Clinician	43	74	12
HAS HAD PRIOR INSTRUCTION			
Yes	51	100	0
No	49	0	100
	(N=62) %	(N=62) %	NA
TIME OF PRIOR INSTRUCTION			
Less Than 3 Months	0	0	
4 to 6 Months	0	0	
7 to 12 Months	0	0	
1 to 2 Years	0	0	
More Than 2 Years	100	100	
INSTRUCTION PROVIDED BY			
Physician	87	87	
Nurse Clinician	13	13	

TABLE 16

COMPARISON SCORES FOR THE INITIAL ENCOUNTER AND SIX MONTH ASSESSMENT IN RELATION TO TIME OF INSTRUCTION

GROUPS		0–29%		30–49%		50–69%		70–79%		80–100%	
										Criterion Level	
COMPOSITE SCORES											
Pre-Test: (2 years or more) N=62 %	Traditional	2		23		66		10		0	
(no prior instruction) N=60 %	*Systems Approach*		*0*		*20*		*63*		*15*		*2*
Post-Test:	Traditional	0		8		49		32		11	
	Systems Approach		*0*		*0*		*3*		*12*		*85*
6 Mo Ret:	Traditional	2		9		68		18		3	
	Systems Approach		*0*		*5*		*38*		*42*		*15*
GENERAL INFORMATION											
Pre-Test:	Traditional	2		14		42		26		16	
	Systems Approach		*3*		*18*		*39*		*25*		*15*
Post-Test:	Traditional	0		11		28		21		40	
	Systems Approach		*0*		*2*		*15*		*22*		*61*
6 Mo Ret:	Traditional	5		8		44		32		11	
	Systems Approach		*3*		*5*		*32*		*38*		*22*
LOW SODIUM DIET											
Pre-Test:	Traditional	14		55		31		0		0	
	Systems Approach		*17*		*51*		*32*		*0*		*0*
Post-Test:	Traditional	5		32		53		8		2	
	Systems Approach		*0*		*2*		*3*		*20*		*75*
6 Mo Ret:	Traditional	10		34		51		5		0	
	Systems Approach		*0*		*20*		*58*		*20*		*2*
MEDICATIONS											
Pre-Test:	Traditional	0		16		8		42		34	
	Systems Approach		*0*		*2*		*8*		*32*		*58*
Post-Test:	Traditional	0		7		21		19		53	
	Systems Approach		*0*		*0*		*0*		*7*		*93*
6 Mo Ret:	Traditional	0		7		19		34		40	
	Systems Approach		*0*		*2*		*12*		*18*		*68*

(a) Findings. Table 17, p. 53, Comparison Baseline and Behavioral Outcomes for the Initial Encounter and Six Month Assessment presents the patients' entry levels and six month outcomes for the T group who have had instruction for a minimum of two years or more in relation to the SA group who have not had prior instruction before the intervention. In reviewing the baseline behaviors there was variation in entry levels; however, the variation wasn't consistent enough to cite that the T group's baseline behavior was higher than the SA group. For instance, a higher percentage in the T group had a lower systolic entry level but a higher diastolic entry level. The T group had $\leq$ 140, 60 percent entry level compared to $\leq$ 140, 42 percent entry level for the SA group. The diastolic $\leq$ 90 entry level for the T group was only 65 percent compared to the $\leq$ 90 entry level for the SA group at 72 percent. Comparing the entry level and six month outcomes, there are gains in the desired directions, or no change for both groups. There is no statistical difference in the outcomes of the two groups.

(b) Discussion. The data suggests that the structure format of the SA approach does facilitate patient achievement and was a superior method compared to the T method. The T group had the benefit of two years or more of instruction and more or less continual reinforcement through health provider interaction whereas the SA subgroup for this set of data did not.

(5) Patient Supplemental Variables for the Six Month Assessment for the Sub-Group.

(a) Rotter's Internal and External Scale.

1 Findings. Table 18, p. 56, Rotter's Internal and External Scale (Locus of Control) for the Six Month Assessment Sub-Group, indicates approximately the same distribution of internally and externally controlled patients in both instructional groups and the main group. There were seven percent more internally controlled subjects in the SA group compared to the T group. Forty percent in the T group and 33 percent in the SA group were externally controlled.

2 Discussion. This set of data supports the suggestion made for the main group, that internally controlled patients may do better with a SA approach than externally controlled. However, caution should be used when interpreting the results because about two-thirds of each population had internals and one-third of each population had externals and on the whole the behavioral scores were comparable. The difference of the two groups appeared in the areas of comprehension and retention, and length of time of instruction versus no prior instruction in relation to behavioral gains. That could mean that higher priority should be given to instructional format design or structure rather than an individual's locus of control. This would indicate an even stronger argument for utilizing the SA approach methodology for patient education.

TABLE 17

COMPARISON BASELINE AND BEHAVIORAL OUTCOMES
FOR THE INITIAL ENCOUNTER AND SIX MONTH ASSESSMENT

OUTCOMES	INITIAL ENCOUNTER T Group (2 years or more) N=62/%	INITIAL ENCOUNTER SA Group (no prior instruction) N=60/%	SIX MONTH ASSESSMENT T Group N=62/%	SIX MONTH ASSESSMENT SA Group N=60/%
BLOOD PRESSURE				
Systolic				
≤ 140	60	42	76	55
> 140	40	58	24	45
Diastolic				
≤ 90	65	72	89	75
> 90	35	28	11	25
WEIGHT IN POUNDS				
Mean Weight In Pounds	162	167	163	166

Frequency Of Weight Gain/Weight Loss

	LOSS-%				GAIN-%		
LBS.	11+	6-10	1-5	0	1-5	6-10	11+
T Group (2 years or more) N=62/%	3	10	24	10	31	16	6
SA Group (no prior instruction) N=60/%	5	13	35	13	27	5	2

Range of Weight Gain/Weight Loss

LBS.	LOSS	GAIN
T Group N=62/%	-18	+20
SA Group N=60/%	-27	+17

OUTCOMES	INITIAL ENCOUNTER		SIX MONTH ASSESSMENT	
	T Group (2 years or more) N=62/%	SA Group (no prior instruction) N=60/%	T Group N=62/%	SA Group N=60/%
COMPLIES WITH LAB AND ANCILLARY TESTS				
Yes	94	98	97	100
No	6	2	3	0
TAKES MEDICATION				
Yes	97	80	95	87
No	0	7	0	0
N/A	3	13	5	13
Don't Know	0	0	0	0
KNOWS DRUGS AND ACTIONS				
Yes	60	63	73	87
No	40	37	27	13
ADHERES TO LOW SODIUM DIET				
Yes	56	60	81	97
No	28	30	11	3
N/A	16	10	8	0
NUMBER OF CUPS OF COFFEE PER DAY				
0	11	29	23	52
1	15	17	18	18
2	21	12	25	13
3	28	18	18	12
4	11	13	11	3
5-9	11	8	5	0
10-19	3	3	0	2
20+	0	0	0	0

TABLE 17 continued

OUTCOMES	INITIAL ENCOUNTER: T Group (2 years or more) N=62/%	INITIAL ENCOUNTER: SA Group (no prior instruction) N=60/%	SIX MONTH ASSESSMENT: T Group N=62/%	SIX MONTH ASSESSMENT: SA Group N=60/%
NO. CIGARETTES PER DAY				
0	78	65	77	63
1-10	5	15	6	18
11-20	5	13	5	15
21-40	10	7	10	2
41+	2	0	2	2
DECREASE IN TENSION				
Yes	45	62	54	54
No	55	38	46	46
TYPE OF PHYSICAL ACTIVITY				
0	64	50	25	12
Sedentary	0	0	0	0
Light	13	8	10	5
Moderate	10	10	39	35
Vigorous	13	22	24	36
Strenous	0	10	2	12
FREQUENCY OF PHYSICAL ACTIVITY				
Daily	45	70	74	81
Twice Weekly	50	20	20	15
Weekly	5	10	6	4

TABLE 18

ROTTER'S INTERNAL AND EXTERNAL SCALE
(LOCUS OF CONTROL) FOR THE SIX MONTH ASSESSMENT SUB-GROUP

SCALE	T Group (2 years or more) N=60/%	SA Group (no prior instruction) N=60/%
INTERNAL	60	67
EXTERNAL	40	33

TABLE 19

NELSON-DENNY READING SCALE
FOR THE SIX MONTH ASSESSMENT SUB-GROUP

SCORE	T Group (2 years or more) N=41/%	SA Group (no prior instruction) N=47/%
8th GRADE AND BELOW	20	19
9th - 16th GRADE	80	81

(b) Nelson-Denny Reading Scale.

1 Findings. See Table 19, p. 56, Nelson-Denny Reading Scale for the Six Month Assessment Sub-Group. The results show that the reading levels were similar to the main group; that is, 80 percent of the T group tested and 81 percent of the SA group tested, had a reading level of 9th grade or above, while 20 percent of the T group tested and 19 percent of the SA group tested, had a reading level of 8th grade or below. Twenty-one subjects in the T group and thirteen in the SA group refused to take the reading test.

2 Discussion. The reading scores of the sub-group match those of the main group.

j. Comparison of Baseline Data in Relation to no Instruction, Instruction by a Physician or by a Nurse Clinician.

(1) Introduction. Another way of examining the data was to compare the entry levels of all patients, those that did not have the benefit of instruction to those who did, to estimate the effectiveness of the existing system of providing patient education via the traditional approach.

(2) Clinic Patient Populations With no Instruction, Instruction by a Physician or by a Nurse Clinician.

(a) Findings.

1 Table 20, p. 58, Demographic and Socioeconomic Characteristics in Relation to no Instruction, Instruction by a Physician or by a Nurse Clinician, shows that all three sub-groups are comparable in population, sex, age, marital status, education attained, and occupational distribution. All categories represented are similar to those breakdowns reported on previously.

2 See Table 21, p. 60, Historical Features of Hypertensive Illness and Education Provided in Relation to no Instruction, Instruction by a Physician or by a Nurse Clinician. Of a total of 402 patients seen, 133 of them reported never having had the benefit of any patient education, or about 33 percent of the total population. The health care provider for 75 percent of the sub-group that didn't receive education was a physician. Twenty-five percent of that same group had their health care provided by a nurse clinician.

(b) Discussion. A better method of patient education is needed in order for the AMEDD health care delivery system to be accountable to all hypertensive patients.

(3) Comparison of Baseline Scores in Relation to no Instruction, Instruction by a Physician or by a Nurse Clinician.

TABLE 20

DEMOGRAPHIC AND SOCIOECONOMIC CHARACTERISTICS
IN RELATION TO NO INSTRUCTION, INSTRUCTION
BY A PHYSICIAN OR BY A NURSE CLINICIAN

Demographic and Socioeconomic Variables	All Patients N=402 %	No Instruction N=133 %	Physician N=143 %	Nurse Clinician N=126 %
RANK OF MILITARY				
Active Enlisted				
E-1 thru E-6	.5	1	0	1.5
E-7 thru E-9	1	1.5	2	0
Active Officer				
Company Grade	.5	1.5	0	0
Field Grade	1	4	0	0
Retired Enlisted				
E-1 thru E-6	3	4	2	2
E-7 thru E-9	8	7	8	10
Retired Officer				
Company Grade	3	4	4	1
Field Grade	21	19	22	23
RANK OF SPONSORS OF DEPENDENTS				
Active Enlisted				
E-1 thru E-6	1	0	1	2
E-7 thru E-9	2	3	2	1.5
Active Officer				
Company Grade	2	3	1	2
Field Grade	9	9	10	6
Retired Enlisted				
E-1 thru E-6	3	2	3.5	5
E-7 thru E-9	15	15	14	16
Retired Officer				
Company Grade	5	3	3.5	3
Field Grade	25	23	27	27

TABLE 20 continued

Demographic and Socioeconomic Variables	All Patients N=402 %	No Instruction N=133 %	Physician N=143 %	Nurse Clinician N=126 %
SEX				
Male	39	41	38	36
Female	61	59	62	64
AGE				
less than 30	1	2	1	0
30-39	8	8	6	9
40-49	25	29	22	25
50-59	42	43	42	42
60-69	21	15	26	20
70 and older	3	3	3	4
MARITAL STATUS				
Married	90	90	95	84
Widowed	7	6	4	10
Single	1.5	2	0	3
Engaged	0	0	0	0
Divorced	.5	1	1	1
Separated	1	1	0	2
EDUCATION COMPLETED				
Elementary (grades 1-6)	2	2	2	3
Junior High (grades 7-8)	4	4	5	2
High School (grades 9-12)	38	37	35	41
1-3 Years College	29	27	31	29
Baccalaureate	18	22	14	19
Master's Degree	8.5	8	12	5
Doctor's Degree	.5	0	1	1
OCCUPATION				
Unemployed or Retired	13	9	17	13
Housewife	42	45	36	45
Administrative (office work)	19	11	22	22
Technical Specialist (mechanical)	7	10	4	6
Professional (non-medical)	11	12	12	8
Combat Related (line groups)	1	3	0	0
Student (full time)	.5	2	1	0
Blue Collar Work (custodial)	2	3	3	2
Medical Professional (RN,MD,DDS)	1.5	2	2	1
Other	3	3	3	3

TABLE 21

HISTORICAL FEATURES OF HYPERTENSIVE ILLNESS
AND EDUCATION PROVIDED IN RELATION TO NO INSTRUCTION,
INSTRUCTION BY A PHYSICIAN OR BY A NURSE CLINICIAN

Historical Features	All Patients N=402 %	No Instruction N=133 %	Physician N=143 %	Nurse Clinician N=126 %
TIME SINCE DIAGNOSIS				
Less Than 3 Months	12	25	6	6
4 to 6 Months	8	10	8	3
7 to 12 Months	6	6	5	7
1 to 2 Years	18	15	16	24
More Than 2 Years	56	44	65	60
HEALTH CARE PROVIDER				
Physician	46	75	55	6
Nurse Clinician	54	25	45	94
HAS HAD PRIOR INSTRUCTION				
Yes	67	0	100	100
No	33	100	0	0
	N=269 %	N=0 %	N=143 %	N=126 %
TIME OF PRIOR INSTRUCTION				
Less Than 3 Months	18	0	10	26
4 to 6 Months	13	0	7	20
7 to 12 Months	5	0	6	5
1 to 2 Years	22	0	17	27
More Than 2 Years	42	0	60	22
INSTRUCTION PROVIDED BY				
Physician	53	0	100	0
Nurse Clinician	47	0	0	100

(a) Findings. Table 22, p. 62, Comparison of Baseline Scores in Relation to no Instruction, Instruction by a Physician or by a Nurse Clinician. Comparison of these three groups show no statistical difference in their pre-test results.

(b) Discussion. The finding that a history of past education by a nurse or by a physician, or by no one, made absolutely no difference in the pre-test score, is not a very good recommendation for the present system. Many reasons could be conjectured for this finding such as poor retention, teaching the wrong thing, the patient's definition of teaching, and so forth, but they are all academis. What is shown is that the SA approach could and did correct this common deficiency in the hypertensive patient.

(4) Comparison of Baseline Behavioral Outcomes in Relation to no Instruction, Instruction by a Physician or by a Nurse Clinician.

(a) Findings. See Table 23, p. 63, Comparison of Baseline Behavioral Outcomes in Relation to no Instruction, Instruction by a Physician or by a Nurse Clinician. There was no difference between any of the groups on analysis of data.

(b) Discussion. All of this data, coupled with the previous data, indicates a need for a more effective, efficient, cost effective method of providing patient education than now exists in the AMEDD health care delivery system.

k. Cost Analysis for Program Evaluation.

(1) Introduction.

(a) Meaningful change can be effected in the health care delivery system by systematic and rational planning. Hopefully, better planning methods will be followed by higher levels of patient education productivity for the comprehensive health care dollar.

(b) Cost analysis is often viewed as an alternate to evaluation research, but essentially it is a logical extension of it. In order to affix dollar values to the benefits of a program, first there has to be some evaluative evidence of what kinds and how much benefit there has been as was described in the preceding section.[65,66,67,68]

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[65] McKean, R. N., Efficiency in Government Through Systems Analysis (New York, John Wiley & Sons, Inc., 1958).

TABLE 22

COMPARISON OF BASELINE SCORES IN RELATION TO NO INSTRUCTION, INSTRUCTION BY A PHYSICIAN OR BY A NURSE CLINICIAN

GROUPS	0-29%	30-49%	50-69%	70-79%	80-100%
					Criterion Level
COMPOSITE SCORES					
No Instruction N=133/%	2	17	66	15	0
Physician N=143/%	2	19	64	14	1
Nurse Clinician N=126/%	2	14	63	20	1
GENERAL INFORMATION					
No Instruction	5	17	43	20	15
Physician	4	13	41	25	17
Nurse Clinician	5	11	38	26	20
LOW SODIUM DIET					
No Instruction	21	44	35	0	0
Physician	20	49	31	0	0
Nurse Clinician	14	47	36	3	0
MEDICATIONS					
No Instruction	1	4	13	28	54
Physician	1	8	15	36	40
Nurse Clinician	1	6	13	33	47

TABLE 23

COMPARISON BASELINE BEHAVIORAL OUTCOMES IN RELATION TO NO INSTRUCTION, INSTRUCTION BY A PHYSICIAN OR BY A NURSE CLINICIAN

OUTCOMES	No Instruction N=133 %	Physician N=143 %	Nurse Clinician N=126 %
BLOOD PRESSURES			
Systolic			
≤ 140	47	59	65
> 140	53	41	35
Diastolic			
≤ 90	66	70	79
> 90	34	30	21
WEIGHT IN POUNDS			
Mean Weight in Pounds	169	164	164
RANGE OF WEIGHTS			
Range of Weights in Pounds	98 to 293	103 to 267	97 to 291

TABLE 23 continued

OUTCOMES	All Patients N=402 %	No Instruction N=133 %	Physician N=143 %	Nurse Clinician N=126 %
COMPLIES WITH LAB AND ANCILLARY TESTS				
Yes	97	97	96	98
No	3	3	4	2
TAKES MEDICATION				
Yes	88	80	89	95
No	3	5	3	2
N/A	9	15	8	3
Don't Know	0	0	0	0
KNOWS DRUGS AND ACTIONS				
Yes	59	54	55	69
No	41	46	45	31
ADHERES TO LOW SODIUM DIET				
Yes	65	61	62	74
No	22	26	23	17
N/A	13	13	15	9
NUMBER OF CUPS OF COFFEE PER DAY				
0	22	27	17	21
1	15.5	15	15	17
2	18	19	16	21
3	18	17	24	14
4	12	11	14	12
5-9	10	7	8	13
10-19	4	3	6	2
20+	.5	1	0	0

TABLE 23 continued

OUTCOMES	All Patients N=402 %	No Instruction N=133 %	Physician N=143 %	Nurse Clinician N=126 %
NO. CIGARETTES PER DAY				
0	71	70	75	70
1-10	9	11	9	7
11-20	11.5	14	8	13
21-40	8	5	7	10
41+	.5	0	1	0
EXPERIENCE TENSION OR NERVOUSNESS				
Yes	58	60	55	59
No	42	40	45	41
TAKES MEDICATION FOR TENSION				
Yes	30	18	42	31
No	70	82	58	69
TYPE OF PHYSICAL ACTIVITY				
0	50	50	53	45
Sedentary	.5	1	0	0
Light	11	6	12	15
Moderate	15.5	15	20	11
Vigorous	18	20	12	25
Strenuous	5	8	3	4
FREQUENCY OF PHYSICAL ACTIVITY				
Daily	67	63	64	75
Twice Weekly	25	31	25	19
Weekly	8	6	11	6

(c) Following is the documentation for the research and developmental, investment, and operating costs.[69,70,71,72]

(2) Findings.

(a) See Table 24, p. 67, Comparison of the Traditional and Systems Approach Groups in Relation to Research and Development, Investment, and Operating Costs. The table shows that the research and development costs for the traditional method are lower. The total research and development costs for the systems approach were approximately $6203.00 to include the one hour of baseline hypertension information (general information, low sodium diet, and medications). Additionally, the figure represents research and development costs for non-expendable equipment, cost of learning lab space and the cost of validating the instructional strategy by the PACOMED staff. The research and development costs are shown for comparative purposes only. If the Army initiates a prototype such as PACOMED, all research and development would be conducted at a central location. The cost then would not be incurred by the individual MEDDAC or MEDCEN as indicated here. See Appendix C, p. 121, Cost Model for Hypertension Patient Education, with accompanying explanation and Appendix E, p. 131, Communications Media.

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TABLE 24

COMPARISON OF TRADITIONAL AND SYSTEMS APPROACH IN RELATION TO RESEARCH AND DEVELOPMENT, INVESTMENT, AND OPERATING COSTS
(All Cost Values Are In Dollars and Cents)

	Research and Development Costs		Investment Costs		Operating Costs 1 Patient		10 Patients		250 Patients		3000 Patients	
	Trad	SA	Trad	SA	Trad	SA	Trad	SA	Trad	SA	Trad	SA
PERSONNEL												
Physician - Major	0		0	17.85	17.85		178.50		4,462.50		53,550.00	
Nurse - Captain	0		0	9.45	9.45		94.50		2,362.50		28,350.00	
Non-Professional Health Educator - E-5		0		230.00		5.75		5.75		143.75		1725.00
INSTRUCTIONAL MATERIALS												
Books, Booklets, Mimeos, 35mm, 3/4" U-Matic cassette, etc.	0	459.00	0		0		0		0		0	
Non-expendable equipment						0.36		0.36		9.00		108.00
AV equipment	0	684.00	0	3,551.00	0		0		0		0	
Furnishings	0	0	0	3,382.00								
SPACE												
Office - Physician	0		1,848.00		0		0		0		0	
Office - Nurse	1,848.00		1,848.00		0		0		0		0	
Learning Lab		4,606.00		4,606.00		0		0		0		0
ADMINISTRATIVE COSTS												
Validating the instructional program or preparing the presentation — Physician	0		0		0		0		0		0	
Nurse	189.00		0		0		0		0		0	
		454.00		0		0		0		0		0
Typing, Reproduction for pre-post test, objectives, etc	0	0	0	132.00	0	0	0	0	0	0	0	0
Paperwork to individualize the strategy	0	0	0	0	0	0.09	0	0.90	0	22.50	0	270.00
TOTALS — Physician	0		1,848.00		17.85		178.50		4,462.50		53,550.00	
Nurse	2,037.00		1,848.00		9.45		94.50		2,362.50		28,350.00	
Systems Approach		6,203.00		11,928.30		6.20		7.01		175.25		2,103.00

(b) There are no investment costs for the traditional method. The investment costs for the systems approach method were approximately $11,930.55. This included the hourly wage of a nurse or physician, the time needed for staff development in order that the professional knows how to utilize the systems approach for optimum benefit of the patient. See Appendix D, p. 125, Staff Development Outline, the cost for forty hours of instruction of a paraprofessional, the time needed for training an individual to operate and manage a patient learning center. See Appendix F, p. 143, Non-Professional Paramedic as Health Educator. Three-thousand five-hundred and fifty-one dollars of the total amount represents the cost of the non-expendable equipment and $3,382.00 represents the approximate cost of the furnishing for a learning center. See Appendix G, p. 155, Physical Facilities. These costs might appear excessively high, however, once the investment costs are made, the equipment and furnishings can be used for other learning systems as well. For example, DeWitt Army Hospital, Internal Medicine Clinic sees about 3,000 hypertensive patients per year. Giving their instruction via the systems approach, would have represented 300 operating hours or 10 weeks. There are still 40 working weeks left in the year.

(c) Below is a chart illustrating the operating costs for various groups of patients using both traditional and the systems approach.

		Traditional Approach	Systems Approach
1 patient :	Physician	$ 17.85	$ 6.20
	Nurse	9.45	
10 patients:	Physician	$ 178.50	$ 7.01
	Nurse	94.50	
250 patients:	Physician	$ 4,662.50	$ 175.25
	Nurse	2,362.50	
3,000 patients:	Physician	$53,550.00	$2,103.00
	Nurse	28,350.00	

Obviously the SA research and development costs and investment costs were more than the T group but, the operating costs became much lower with the greater number of patients seen (economy of scale) in comparison to the T group operating costs, which became excessively higher (Fig 3, p. 69). Also, when the health care professionals provide the patient education, it lacks uniformity, standardization of baseline information, quality assurance, accountability, task structure, and the appeal to multiple senses needed for better comprehension.

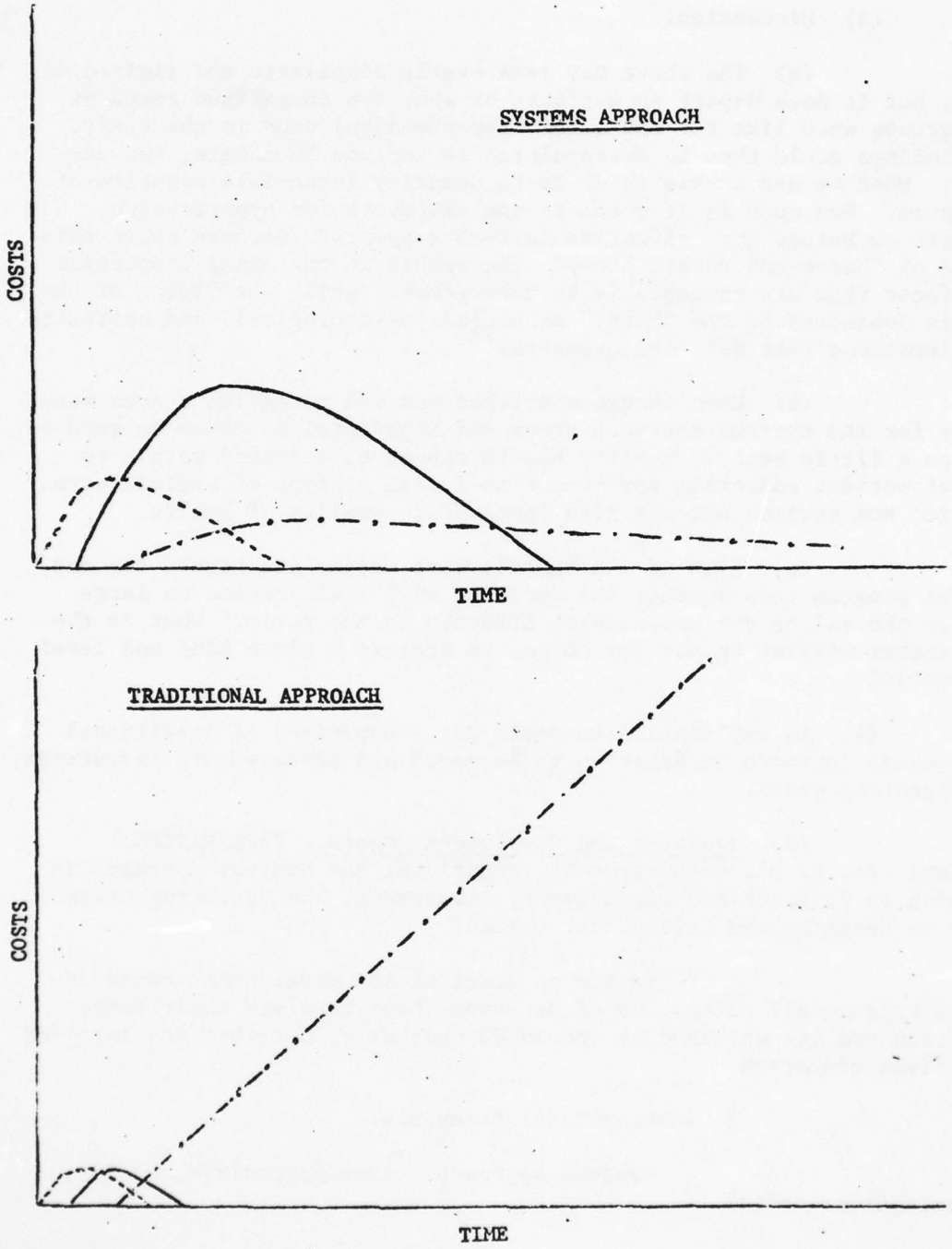

FIGURE 3

RELATIONSHIP BETWEEN COSTS AND THE LIFE CYCLE OF A PROGRAM

(3) Discussion.

(a) The above may seem overly simplistic and limited in scope, but it does depict an estimate of what the comparison costs of both groups were like for the model (hypertension) used in the study. The findings could then be extrapolated to include 50 models, for example. What we are unable to do is to quantify intangible benefits of a program. How much is it worth to the taxpayers for hypertensive patients to become more effective self-care agents? Dorfman calls this a case of "horse-and-rabbit stew." The rabbit is the small proportion of effects that are susceptible to measurement, while the flavor of the stew is dominated by the "horse" of social, psychological, and aesthetic considerations that defy measurements.[73]

(b) Even though comprehension and retention scores were higher for the systems approach group and behavioral outcomes as good or perhaps a little better, quality health cannot be ascribed solely to type of patient education any more than it can to type of medical care. Genetics and environment are also involved in quality of health.

(c) Even if the benefit cost ratios are higher for one type of program than another the decision will still depend in large part on the values the policymaker attaches to the goals. What is the policymaker willing to pay (or forgo) to achieve a given kind and level of benefit?

(4) An explanation to Table 24: Comparison of Traditional and Systems Approach in Relation to Research and Development, Investment, and Operating Costs.

(a) Research and Development Costs. EXPLANATION: See Table 24, p. 67, Comparison of Traditional and Systems Approach in Relation to Research and Development, Investment, and Operating Costs. Refer to Research and Development column.

1 There are no research and development costs involved because all categories of personnel have received their basic education and are utilized by the AMEDD whether or not they are involved in patient education.

2 Instructional Materials.

a Systems Approach. (See Appendix E, p. 131, Communications Media).

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[73]Dorfman, R., "Introduction," Measuring Benefits of Government Investments, The Brookings Institution, Washington, DC, 1965, 1-11.

(1) The $459.00 expenditure under the Systems Approach column represents the cost of the PACOMED script (advanced organizer), low sodium diet, general medications, plus the purchase cost of the general information program. All costs represented are approximately three years old and an inflation kicker has not been added.

(2) The audiovisual equipment costs of $684.00 represents the cost of the 3M sound on slide and the "Voice of Music" pulser which were used for the instructional system design phase.

b Traditional Approach. The traditional approach required no instructional materials.

3 Space. Cost is represented by square feet of space and building cost per square foot which was approximately $14.00. Once the space is paid for, it remains a constant because it represents a sunk cost.

a Traditional Approach. No cost was incurred by the physician because no additional space was needed. A nurse clinician's cost of $1,848.00 would cover an office space of 132 square feet.

b Systems Approach. The space used under the systems approach was 329 square feet which included the learning lab and the health educator's office. The cost would be $4,606.00.

4 Administrative Costs.

a Traditional Approach. Physician: The physician did not have an organized program of instruction. Through personal conversations with several physicians, they stated that they relied mostly on the knowledge learned in medical school and then adjusted it to meet the needs of the patient. No learning objectives or formalized patient assessments (pre-post tests) were used.

b Systems Approach. The $454.00 for the developing of the instructional program included the hourly wage of the PACOMED staff to validate the program. For a further breakdown of the figures see Appendix C, p. 121, Cost Model for Hypertension Patient Education and accompanying information.

(b) Investment Costs. EXPLANATION: See Table 24, p. 67. Refer to Investment Costs column.

1 Personnel.

a Systems Approach. Physician: A cost of $17.85 for one hour of physician time in the systems approach column represents the time needed for staff development to introduce the physician to the PACOMED concept. The rank of "major" was the mean rank of physicians assigned to DeWitt Army Hospital and their hourly wage is based on eight

years service base pay, quarters allowance, subsistence, VIP category 1, medical pay, and 20 percent for fringe benefits.

b Nurse Clinician. A cost of $9.45 for one hour of nurse clinician time in the systems approach column represents the time needed for staff development to introduce the nurse clinician to the PACOMED concept. The rank of "captain" is the mean rank of nurse clinicians assigned to DeWitt Army Hospital and their hourly wage is based on four years service base pay, quarters, allowance, subsistence, and 20 percent for fringe benefits.

c Health Educator. A cost of $230.00 represents the cost of 40 hours of training time needed to enable an E-5 nonprofessional to operate the learning laboratory and related activities. An E-5's hourly wage is based on four years service, quarters allowance, subsistence, and 20 percent for fringe benefits.

2 Instructional Materials.

a Systems Approach. An expenditure of $6,933.00 represents the cost of the audiovisual equipment that was selected once the research and development phase was completed. (This may or may not represent a cost. Most MEDDAC's have several Sony video tape players and receivers that may be utilized if not committed elsewhere.)

b Traditional Approach. The traditional approach required no instructional materials costs.

3 Space.

a Traditional Approach. The cost of $1,848.00 under this approach is for office space and is the same for physicians and nurse clinician.

b Systems Approach. The cost ($4,606.00) for space is the same as in the research and development section. This space was used for staff development as well as giving patient education. See the preceding section.

4 Administrative Costs.

a Systems Approach. The $132.00 for the systems approach covers the cost of typing and reproduction of pre-post tests, objectives, and other forms.

b Traditional Approach. This approach had no administrative costs.

(c) Operating Costs - 1 Patient. EXPLANATION: See Table 24, p. 67. Refer to Operating Costs - 1 Patient.

1 Personnel.

a Traditional Approach.

(1) Physician. Seventeen dollars and eighty-five cents represents the hourly wage, based on 60 minutes, the length of time needed to give baseline hypertensive information.

(2) Nurse Clinician. Nine dollars and forty-five cents represents the hourly wage, based on 60 minutes, the length of time needed to give baseline hypertensive information.

b Systems Approach. Non-Professional Health Educator. Five dollars and seventy-five cents represents the hourly wage, based on 60 minutes, the length of time the health educator would be in the learning laboratory.

2 Instructional Materials.

a Systems Approach. Refer to Appendix C, p. 121, Cost Model for Hypertension Patient Education. The $0.36 refers to the cost per hour of educational hardware and software used to include maintenance amortized for 6,000 hours of operation. (30 hours/week X 40 weeks/year X 5 years = 6,000 hours.)

b Traditional Approach. No instructional materials costs incurred.

3 Space. See preceding sections.

4 Administrative Costs. Systems Approach. Ninety cents represents one set of paperwork needed for each patient to individualize the instructional strategy.

(d) Operating Costs - 10 Patients.

1 Personnel.

a Traditional Approach.

(1) Physician. One hundred and seventy-eight dollars and fifty cents represents the cost for ten hours of physician time needed to give individualized instruction to ten patients.

(2) Nurse Clinician. Ninety-four dollars and fifty cents represents the cost for ten hours of nurse clinician time needed to give individualized instruction to ten patients.

b Systems Approach. Non-Professional Health Educator. Five dollars and seventy-five cents is the cost of giving

individualized instruction to ten patients. This was possible because of the individualized formalized systematic assessments inherent in the systems approach.

2 Instructional Materials.

a Systems Approach. Thirty-six cents is the cost based on the number of patients that could be seen per session (10 patients) in a small learning center. The $0.36 refers to the cost per hour of educational and software use to include maintenance. Once the validated educational system (audiovisual) is developed the cost per hour remains a constant whether one patient or ten patients are given the instruction. The number of patients seen per hour is contingent upon the size of the learning center, number of patients, and the type of referral system.

b Traditional Approach. No instructional materials cost incurred.

3 Space. See preceding sections.

4 Administrative Costs. Systems Approach - $0.90 represents the cost for ten sets of paperwork at $0.09 per set.

(e) Operating Costs - 250 Patients.

1 Personnel.

a Traditional Approach.

(1) Physician. Four thousand four hundred sixty-two dollars and fifty cents represents the cost for 250 hours of physician time. This is the time it would take to give individualized baseline instruction to 250 patients.

(2) Nurse Clinician. Two thousand three hundred sixty-two dollars and fifty cents represents the cost for 250 hours of nurse clinician time.

b Systems Approach. Non-Professional Health Educator. One hundred and forty-three dollars and seventy-five cents represents 25 hours of the paraprofessional's time. It was possible to give baseline individualized instruction to ten patients per hour via the systems approach.

2 Instructional Materials. Systems - $9.00 represents the cost per hour ($0.36) of educational software and hardware use for 25 hours.

3 Space. At this point it would be a constant.

4 Administrative Costs. Systems Approach - $22.50 represents the cost for 250 sets of paperwork at $0.09 a set.

(f) Operating Costs - 3,000 Patients.

1 Personnel.

a Traditional Approach.

(1) Physician. Fifty-three thousand five hundred and fifty dollars represents the cost for 3,000 hours of physician time, the time it would take to give all hypertensive patients who were seen at Andrew Rader US Army Clinic, Fort Myer, Virginia or those seen at DeWitt Army Hospital Internal Medicine Clinic, Fort Belvoir, Virginia in one year, one hour of baseline individualized instruction. Approximately 3,000 hypertensive patients per year are seen in each Internal Medicine Clinic.

(2) Nurse Clinician. Twenty-eight thousand three-hundred fifty dollars represents the cost for 3,000 hours of nurse clinician time, the time it would take to give all the hypertensive patients seen within one year, patient education at one or the other of the clinics.

b Systems Approach. Non-Professional Health Educator. One thousand seven hundred twenty-five dollars represents 300 hours of the health educator's time. Ten patients/hour X 300 hours.

2 Instructional Materials.

a Systems Approach. One hundred and eight dollars represents the cost per hour of educational software and hardware use for 300 hours X $0.36 cost per hour.

b Traditional Approach. Neither the nurse clinicians nor the physicians used any form of nonexpendable equipment. Some physicians and nurse clinicians gave their patients pamphlets or similar literature. Most of the literature was donated by various companies or organizations. There was a lack of consistency between the physicians and nurses as to what was given the patients and when it was given.

3 Space. At this point it would be a constant.

4 Administrative Costs.

a Systems Approach. Two-hundred and seventy dollars represents the cost for 3,000 sets of paperwork at $0.09 a set.

b Traditional Approach. Neither the nurse clinician nor the physicians used any type of formalized systematic

assessment to measure the patients' entry knowledge level, their gain or deficiencies after the intervention.

5. CONCLUSIONS.

a. There is a need for a more effective, efficient, cost effective method of providing patient education than now exists in the AMEDD health care delivery system.

b. The systems approach to a patient education program was demonstrated to have the following advantages or attributes when compared to the traditional approach.

(1) Better comprehension of the information and concepts presented.

(2) Better retention although both groups had a marked loss after six months.

(3) The patients in both groups reported improved behavior after six months. There was a greater gain in the systems approach group. Neither group showed any improvement in the objective measurement of behavioral change, i.e., weight loss.

(4) The SA patients were very positive in their opinion about the instructional experience.

(5) The SA system is shown to be more economical of critical professional manpower resources than the traditional system.

c. The traditional system of patient education with the practitioner instructing the patient could be improved. The individual physician and norse practitioner would be more effective if they were trained in educational techniques and strategies. The traditional system will always be profligate of professional manpower when compared to the systems approach system, but it could be improved so the man hours used were more effective.

d. The Systems Approach methodology described here should not be restricted to patient education programs. It could be used effectively for such things as worker safety and occupational health, preventive medicine, school health education, self-help programs, nutrition, etc.

6. RECOMMENDATIONS.

a. In view of the demonstrated efficiency in the areas of comprehension, retention, reported behavioral outcomes, and cost-effectiveness of the SA approach compared to the T approach, it would appear very desirable to institute this type of patient education program.

b. Consideration should be given to providing in-service or continuing education to physicians and nurses in the area of educational methodology to make the time they spend in patient education more productive.

c. Additional research should be encouraged with the following goals.

(1) To determine requirements for reinforcing education as to quantity and time intervals for maximum retention.

(2) Long term follow-up studies of patients who are adequately educated to determine if there are permanent changes in behavior or life style.

(3) Population studies to determine if adequate patient education can be measured in changing disease patterns, lowering of rates of avoidable sequelae, or lessening of dependence upon medical treatment facilities.

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(NOT USED)

APPENDIX A

TECHNICAL TABULAR AND GRAPHIC DATA PERTAINING TO SUMMARY STATISTICS OF TEST SCORES

APPENDIX A

TECHNICAL TABULAR AND GRAPHIC DATA PERTAINING TO SUMMARY STATISTICS OF TEST SCORES

1. INTRODUCTION.

a. As mentioned in the body of the report, when one uses criterion-referenced tests (as in the PACOMED study), one is interested in the proportion of patients who meet a criterion level of performance. Thus, as was represented in the text a graphic display of the results of a criterion-referenced test gave the percentage of patients who reached the criterion level. This is consistent with current thinking on the use of criterion-referenced measures when one is interested in determining whether patients have achieved a particular prespecified level of performance or not, rather than in placing an individual at a particular point along a scale.

b. What follows is the classical method of reporting the results of the evaluation study such as would be included in standardized achievement tests and many teacher-made tests of academic performance (norm-referenced tests).

c. Caution should be used when viewing the results for the reasons given.

d. Typical statistics obtained for use in prototype evaluation include measures of central tendency (usually averages) and measures of dispersion (often standard deviations).

e. Because the designer of a criterion-referenced test has little interest in discriminating among examinees, no attempt is made to select items to produce a test of maximum test score variability, and thus, that variance will typically be small if instruction is effective. Also, criterion-referenced tests are usually administered either immediately before or after small units of instruction. It is not surprising that frequently homogenous distributions are observed of test scores on pre-post tests, but centered at the low and high ends of the achievement scales, respectively. Additionally, it is well known from the study of classical test theory...that when the variances of test scores is restricted, correlational estimates of reliability and validity will be low. It seems clear that the classical approaches to reliability and validity estimation will need to be interpreted more cautiously (or discarded) in the analysis of criterion-referenced tests.[1,2,3,4,5,6]

[1]Swaminithan, H. and Hambleton, A.J., "Reliability of Criterion-Referenced Test: A Decision-Theoretic Formulation," Journal Of Educational Measurement, Winter, 1974, 11: 263-267.

[2]Popham, J.W., "Implications of Criterion-Referenced Measurement," Journal of Educational Measurement, 1969, 8: 79-89.

[3]Popham, J.W., Educational Evaluation (Englewood Cliffs, NJ, Prentice-Hall Inc, 1975), 20-44.

[4]Popham, J.W., (Ed.) Evaluation in Education: Current Applications (Berkeley, CA, McCutchan Publishing Corp., 1974), 533-585.

[5]Baker, E.L., "Beyond Objectives: Domain-Referenced Tests for Evaluation and Instructional Improvement," Educational Technology, 1974, 14: 10-16.

[6]Cleary, A.T., "Strategies for Criterion-Referenced Test Construction Using Classical Procedures," Paper presented at the Annual Meeting of the American Educational Research Association, 1971, 10.

TABLE 1-1

ANALYSIS OF PRE AND POST SCORES BY TYPE OF INSTRUCTION

GROUPS		MEAN	STANDARD DEVIATION	RANGE
COMPOSITE SCORE				
SA Group (N=202)	pre	43.6	8.3	7 to 60
	post	62.4	8.1	16 to 72
T Group (N=200)	pre	41.5	8.7	16 to 56
	post	47.5	8.4	22 to 68
GENERAL INFORMATION				
SA Group	pre	15.5	4.1	1 to 24
	post	19.5	3.3	3 to 24
T Group	pre	15.3	4.3	2 to 23
	post	17.1	4.1	5 to 24
LOW SODIUM DIET				
SA Group	pre	13.0	4.0	1 to 21
	post	24.8	3.8	9 to 29
T Group	pre	12.0	4.2	0 to 21
	post	15.5	4.5	0 to 26
MEDICATIONS				
SA Group	pre	15.3	2.6	1 to 19
	post	18.1	1.7	4 to 19
T Group	pre	14.2	2.8	7 to 19
	post	15.1	2.4	7 to 19

f. Table 1-1, Analysis Of Pre And Post Scores By Type Of Instruction, is a variant bar graph representing the pre-post test means, standard deviation and ranges.

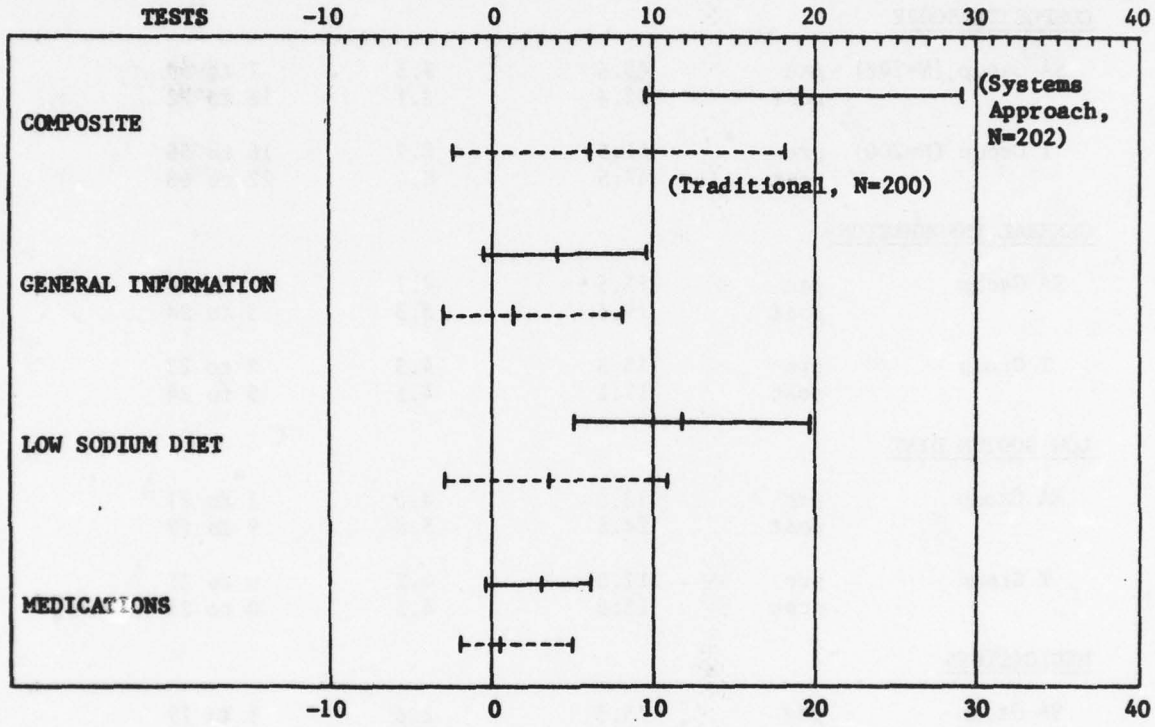
g. Notice that the mean of the SA group is considerably higher than that of the T group.

h. Not only does the mean of the SA group exceed the mean of the T group, but so do the different scores between the pre and post tests that fall between the fifth (P5) and ninety-fifth (P95) percentiles (this does not represent the lowest or the highest score). Percentile indicates the percentage of patients whose scores fall at or below a given score. Thus, at all levels patients in the SA group performed better than patients in the T group.

i. More than three quarters of the patients in the SA group exceed the mean of the T group in the composite and low sodium scores. See Table 1-2, p. 103, Performance Levels Of The Difference Between The Pre And Post Tests (Mean, P5, and P95) For Systems Approach And Traditional Groups.

TABLE 1-2

PERFORMANCE LEVELS OF THE DIFFERENCE BETWEEN THE PRE AND POST TESTS (MEAN, P5, AND P95) FOR SYSTEMS APPROACH AND TRADITIONAL GROUPS



j. Refer to Table 3, p. 20, Percentage Of Patients That Achieved The Criterion Level By Type Of Instruction For The Initial Encounter. Unfortunately, what these summary statistics fail to point out is that 81 percent of the SA group reached the criterion level compared to only 8.5 percent in the T group. The reason for this is that the scores between the 5 to 95 percentile were only represented. However, a consistency of results is seen. Clearly the greatest deficiency in the T group was in the area of low sodium diet.

TABLE 1-3

DIFFERENCE IN MEAN GAIN (POST-PRE) BETWEEN THE SYSTEMS APPROACH AND TRADITIONAL GROUPS

GROUPS POST-PRE SCORES	MEAN GAIN	STANDARD DEVIATION	Z	P
COMPOSITE				
SA Group (N=202)	18.77	.40	21.36	<.0001
T Group (N=200)	5.94	.45		
GENERAL INFORMATION				
SA Group	4.21	.23	4.28	<.0001
T Group	1.79	.24		
LOW SODIUM DIET				
SA Group	11.79	.29	20.77	<.0001
T Group	3.34	.29		
MEDICATIONS				
SA Group	2.77	.13	9.85	<.0001
T Group	.81	.15		

k. Table 1-3 gives the Difference In Mean Gain (Post-Pre) Between The Systems Approach And Traditional Groups.

l. In each case the difference in mean gain (post-pre) between the SA and T groups was statistically significant ($p < .0001$). The greatest difference between the two groups occurs for the sodium restricted diet test. This component contributed most to the difference in total scores.

m. Since the sample sizes (N=202,200) are quite large the test of significance for mean differences was based on the use of the Z test.[7]

n. Notice that a greater mean change (initial post score - 6 month score) occurred in the SA group for each of the three tests. However, the mean score was still higher for each test in the SA group. See Table 1-4, p. 105, Mean Test Scores On Subjects That Had The 6 Month Follow-Up and Table 1-5, p.105, Analysis Of Post-Minus Retention Scores By Type Of Instruction. Also see Tables 1-6,7,8,and 9, Performance Levels Of The Difference Between The Pre/Post And Six Month Tests (mean, P5, and P95) For SA And T Groups: Composite Scores, General Information, Low Sodium Diet, and Medications.

o. Although norm referenced test were not used in the study, it was interesting to note that even with the classical methods of measurement the SA group performed better.

[7] Culton, T., Statistics In Medicine (Boston, Little, Brown, and Co, 1974),139.

TABLE 1-4

MEAN TEST SCORES ON SUBJECTS THAT HAD THE 6 MONTH FOLLOW-UP

		SA GROUP (N=126)		T GROUP (N=124)	
	TEST	MEAN	S.D.	MEAN	S.D.
COMPOSITE:	Pre	43.98	8.1	42.06	7.8
	Post	63.23	7.8	48.14	7.6
	Post-Pre	19.25	5.7	6.08	6.1
	6 Month	50.62	7.4	45.59	7.2
	6 Mo Loss	12.61	6.6	2.55	6.6
GENERAL	Pre	15.11	4.2	15.52	3.8
INFORMATION:	Post	19.71	3.7	17.24	3.8
	Post-Pre	4.60	3.2	1.72	3.2
	6 Month	16.90	3.4	15.75	1.9
	6 Mo Loss	2.81	3.8	1.50	3.7
LOW	Pre	13.25	3.9	12.24	3.8
SODIUM	Post	25.32	3.6	15.84	4.1
DIET:	Post-Pre	12.07	4.1	3.60	4.1
	6 Month	17.57	3.6	15.08	3.6
	6 Mo Loss	7.75	3.6	.76	4.4
MEDICATIONS:	Pre	15.63	2.3	14.30	2.8
	Post	18.21	1.6	15.06	2.4
	Post-Pre	2.58	1.6	.76	2.2
	6 Month	16.15	2.3	14.76	2.5
	6 Mo Loss	2.06	2.2	.30	2.3

TABLE 1-5

ANALYSIS OF POST-MINUS RETENTION SCORES BY TYPE OF INSTRUCTION

GROUPS	MEAN	S.D.	RANGE
COMPOSITE SCORE			
SA Group (N=126)	-12.6	6.6	-33 to 19
T Group (N=124)	- 2.6	6.6	-25 to 15
GENERAL INFORMATION			
SA Group	- 2.8	3.8	-16 to 8
T Group	- 1.5	3.7	-12 to 7
LOW SODIUM DIET			
SA Group	- 7.7	3.61	-16 to 5
T Group	- 0.8	4.43	-14 to 12
MEDICATIONS			
SA Group	- 2.0	2.2	-10 to 6
T Group	- 0.3	2.3	-10 to 5

TABLE 1-6

PERFORMANCE LEVELS OF THE DIFFERENCE BETWEEN THE PRE/POST AND SIX MONTH TESTS (mean, P5, and P95) FOR SA AND T GROUPS

COMPOSITE SCORES

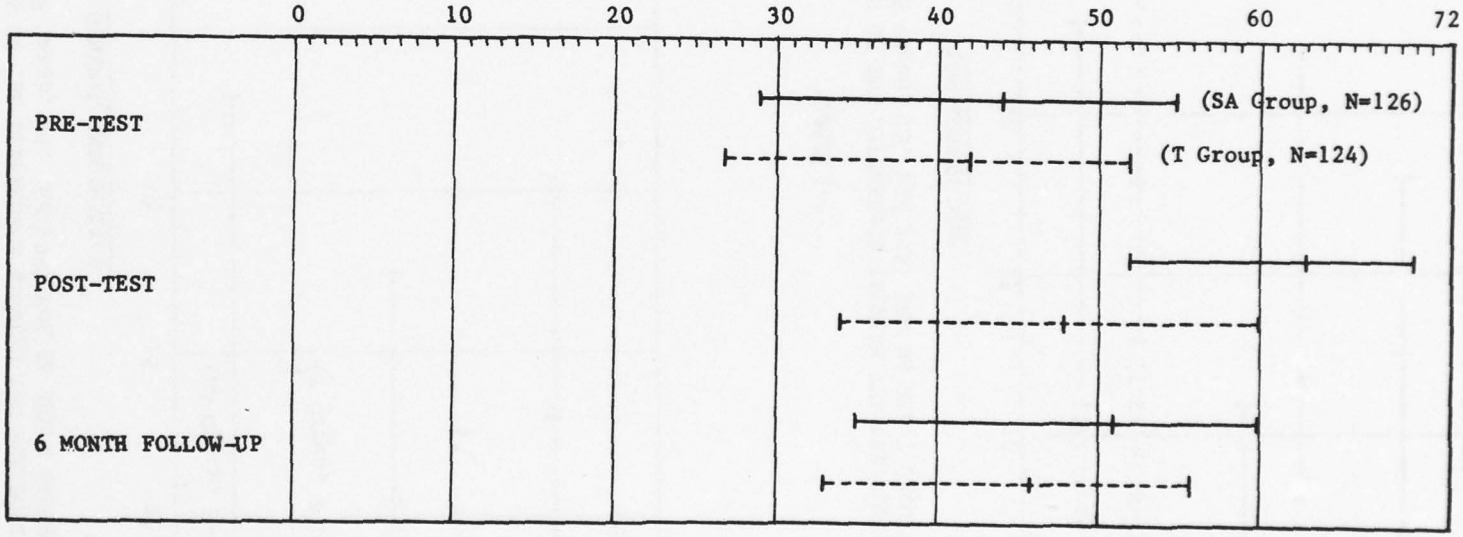


TABLE 1-7

PERFORMANCE LEVELS OF THE DIFFERENCE BETWEEN THE PRE/POST AND SIX MONTH TESTS (mean, P5, and P95) FOR SA AND T GROUPS

GENERAL INFORMATION

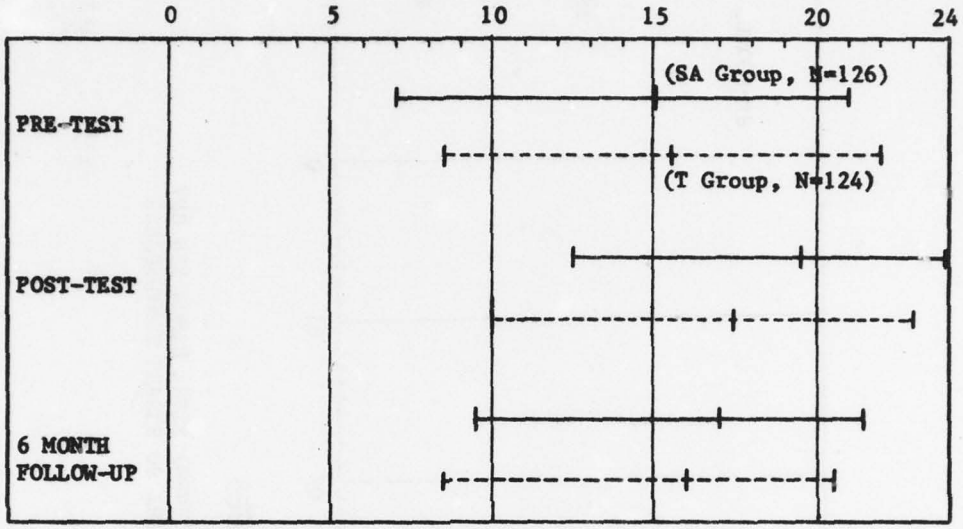


TABLE 1-8

PERFORMANCE LEVELS OF THE DIFFERENCE BETWEEN THE PRE/POST AND SIX MONTH TESTS (mean, P5, and P95) FOR SA AND T GROUPS

LOW SODIUM DIET

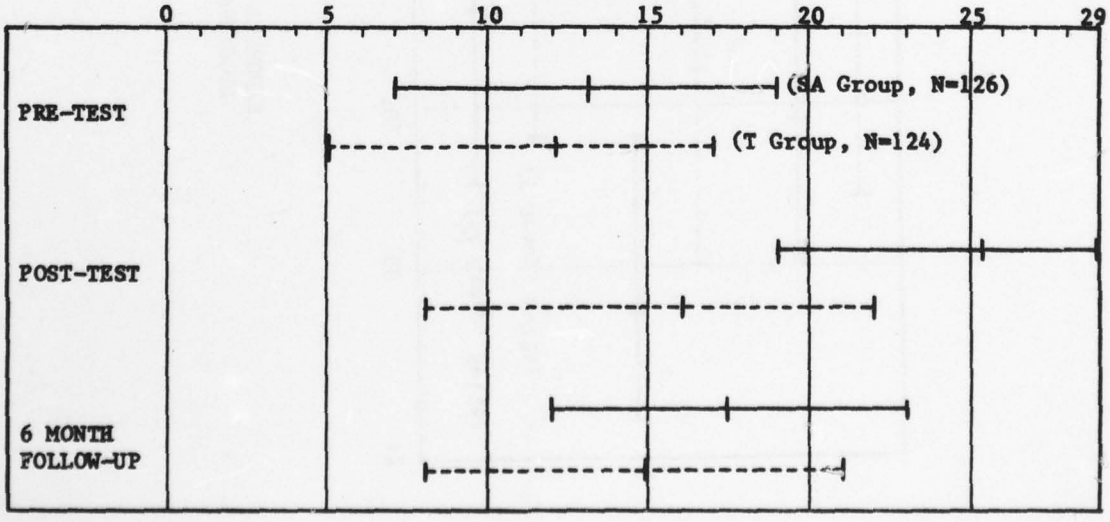


TABLE 1-9

PERFORMANCE LEVELS OF THE DIFFERENCE BETWEEN THE PRE/POST AND SIX MONTH TESTS (mean, P5, and P95) FOR SA AND T GROUPS

MEDICATIONS

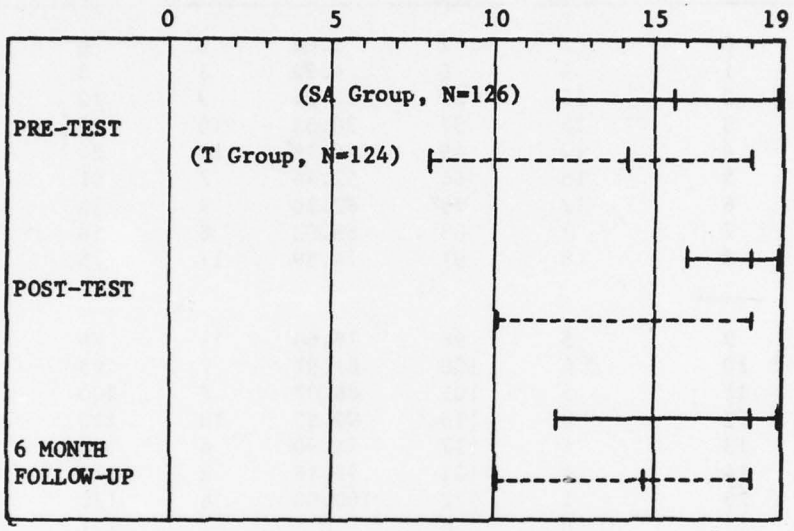


TABLE 1-10

CUMULATIVE DISTRIBUTION OF ROTTER'S TEST SCORES IN SA AND T GROUPS

	ROTTER'S SCORE	SA GROUP # Subj	SA GROUP Cum # Subj	SA GROUP Cum %	T GROUP # Subj	T GROUP Cum # Subj	T GROUP Cum %
Externally Controlled Internally Controlled	0	2	2	1.64	0	0	0
	1	4	6	4.92	3	3	2.46
	2	15	21	17.21	9	12	9.84
	3	16	37	30.33	10	22	18.03
	4	12	49	40.16	12	34	27.87
	5	15	64	52.46	7	41	33.61
	6	12	76	62.30	9	50	40.98
	7	7	83	68.03	8	58	47.54
	8	8	91	74.59	17	75	61.48
	9	5	96	78.69	11	86	70.49
	10	4	100	81.97	7	93	76.23
	11	5	105	86.07	7	100	81.97
	12	8	113	92.62	10	110	90.16
	13	4	117	95.90	4	114	93.44
	14	4	121	99.18	2	116	95.08
	15	1	122	100.00	4	120	98.36
	17	0	0	0	1	121	99.18
	18	0	0	0	1	122	100.00
	TOTAL	122*			122*		

* Note: 4 missing (code 99) in SA group, (N=126).
2 missing (code 99) in T group, (N=124).

Referring to the Cumulative % columns, the SA group has 74.59 percent with scores less than or equal to 8 (0-8) whereas the T group has only 61.48 percent with scores ranging from 0 thru 8.

p. See Table 1-10, p.109 , Cumulative Distribution Of Rotter's Test Scores In SA And T Groups, and Table 1-10, Figure 1-1, p.110 , (constructed from the cumulative percentages in Table 1-10. Given are the distribution of Rotter Test Scores in the SA and T groups.

q. Figure 1-1 clearly shows that the SA group tends to have lower Rotter test scores (its cumulative distribution is shifted to the left). Or, the results show that more subjects are internally controlled in the SA group, 74.59 percent compared to 61.48 percent in the T group.

TABLE 1-10

CUMULATIVE DISTRIBUTION OF ROTTER'S TEST SCORES IN SA AND T GROUPS

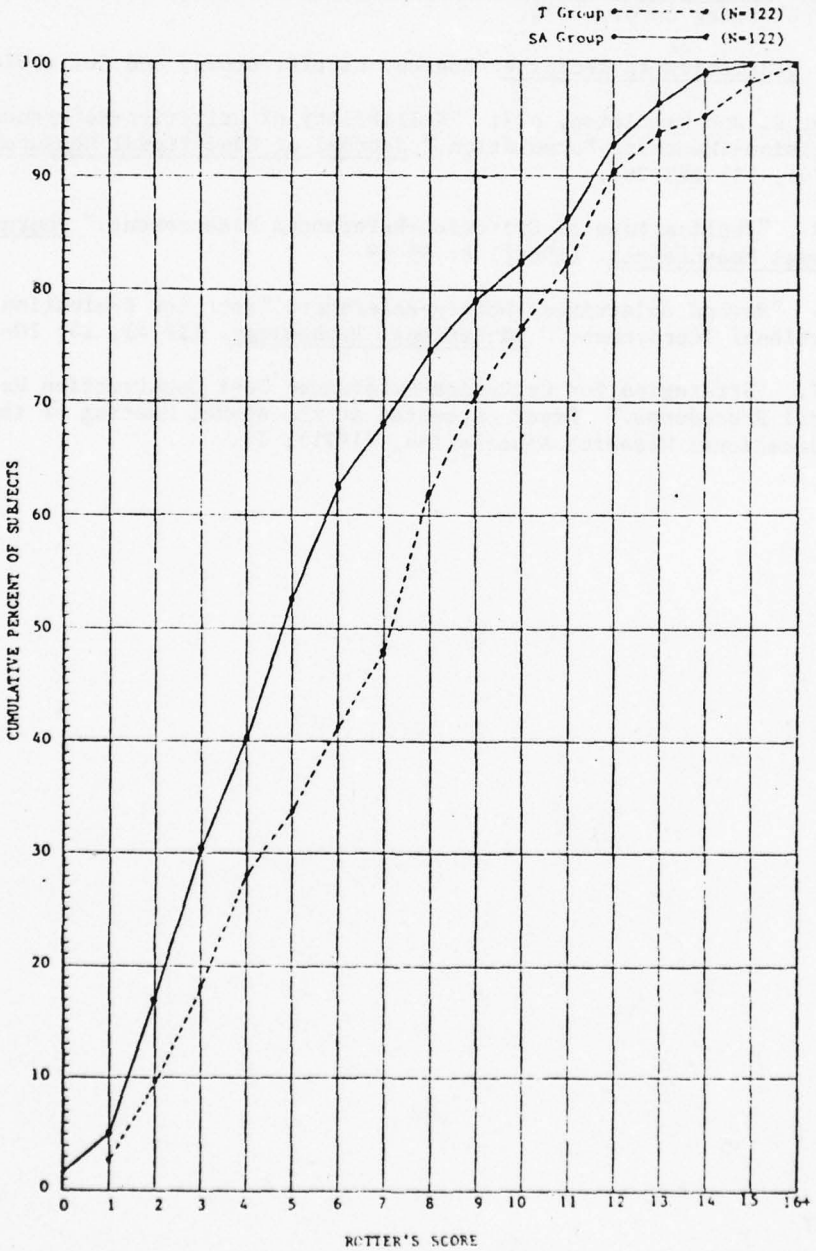


FIGURE 1-1

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Baker, E.L. "Beyond Objectives: Domain-Referenced Tests for Evaluation and Instructional Improvement." Educational Technology. (1974), 14: 10-16.

Cleary, A.T. "Strategies for Criterion-Referenced Test Construction Using Classical Procedures." Paper presented at the Annual Meeting of the American Educational Research Association, (1971), 10.

APPENDIX B

RAW SCORES OF BASELINE AND 6 MONTH BEHAVIORAL MEASURES PRIOR TO CONVERSION TO PERCENTAGES

APPENDIX B

RAW SCORES OF BASELINE AND 6 MONTH BEHAVIORAL MEASURES
PRIOR TO CONVERSION TO PERCENTAGES

SYSTEMS APPROACH GROUP (Initial and 6 Month) N=126

COMPLIES WITH LAB AND ANCILLARY TESTS

Initial \ 6 Month	0 (blank)	Yes	No	
0 (blank)	0	0	0	0
Yes	0	124	1	125
No	0	1	0	1
	0	125	1	126

TAKES MEDICATION

Initial \ 6 Month	0 (blank)	Yes	No	N/A	Don't Know	
0 (blank)	0	0	0	0	0	0
Yes	0	106	0	3	0	109
No	0	5	0	0	0	5
N/A	0	3	0	9	0	12
Don't Know	0	0	0	0	0	0
	0	114	0	12	0	126

KNOWS DRUGS AND ACTIONS

Initial \ 6 Month	0 (blank)	Yes	No	N/A	
0 (blank)	0	0	0	0	0
Yes	0	77	3	0	80
No	0	24	7	3	34
N/A	0	3	0	9	12
	0	104	10	12	126

ADHERES TO LOW SODIUM DIET

Initial \ 6 Month	0 (blank)	Yes	No	N/A	
0 (blank)	0	0	0	0	0
Yes	0	78	3	0	81
No	0	27	5	0	32
N/A	1	12	0	0	13
	1	117	8	0	126

NUMBER OF CUPS OF COFFEE/DAY

Initial \ 6 Month	0 (blank)	1	2	3	4	5-9	10-19	20+	
0 (blank)	27	2	1	1	0	0	0	0	31
1	4	15	1	1	0	0	0	0	21
2	6	6	5	2	0	1	0	0	20
3	3	2	6	7	1	0	0	0	19
4	6	1	4	1	0	0	0	1	13
5-9	6	0	2	2	3	0	1	0	14
10-19	1	1	0	0	3	1	2	0	8
20+	0	0	0	0	0	0	0	0	0
	53	27	19	14	7	2	3	1	126

NUMBER OF CIGARETTES/DAY

Initial \ 6 Month	0 (blank)	1-10	11-20	21-40	41+	
0 (blank)	86	1	0	0	0	87
1-10	1	10	2	0	0	13
11-20	1	1	13	0	0	15
21-40	0	2	5	3	1	11
41+	0	0	0	0	0	0
	88	14	20	3	1	126

DECREASE IN TENSION

Initial \ 6 Month	0 (blank)	Yes	No	
0 (blank)	0	0	0	0
Yes	0	44	39	83
No	43	0	0	43
	43	44	39	126

TYPE OF PHYSICAL ACTIVITY

Initial \ 6 Month	0 (blank)	Sedentary	Light	Moderate	Vigorous	Strenuous	
0 (blank)	15	0	2	22	16	2	57
Sedentary	0	0	0	0	0	0	0
Light	1	1	1	4	4	1	12
Moderate	1	0	0	7	6	1	15
Vigorous	0	0	1	7	23	1	32
Strenucus	1	0	1	0	2	6	10
	18	1	5	40	51	11	126

FREQUENCY OF PHYSICAL ACTIVITY

Initial \ 6 Month	0 (blank)	Daily	Twice Weekly	Weekly	
0 (blank)	15	31	8	3	57
Daily	1	50	1	0	52
Twice Weekly	0	6	4	0	10
Weekly	2	3	1	1	7
	18	90	14	4	126

TRADITIONAL APPROACH GROUP (Initial and 6 Month) N=124

COMPLIES WITH LAB AND ANCILLARY TESTS

Initial \ 6 Month	0 (blank)	Yes	No	
0 (blank)	0	0	0	0
Yes	0	115	4	119
No	0	5	0	5
	0	120	4	124

TAKES MEDICATION

Initial \ 6 Month	0 (blank)	Yes	No	N/A	Don't Know	
0 (blank)	0	0	0	0	0	0
Yes	0	114	0	4	0	118
No	0	0	0	3	0	3
N/A	0	2	1	0	0	3
Don't Know	0	0	0	0	0	0
	0	116	1	7	0	124

KNOWS DRUGS AND ACTIONS

Initial \ 6 Month	0 (blank)	Yes	No	N/A	
0 (blank)	0	0	0	0	0
Yes	0	57	8	2	67
No	0	36	13	5	54
N/A	0	2	1	0	3
	0	95	22	7	124

ADHERES TO LOW SODIUM DIET

Initial \ 6 Month	0 (blank)	Yes	No	N/A	
0 (blank)	0	0	0	0	0
Yes	0	78	1	0	79
No	0	13	9	1	23
N/A	0	16	2	4	22
	0	107	12	5	124

NUMBER OF CUPS OF COFFEE/DAY

Initial \ 6 Month	0 (blank)	1	2	3	4	5-9	10-19	20+	
0 (blank)	16	0	2	1	0	0	0	0	19
1	6	13	1	0	0	0	0	0	20
2	6	2	11	2	1	0	0	0	22
3	1	1	11	9	4	2	0	0	28
4	3	1	4	5	7	1	0	0	21
5-9	2	1	0	1	3	4	0	0	11
10-19	2	1	0	0	0	0	0	0	3
20+	0	0	0	0	0	0	0	0	0
	36	19	29	18	15	7	0	0	124

NUMBER OF CIGARETTES/DAY

Initial \ 6 Month	0 (blank)	1-10	11-20	21-40	41+	
0 (blank)	87	1	1	0	0	89
1-10	1	5	1	0	0	7
11-20	0	1	11	4	0	16
21-40	0	0	1	10	0	11
41+	0	0	0	0	1	1
	88	7	14	14	1	124

DECREASE IN TENSION

Initial \ 6 Month	0 (blank)	Yes	No	
0 (blank)	0	0	0	0
Yes	0	30	30	60
No	61	2	1	64
	61	32	31	124

TYPE OF PHYSICAL ACTIVITY

Initial \ 6 Month	0 (blank)	Sedentary	Light	Moderate	Vigorous	Strenuous	
0 (blank)	25	0	4	28	9	0	66
Sedentary	0	0	0	0	0	0	0
Light	0	0	1	10	4	0	15
Moderate	2	0	1	13	11	0	27
Vigorous	1	0	3	1	8	1	14
Strenuous	0	0	0	0	1	1	2
	28	0	9	52	33	2	124

FREQUENCY OF PHYSICAL ACTIVITY

Initial \ 6 Month	0 (blank)	Daily	Twice Weekly	Weekly	
0 (blank)	25	28	10	3	66
Daily	2	33	0	0	35
Twice Weekly	1	12	5	1	19
Weekly	0	3	1	0	4
	28	76	16	4	124

APPENDIX C

COST MODEL FOR HYPERTENSION PATIENT EDUCATION

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COST MODEL FOR HYPERTENSION PATIENT EDUCATION

HARDWARE	RESEARCH & DEVELOPMENT COSTS	OPERATING COSTS PER HOUR
3M Sound on Slide	$459.00	Only for developmental purposes.
Voice of Music Recorder/ Pulser	225.00	
TOTAL	$684.00	
SOFTWARE	**RESEARCH & DEVELOPMENT COSTS**	**OPERATING COSTS PER HOUR**
PACOMED Script (Advanced Organizer)	$194.00	$0.032
MEDFACT: General Info Hypertension	65.00	.011
PACOMED + BRADY: Low Sodium Diet	100.00	.016
PACOMED + BRADY: General Medications	100.00	.016
SUB-TOTAL	$459.00	$0.075*
HARDWARE	**INVESTMENT COSTS**	**OPERATING COSTS PER HOUR**
Sony Video Tape Player (3/4 inch)	$884.00	$0.147
Sony Video Tape Receiver	487.00	.081
Headphones	14.00	.002
Listening Center	13.00	.002
Maintenance	For each piece of equipment = 1¢/Unit Hour	.05
SUB-TOTAL	$1,398.00	$0.282*
TOTAL**		$0.36
ADDITIONAL TRACKS		
MEDFACT: Weight Control	$65.00	$0.011***
Smoking	$65.00	$0.011***
ADMINISTRATIVE COSTS		
Developmental	$454.00	
Typing & Reproduction	132.00	
Paperwork to Individualize Strategy		$0.09
SUB-TOTAL	$586.00	$0.09
TOTAL**	$2,443.00	$0.45

* Cost per hour of educational hardware and software use remains a constant whether one patient, ten patients, or twenty patients are given the instruction.

** Total costs rounded to the nearest cent.

*** Extra tracks to individualize as required, costs can be added as indicated.

APPENDIX C

DEVELOPMENT OF COST MODEL FOR HYPERTENSION PATIENT EDUCATION

The information used for hypertension patient education was based on the optimum level of baseline knowledge needed by every hypertensive. (The optimum baseline knowledge was determined by the physician assigned, PACOMED Project Director, PACOMED staff, and a representative number of patients with the disease.) Enumerated are the costs of the educational hardware, software, administrative and personnel expenses necessary to operate the learning strategy. The time involved to administer the baseline learning strategy was approximately 50 - 60 minutes.

EXPLANATION

Cost Model for Hypertension Patient Education:

1. Categories: Educational hardware, software, maintenance, administrative and personnel costs.

2. The research and development, investment, and operating costs of the educational hardware and software.

3. The computed cost per hour of the educational hardware and software. This required an estimate of the useful life of the educational hardware and software in terms of hours of operation. In this case, the estimate is that all of the educational hardware and software that was compared will last five years (minimum) or for 6,000 hours of operation. This was based on 30 hours per week, times 40 weeks per year for 5 years. Amortized for 6,000 hours of operation. (30 Hrs/Wk X 40 Wks/Yr X 5 Yrs= 6,000 Hrs.)

4. It is also estimated that repairs and maintenance for each piece of equipment would cost one cent per unit hour.[1]

5. Administrative costs are self explanatory, i.e., the developmental costs were based on the hourly wage of the PACOMED personnel involved in the validation process, plus the material costs.

6. See various sub-components. The total costs would depend on the various combinations used. For example, (Sub-total) educational hardware and software + (Sub-total) administrative costs + (Sub-total) personnel = total. For purposes of this study only the three main components were used: general information, low sodium diet, and medications.

[1]Johnson, S.R. and Johnson, R.B., Developing Individualized Instructional Material (Westinghouse Learning Press: Palo Alto, CA, 1970).

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APPENDIX D

LESSON PLAN FOR PROFESSIONAL STAFF

APPENDIX D

LESSON PLAN FOR PROFESSIONAL STAFF

1. INTRODUCTION.

a. PACOMED (Patient and Community Health Education Model) is a pilot project for the development and evaluation of patient and community health education. The overall purpose of this effort is to utilize non-professional personnel and appropriate educational technology in the task of meeting some of the needs of patients and community health education.

b. Objectives of study.

(1) To identify cost-effective, feasible ways of delivering patient education.
(2) To guarantee an important resource for the professional in fulfilling his/her patient education responsibilities.
(3) To help minimize the medical workload.
(4) To assure medical accountability in the patient education area.
(5) To improve medical management.
(6) To decrease patient recidivism.
(7) To enhance patient satisfaction.
(8) To assist the patient consumer to be an effective self-care agent.

c. Evolution of PACOMED.

(1) Protocol initiated January 1974.

(2) Study conducted under the auspices of

Health Care Studies Division
Academy of Health Sciences
Fort Sam Houston, Texas 78234

(3) Study monitor.

Ambulatory Care Division
Health Services Command
Fort Sam Houston, Texas 78234

(4) Site selection.

Outpatient Facility
DeWitt Army Hospital
Fort Belvoir, Virginia 22060

(5) Personnel.

(6) Interface with Family Practice.

d. Systematic assessment of patient education needs.

(1) Professional personnel.

(2) Potential patient consumers.

(3) Patient consumers (Family Practice Clinic and AMIC).

(4) Baseline for patient teaching currently being done.

e. Development Component: Description of the Prototype System.

(1) Location of the Patient Education Center.

(2) Self-instructional units.

(3) Multi-media approach.

(4) Expanded role of patient as self-care agent.

(5) Non-professional as health educator.

(6) Validated audio-visual programs.

(7) Pre-set behavioral objectives.

(8) Individualized programs.

(9) Observable goals.

(Note: Show briefing tape)

f. Formative Evaluation: Validation of instructional strategies.

(1) Topic selection.

(2) Content consultant.

(3) Development of behavioral objectives.

(4) "Real World" search for existing educational software.

(5) Evaluation of existing educational software.

(6) Development of criterion measures.

(7) Design of the instructional system.

(8) Formative evaluation (30 subjects for every topic).

(9) Data collection.

(10) Revision

(11) Physician evaluation.

(12) Cost Analysis.

(13) Final staff evaluation.

2. STAFF DEVELOPMENT.

a. In order for any comprehensive medical system to be effective, the professional user must have a general knowledge of all components (patient education, in this instance) being offered.

(1) All newly assigned physicians, nurse clinicians, dieticians, and physical therapists will receive an orientation to PACOMED as soon as possible.

(2) All will receive an introduction to each patient education system being offered prior to utilizing the system for patient referral.

b. Procedure.

(1) Physician, nurse clinician, dietician, or physical therapist initiates request on special form.

(2) Patient gives form to receptionist, who routes it to PACOMED staff.

(3) PACOMED staff schedules patient and notifies him.

(4) PACOMED staff provides feedback information to physician, nurse clinician, dietician, or physical therapist.

(a) when patient completes program,
(b) when patient does not comply, and
(c) to include any difficulties patient has with program.

(5) Return visits will be scheduled at time of initial encounter.

(6) Patients to receive more than one educational package will not be scheduled to receive the second until completion of the first.

c. Systems utilized and number of visits required (minimum).

(1)	hypertension	two visits
(2)	diabetes	two, three, if on insulin
(3)	weight control	two
(4)	breast self-examination	one
(5)	vaginitis	one
(6)	family planning	one
(7)	child growth and devel.	one
(8)	low back pain	one

Note: only exception to above will be if patient does not reach competency level and must return for additional information or reinforcement.

all patients obtaining scores of 80 percent or higher on pre-test will not be required to see that portion of the learning package.

3. SUMMARY.

a. The patient learning center can be an efficient, cost-effective source of health education if we:

(1) refer all the patients needing health education,

(2) tell the patients what they can expect,

(3) tell the patients what we expect,

(4) have a general knowledge of all programs, and

(5) approach the PACOMED concept with a positive attitude.

APPENDIX E

COMMUNICATIONS MEDIA

APPENDIX E

COMMUNICATIONS MEDIA

1. INTRODUCTION.

Health care personnel are correct in being concerned about having ready access to rich and varied collections of patient education materials, equipment and services. They are beginning to understand how such resources influence both the nature and the quality of their patients' medical management.[1]

The term "medium" has many definitions, from a solution for mixing paints to a person who purports to make contact with the dear departed. In all of its meanings, however, a medium is something in the middle, between other things, and most often it is considered as a vehicle or instrument for making something happen. In instruction or in advertising, to mention two common examples of systems which use communication, media includes all the different kinds of methods and devices that these systems use to achieve their disparate ends.[2]

Communication media have frequently been confused in many people's thinking with communication aids, particularly in instruction. The main obstacle to the application of media to the patient education process is inability or unwillingness to acknowledge the full consequences of the fundamental changes that have occurred in communications.[3] As audiovisual materials have been successively introduced into the health care environment, they have been dealt with on the basis of aids to those who used them. They have not been conceived of as self-contained instruction, and utilization procedures have assumed the necessity of a professional health care worker to complete the instructional task. All audiovisual aids have been subsumed under the health care personnel and there rested the final decision in regard to use.[4] Although certain studies and some programs, notably in the Armed Forces, have indicated that audio-visual materials could be far more than aids, tradition has definitely prevailed.

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[1]Kucha, D.H., The Design, Development, and Evaluation of An Empirical Model of An Outpatient Health Information and Management System (Unpublished Doctoral Dissertation, The Catholic University of America, Washington D.C., 1973), 93-123.

[2]Bretz, R., A Taxonomy of Communication Media (Englewood Cliffs, N.J., Educational Technology Publications, 1971), 5.

[3]Allen, W.H., "Intellectual Abilities and Instructional Media Design," A/V Communication Review, 1975, 23: 139-170.

[4]Levie, H.W. and Dickie, K.E., "The Analysis and Application of Media," In R.M.W. Travers (Ed.), Second Handbook of Research on Teaching (Chicago, Rand McNally, 1973), 858-882.

When newer methods, such as television, language laboratories, and programmed instruction (including computer assisted instruction) were developed, attempts were made to make them conform to the traditional pattern. However, experience with new technologies of instruction indicates that rather than being aids, such technologies can be treated as self-contained instruction, permitting the user to assign with confidence major instructional tasks to mediated instruction. Concomitant with these developments has been the growing incorporation of traditional audiovisual materials, particularly films, into large packages intended not only to carry a major share of the instructional burden, but also to establish the entire instructional format.[5] While it is possible to reduce technologies of instruction to aids, it is apparent that their proper and intended use breaks the traditional instructional pattern. Mediated instruction does not extend the health care instructor, it represents alternate ways of achieving instructional goals. Programmed instruction, for example, is not an aid to health care instruction in the same sense as is the chalkboard or the overhead projector; it is designed to teach behavioral objectives set forth by another instructor, the programmer.[6]

While communication media cannot take over all the health education functions now performed by a good health care provider, they have enormous potential for increasing both the quality and quantity of available health education. A few generalizations can be made regarding the advantages of these resources:

(1) They can relieve the health care workers of repetition, thereby freeing them to use their time more creatively. It is inefficient to use the time of physicians and other health care workers to repeat basic instructions to a patient when various types of media and accompanying instructional systems can do the task equally well or better.

(2) Technology can free health education teaching from its stereotype. Through the use of films, videotapes, and storage retrieval systems, patients have access to better and more flexible instructional resources.

(3) Technology can raise the quality of patient education by providing more and better instruction. It can present information to patients who have varying abilities and allow all of them to learn at their own rate of speed. These resources have not been fully exploited in the task of meeting needs of patient education.

a. Purpose.

To identify and evaluate the most cost effective and efficient media in which to transmit the validated learning systems.

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[5]Ibid.

[6]Kanner, J.H. and Rosenstein, A.J., "Television and Army Training: Color vs Black and White," A/V Communication Review, 1960, 8: 243-252.

b. Background.

When video tape first became available, in 1956, it started a revolution in the television industry which was very far-reaching in its effects. Television has been primarily a full telemedium which produced its own software, even though films had always been an important ingredient of television programming and the broadcast of kinerecordings had been increasing. With video tape, there seemed little advantage in doing much live programming anymore. Television changed rapidly from a telecommunication medium to a transmission medium. The chief recording medium transmitted continued to be sound film, but video tape soon became a close second.

In instructional television, where the technical costs of equipment and recording stock are proportionately larger budget items than they are in entertainment production, video tape provides a more feasible medium than film for many purposes. This has been increasingly true with the development of inexpensive, portable video tape recorders. At the present writing, there are about 40 manufacturers of protable video tape equipment. From the 1956 cost of $75,000 for the first VTR machines that appeared on the market, the cost of equipment providing comparable picture quality dropped to around $25,000, and equipment designed to somewhat lower quality standards went down to $12,000, then $8,000, then $3,000. In the middle sixties, VTR machines costing under $1,000 appeared in department stores for sale to the home market. The outlook is that the cost of such machines may eventually be reduced to under $750. Standard broadcast machines use 2-inch tape; the less expensive models generally use 1-inch, 3/4-inch, or 1/2-inch tape. Two Japanese firms introduced 1/2-inch and 3/4-inch video tape in cassette form during 1969. Since video recorders are only slightly more complicated to operate than audio-recorders, and the tape is similarly reusable, video tape now ranks with audio tape as a leading home--or local--production medium.[7]

Audio-still-visual media are capable of all the representations of information that class I media can provide, except that they cannot represent visual images in motion. However, they have the advantages of being very much less expensive and of having simpler hardware, simpler production procedures and simpler transmission problems.

Still-picture television is the most promising unexplored telecommunication medium. It appears to approach both television's universality of use and radio's inexpensiveness.[8]

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[7]Op. Cit. Bretz, 101-107.

[8]Ibid.

2. OBJECTIVES.

a. To identify a medium that would maximize the Army's (and the AMEDD's) existing resources;

b. To identify a medium which would be acceptable for adult education;

c. To identify a medium that would be compatible with the systematic approach to designing instruction;

d. To identify a medium which would be the most successful for relaying objectives that are mostly cognitive, but that was relatively effective with skill and affective objectives;

e. To identify a medium that has acceptable picture and sound quality;

f. To identify a medium that would allow for ease of operation, portability and have minimal maintenance;

g. To identify a medium that would have medium to low duplication costs.

3. METHODOLOGY AND FINDINGS.

a. Overview and Procedures.

(1) In July 1976 the final report for the Strategy For Instructional Systems Design Process and Formative Evaluation was submitted. In that report under Findings, the results of testing three different types of educational hardware were given. In essence the findings were: the PACOMED staff found the video cassette format was cost-effective and reliable. Additionally, the playback unit allowed for: (a) ease of operation, (b) could be reversed for review without losing a portion of the program, (c) was very quiet during operation, (d) was less expensive to reproduce a program than the other formats, and (e) could be a cost savings since most Army hospitals already have the video playback units available to them.[9]

(2) Following is a description of the selection of the "messenger to carry the message" (the format and/or media selection).

[9]Kucha, D.H. and Everett, S.W., Strategy for Instructional Systems Design Process and Formative Evaluation (Final Report, July 1976, HCSD, AHS, FSHTX), 13-15.

4. DISCUSSIONS.

a. Utilizing the Army's Existing Resources.

(1) The Army started using video units in late 1970 (Recommendations were derived from a study conducted by the Combat Training Board 1970). Then after standardization on 3/4 inch tape by several major companies, the Army did their "major buy" between the years of 1971 and 1974. Because of the Army's enormous investment in studios, equipment, etc., this format will be used until at least 1985. Consequently, in light of cost effectiveness the format was basically predetermined prior to the conception of project PACOMED. In most military installations and hospitals other than lectures, television is the primary medium of instruction. Therefore in this area, no major investments would be needed to utilize the 3/4 inch videocassette format for patient education.[10]

b. Adult Education.

(1) America leads the world in Adult Education. Almost any issue of any popular magazine or Sunday supplement will provide advertisements for a dazzling display of self-improvement courses. The total number of adults occupied in adult education is conservatively estimated to be half of our population. This apparent thirst for self-improvement can be used to advantage by health planners and providers alike by giving the consumers the health information and education they are seeking and asking for. One does not need to be a Jules Verne to grasp the possibilities and potential outlets for vidiocassettes. In fact, in the not too distant future the patient education programs can be given to the patients to play in the covenience of their homes. Videocassette (and soon vidiodisc) technology has the power and the mode to spread patient education and information more widely and make its surface attractions even more interesting to the general public through proper programming and advertising. Also, through evaluation hazards may be prevented, and losses may be anticipated. It requires, first, prescience and second, organization, before the technology of videocassettes inundates the consumer patient education market, that is, soon. Videocassettes also represent a potential liberation for the health care provider by being able to provide accountability in the area of health education to every patient for a nominal cost.[11]

[10]Telecon, 23 February, 1977, Major Russell, Director of the United States Army Audio Visual Activity, Pentagon, HDQ's, Dept. of the Army.

[11]Gordon, G.N. and Falk, I.A., Videocassette Technology in American Education (Englewood Cliffs, N.J., Educational Technology Publications, 1972), 106-119.

c. Compatability with the Instructional Systems Design Process.

(1) When used for patient education, videocassette would require a clear distinction between the delivery system and the development system. This distinction is necessary because the initial instructional content needs to be stored in a modifiable medium. (PACOMED used primarily the 3m Sound on Slide for developmental purposes). A completely separate system with easily modifiable storage allows for development, evaluation and revision of the instructional content. Only after the developmental process is completed can the instructional content be recorded on a master video-tape. The master tape can then be used for duplication purposes.[12]

(2) Implementing these kinds of systems will not be a matter of simply waiting for the appropriate hardware. The major feasibility questions do not revolve around the communications technology, but around an instructional technology. To be really cost-effective, videocassettes must be duplicated in reasonable numbers (economy of scale); and, therefore, a reasonable number of health care facilities, professionals and patients must agree to use them. This acceptance will not occur unless the instructional content put on the videocassette really works well. And it's not likely to work well unless it was developed and tested by people who have a pretty good idea of how to do the job right the first time. Unfortunately, instructional developers of such caliber are very few in number. Most videocassettes have been developed as if they were to be given as class lectures, and as a result they haven't turned out to be much of an improvement over presentations that they were designed to replace.[13]

d. Relaying Instructional Objectives.

(1) The thinking in education has been changing its direction. The great body of research in the early years, generated seemingly in the hopes of finding some magical quality of the television medium itself that was independent of content and teaching strategy, came up with the unanimous but disappointing verdict: No significant difference. It was still the same lock-step instruction--presentation of information--with learning measured by the same tests. Mainly because objective tests were used, it was only cognitive learning that was being investigated. Instruction in skills was considered inappropriate to television, or beyond its capabilities. The achievement of affective objectives was considered totally beyond measurement.

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[12]Carl, D.R., "Instructional Development In Instructional Television," Educational Technology, May 1976, 16 (5): 10-24.

[13]Ibid.

(2) Today the thrust is more in the direction of individualization. In patient education emphasis is upon the patient assuming more responsibility and to assume an active role for managing his own disease, within the range of choices allowed by the health care facilities and health care providers.

(3) The new approach reduces the role of lesson presentation by the health care provider, and tends to emphasize other roles for health care provider and patient alike. Interestingly the technology of television has now become better adapted for use in these other instructional activities, such as skills learning and can be used in the individual mode as well as "instructional TV" that was researched so widely some two decades ago. The technology has vaulted ahead of the research conclusions.[14,15]

e. Videocassette and Cartridge Capabilities.

(1) Names.

(a) MAGNETIC TAPE: (1/2 inch or 3/4 inch tape); Ampex (Instavision); Avco (Cartrivision); Japan Victor; Panasonic; Philips (VCR); Sony (U-Matic); and 3M Company.

(2) Compatibility and Standardization: No possibility among the several systems except for Sony, JVC, and 3M, who have agreed on 3/4 inch tape cassette format. The other companies have a 1/2 inch reel to reel.

(3) Recording Potential: Yes, instant.

(4) Cost of Playback Equipment: Medium to high, about $1,000 to $1,500.

(5) Cost of Recording Medium: High, about $18,000 to $22,000.

(6) Video Picture Quality: No single system has an inherent substantial picture quality advantage over any other using broadcast standards as a reference.

(7) Reliability of System: Average, 200 to 300 runs. It is dependent on the operator and preventive maintenance.

(8) Ratio of Playing Time to Duplication Time: No high speed duplication.

(9) Cost of Duplication of 12 Copies: Low.

(10) Cost of Duplication of 500 Copies: Medium, $20.00/hr.

(11) Cost of Duplication of 10,000 Copies: Low.

(12) Ability Erase Reuse Record Medium: Yes.

[14]Bretz, R., "In School Television and the New Technology," Educational Technology, May 1976, 16 (5): 50-53.

[15]Op Cit., Gordon and Falk, 150-153.

(13) Playing Time: All systems may, one way or another, achieve equivalent playing time up to one hour.

(14) Single Frame Storage Potential: No, can only freeze in place.

(15) Video Playback Pickup Method: Helical scan magnetic head pickup.

(16) Major Market Control: Consortia of US and Japanese.

5. CONCLUSIONS.

Until approximately 1985 the videocassette format is the most cost effective and efficient medium (for the Army) in which to transmit the validated patient learning systems.

6. RECOMMENDATIONS.

a. By 1980 thought should be given to evaluating the use of videodiscs for the patient education format. The hardware advantages are already superior to the videotape players. The optical videodiscs are free of the wear factors characteristic of videotape players, provide very high density of information storage, and compared with the prior art, are delightfully easy on the pocketbook: a player will cost about $500.00 and the discs should cost about $2.00 to $5.00 each, depending upon program material. In addition the cost of duplication drops quite rapidly with any real volume (See Table 1, Typical Costs of A/V Reproduction Equipment and Table 2 , Per Copy Costs for a One-half Hour Motion Visual Program, p.140). And over a five year period by using videodiscs instead of videotapes the average annual cost can be reduced by 42 percent. It is important to realize that the economic advantage of videodiscs is due to their durability and ruggedness, as well as to their low purchase costs. Videotape cassettes are good for two to three hundred plays. With optical videodiscs, fingerprints, dust and surface scratches can't penetrate the plastic "sandwich" that protects the inner reflective surface. When the disc is played, its outer surface, dust, scratches and all, is outside the focal range of the microscope objective. The player can show the same frame, hour after hour, without any degradation of the television image.[16]

b. Videodiscs will set new standards for inexpensive large-scale media distribution. Educational use of videodiscs for the presentation of conventional linear motion pictures will probably catch on like "wildfire". Non-linear, interactive applications will make a real contribution to the quality of education, but not until instructional development becomes a matter of production, instead of experimentation.

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[16]Schneider, E.W., "Videodiscs, or the Individualization of Instructional Television," Educational Technology, May 1976, 16 (5): 53-59.

TABLE 1

Typical Costs of AV Reproduction Equipment

1.	8mm video player and monitor	$1,592.00
2.	3/4" videotape cassette player and monitor	1,500.00
3.	Optical videodisc player and monitor	900.00
4.	16mm projector and screen	825.00
5.	8mm projector and screen	554.00

TABLE 2

Per-copy Costs for a One-half
Hour Motion Visual Program

MEDIUM	QUANTITY			
	1	10	100	1000
16mm film	$417.00	$108.00	$84.52	$66.17
8mm film	285.00	66.00	52.00	44.76
3/4" videocassette	70.00	31.00	21.25	18.50
Videodisc	450.00	46.00	3.01	.63

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Telecon, Major Russell. (23 February 1977), Director of the United States Army Audio Visual Activity, Pentagon, HDQ's, Dept of the Army.

APPENDIX F

NON-PROFESSIONAL PARAMEDIC AS HEALTH EDUCATOR

APPENDIX F

NON-PROFESSIONAL PARAMEDIC AS HEALTH EDUCATOR

1. INTRODUCTION.

The notion of efficient manpower utilization centers on the appropriate use of skilled personnel. In the health field, where physician compensation is extremely high, inappropriate use of physician services results in inefficiency, lower productivity, and ultimately higher costs to the consumer. Currently, inappropriate use of physician services is a frequent occurrence, a physician's level of medical proficiency is not required for many of the services performed by physicians today. This situation continues to exist for at least three reasons. One is the very limited supply of paramedical personnel availiable due to the only relatively recent discovery of their potential in the health field. A second is that restrictive licensure legislation still applies to paramedics, either by limiting their activities or by health providers refusing entirely to sanction their use. Finally, physician resistance to paramedics is often strong for a variety of reasons, including econonic self-interest, the role a physician sees for him/herself (specialist or generalist), and the problem of medical responsibility. Nevertheless, the cost control potential of paramedics remains high. Appropriate use of paramedical personnel can help to alleviate shortages by delegating to paramedics the simple, more routine physician tasks and freeing the physician to handle patients more in need of their highly skilled level of training. Such a physician-paramedic tandem ought to reduce fees for basic services due to the lower compensation levels of paramedics, or, if applied in an ambulatory setting, increase the comprehensiveness of benefits, which if properly utilized simply amounts to another form of cost control.[1,2]

a. Purpose.

In order to improve health and health care services, ongoing systems of health education must be planned, implemented, and documented. The maintenance of health and the prevention of disease can be achieved by a cooperative effort between knowledgeable and motivated consumers and health care personnel. One facet of the overall purpose of this effort was to utilize non-professional paramedical personnel and appropriate educational technology in the task of meeting some of the needs of patient and community health education.[3]

[1]Decker, B. and Bonner, P., PSRO: Organization for Regional Peer Review (Cambridge, Mass, Ballinger Publishing Company, 1973), 134-135.

[2]Weckwerth, V.E., "How to Use and Misuse Average Length of Stay Data," Modern Hospital, October 1965, 105: 114-117, 176.

[3]"Health Education: Role and Responsibility of Health Care Institutions," Statement, American Hospital Association, Chicago, Illinois, 1975.

b. Background.

Until recently there has been no way for physicians, regularly, to provide education for their patients across a wide spectrum of medical and surgical practice or both except to do it themselves. And in a reasonable proportion of cases they were probably not able to do it entirely satisfactorily, for a variety of reasons. It seems obvious that the physician's office is a logical base for much patient education. Only a small proportion of the patients a doctor sees in the ambulatory setting have to enter a hospital.

But let's face facts. Physicians are seldom suited to carry out all the education themselves. They are not really trained to play the ongoing, supporting role required. Even if they are a good communicator they don't have enough time to do the job thoroughly, and at the end of the day they will probably not cover the essential information as completely as they would have earlier in the day. Even when individual patients know the right questions to ask (which takes some education in itself), they are often afraid to ask them, either because they believe the doctor is too busy or they don't want to appear ignorant.

Physicians want to remain in control of their patients' education, and of course, they should. They can direct it and they can prescribe its content, but they should not attempt to do all of it themselves. Or, as Dr. Robert E. Canfield of the College of Physicians and Surgeons at Columbia University has written, "While the physician must play a very special role in helping the individual patient apply this knowledge to his specific disease situation, the physician should be supplied with some teaching assistance to promote better communication of information to the patient and also to lower the labor cost of the process."[4]

2. OBJECTIVES.

a. To utilize the non-professional paramedic in the role of health educator.

b. To recommend the prerequisites for a potential non-professional paramedic health educator.

c. To identify the functions and tasks that could serve as guidelines for the role of a non-professional paramedic health educator.

d. To determine the cost saving of a non-professional paramedic health educator.

[4]Jamplis, R.W., "The Practicing Physician and Patient Education," Hospital Practice, October 1975, 93-99.

3. METHODOLOGY.

a. Overview.

(1) One aspect of the study plan called for the utilizing of a non-professional paramedic as health educator. It was suggested by the project director in the original study protocol that, if possible, the technician should have a non-professional paramedical background, i.e., 91C or LPN. This was necessary in order to study the feasibility of having a non-professional coordinate the utilization of the patient education packages once the instructional models were developed. If the results of utilizing this caliber of personnel proved positive it would save professional time and be much more cost-effective. Further, it was hypothesized that the individual selected to develop the role would possess qualities needed for the evaluative aspect of the study, but qualities not necessarily needed to manage a patient learning center. Therefore, a mature 91C, E/7, was selected.

b. Procedures.

(1) In order to prepare the non-professional paramedical health educator to assume and critically develop the role, a series of logical, systematic planned experiences were accomplished. The potential health educator joined the staff April 1975, after the assessment phase was completed, physical area decorated and furniture and equipment ordered. Consequently, the first three months were spent in learning about the concept, study plan and study outcomes completed up to that time. From July of '75 to July of '76, the eight learning systems were developed, revised, and validated. During the instructional systems development and formative evaluation phase the study plan called for developing the health educator's role and revising it (adding or deleting functions) until a point was reached when it was felt that the 91C could assume the full responsibility. In the year's time, the health educator was coached, given selected reading materials, continuing education and an array of simulation exercises. Additionally, he assisted with the patients used for the validation process, and gained in competence with each succeeding system.

(2) Within six months of opening the learning center, by Dec '75, it became apparent that one health educator was not enough due to the additional evaluation functions required (i.e., collecting data on the control group at Ft. Myer, telephoning subjects for follow-up and the clerical and administrative duties associated with studies). And, as was mentioned earlier, one of the primary thrusts of Project: PACOMED had been to improve cost-effectiveness in the utilization of non-professional personnel for patient education. It was postulated that the technical-mechanical aspects could be administered by an E/4 or E/5. In practice, it became apparent that a well-qualified individual of this low rank could carry out many of the functions that were being performed by persons

of higher rank and education. In April 1976, an E/5 was added to the staff enabling this element of the protocol to be implemented and evaluated.

4. FINDINGS (and Related Discussions).

a. Prerequisites.

(1) Educational Qualifications

(a) Graduate of the 91C20, Clinical Specialist course.

(b) The scope of instruction for the 91C20 includes: Military publications and correspondence; medical records and reports; interpersonal relations; techniques of instruction; techniques of management; Army medical field service; emergency medical and dental care; medical management of mass disaster casualties; military preventive medicine; introduction to medical science; pharmacology and patient care; concepts of patient care; medical surgical nursing; mental health and mental illness, care of obstetrical patient and the new born; care of the pediatric patient; dispensary procedures; surgery in the Army dispensary and health facility; and clinical experience.

(c) Length: 40 weeks.

(d) Prerequisites to attend the 91C20, Clinical Specialist course.

(e) High school graduate or the equivalent as measured by GED tests. Must have credit for high school level course in mathmatics or have a standard score of 45 or higher in GED test 5, high school level. An interview by and written recommendation from an Army Nurse Corps officer or, when not available, a Medical Corps officer, as to the applicant's interest in patient care, potential and physical suitability for the course. Standard score of 100 or higher in aptitude area GT or ST. Must have sucessfully completed 91B10 training conducted at the AHSUSA, and have a minimum of 18 months clinical experience. Twenty-four months or more of active duty service remaining after completion of the course. No security clearance is required.[5]

(2) Physical and Behavioral Characteristics.

Be well groomed, possess military bearing, have normal weight, be a non-smoker, and moderate to light in alcoholic and caffeine consumption. It is desirable that the health educator be a role model and help teach individuals how to cope with medical problems that are self-induced or caused by factors existing within the environment. More often than not the health educator's efforts were directed toward attacking self-imposed "diseases of choice", including smoking, alcoholism, and nutritional abuses that may ultimately lead to hospitalization.

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[5]Army Medical Department Course Catalog, Fiscal Year 1976 (1 Jul 75--30 Jun 76) and Fiscal Year 7T (1 Jul 76--30 Sep 76), 6-7, 6-10.

(3) Pay Grade--E/4 or E/5.

(4) Tour.

A minimum stabilization tour of two to three ye , This would allow for job security, satisfaction, and continuity of care for the patients.

(5) Training Time.

Based upon the PACOMED's staff experience, it is considered that five working days in a patient learning center are necessary. This aspect would include the following functions: (a) operating the learning center, (b) counseling, (c) maintaining records, and (d) coordinating activities. Of course, much is contingent upon each individual's background and prior educational preparation. Therefore, it is suggested that if a centralized learning center is ever developed for preparing these health educators that some type of competency testing be done. For instance, it is not uncommon for some college graduates to refuse or be denied a commission for various reasons, many of whom become 91C20s. It could be that an individual of this caliber (especially if she or he was a former teacher) would need very little in the way of new skills, but only need to learn how to implement the standardized procedures. On the other hand, it could be possible that a borderline individual would meet the prerequisites and screening procedures. This person would undoubtedly need additional training time.

b. Operating the Learning Center.

(1) Because the validated learning systems have accompanying directions and flow charts for their administration, the tasks involved in operating the learning center are minimal and elementary in nature. The tasks that were identified are as follows: (a) Prepare learning center environment for learning systems presentation: 1) Insure that audiovisual equipment is operational, to include lighting and sound system, 2) Prepare individual folders for each patient. The folders contain the necessary forms for each system, 3) Insure that pencils and paper are at each carrel. (b) Insure that forms for each system are properly completed by the respective patients. (c) Prior to showing the advanced organizer give the patient a brief description of PACOMED and the educational program to be received. (d) Provide, collect, and score pre/post tests. (e) Show audiovisual programs. (f) Assist patients as needed. (g) Maintain learning center in readiness for the following sessions. (h) Maintain form level for each system. (i) Provide first-echelon maintenance on the audiovisual equipment. (j) Conduct monthly equipment inventory and maintain inventory records. (k) Insure that the learning center is kept in a high state of cleanliness. (l) Maintain an additional set of tapes for each system in case of damage to the original. (m) Insure that the learning center and adjacent facilities are properly secured at all times.

(2) Seventy-five percent of the health educator's time was devoted to the function of operating the learning center. All of the above tasks are ongoing and not likely to change with this prototype. Forms completed by the health educator and test scoring were done while the patients were viewing the audiovisual programs. This feature maximizes the health educator's time, and eliminates delay and unnecessary waiting for the patient.

c. Counselor.

(1) The health educator must establish rapport with each patient and family member. An open line of communication must be developed and maintained during the entire series of sessions. The initial interview is important in that the patient must feel he or she has been accepted and that there is a sincere desire for the health educator to help. The health educator worked with each patient on a personal basis. The pacient was assisted to develop a sense of accomplishment initially in order to sustain motivation.[6,7] The tasks that were identified are as follows: (a) Review consultation sheets. (b) Interview patients to find out their needs. (c) Collect baseline data. (d) Determine deficiencies. (e) Develop a plan of action. (f) Provide explanations or reinforcement. (g) Encourage compliance to treatment plan. (h) Give feedback to the health care provider as needed. (i) Collect follow-up data. (j) Terminate sessions when appropriate. (k) Return consultation sheet to health care provider, denoting patient's progress.

(2) In addition the elements of good human relations should be mastered. These include: respect, acceptance, objectivity, protection, observation, evaluation, listening, communication, and action (interpersonal relations are given in the scope of instruction for the 91C20). Only when the health educator has learned successful interaction with the patient can he or she achieve their full potential in the role.[8]

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[6]Dorroh, T.L., Between Patient and Health Worker (New York, McGraw-Hill Book Company, 1974), 224-251.

[7]Teachey, W.G. and Carter, J.B., Learning Laboratories (Englewood Cliffs, N.J., Educational Technology Publications, 1971), 13-26.

[8]Dorroh, Op. Cit., 251.

(3) Ten percent of the health educator's time was devoted to counseling.

d. Records Management.

(1) The health educator also serves as a record-keeper in maintaining accurate and adequate reports on each patient.

(2) A chief criticism of the patient learning center could be that it entails extensive record-keeping because of the personalized learning practiced and the necessity to account for this learning. Record-keeping is a very important factor to the success of the patient learning center. It was necessary, therefore, to devise procedures that kept record-keeping to a minimum.

(3) The health educator maintains a checklist for each system to insure consistency, individualization, standardization, quality assurance and accountability for each patient.

(4) The patients' personal files and cumulative records were maintained under the same regulation that all patients records are kept, AR 40-400, change 4, 1 Nov '76, MEDICAL SERVICES PATIENT ADMINISTRATION.

(5) The records were stored in locked file cabinets in the health educators' office(s). (In addition the offices had security locks on their doors.)

(6) The tasks for the record-keeping are covered in sections b, Learning Center Operator and c, Counselor.

(7) The original itemized forms for each system appear in the final report for the Formative Evaluation Phase of PACOMED, July 1976.

(8) The time spent in management of records was five percent.

e. Coordinator of Activities.

(1) The tasks enumerated in this section are not to be confused with program planning. The main focus here were the managerial functions associated with the ongoing activities of the learning center.

(2) The tasks identified that the 91C20 could successfully perform were: (a) Maintain accurate calendar of events, to include: scheduling patients, attending meetings and briefings that were germane to the operation of the learning center. (b) Insure that activities centered around the learning center were coordinated to eliminate confusion and provide optimum time utilization. (c) Establish priorities insuring that activities not directly involving the patient were secondary in nature. (d) Give initial staff orientation pertaining to the learning center. (e) Schedule ongoing orientation for newly assigned personnel. (f) Periodically reinforce professional staff. (g) Maintain liaison with professional users. (h) Give briefings to visitors of the learning center.

The time consumed in this function was approximately ten percent.

(3) Because of the evaluative nature of the study it was imperative that the health educator control the scheduling of the patients. However, it is suggested that for the future the health educator provide a monthly calendar to the central appointment section that would include times and dates for scheduling the learning systems. This could save the health educator half of the ten percent that was being spent in the task.

(4) One of the most important tasks of the health educator is staff (user) orientation. In order for the learning center to be successful and utilized to maximum potential the professionals should refer all patients that need health education to the learning center. To facilitate the process the professionals need to understand the services being offered, know how to refer patients and most importantly be familiar with the contents of the learning systems. Only in this way can the communication between the consumer and health care provider be maximized and economy of medical resources and minimization of medical workload be realized.

f. Program Planning.

(1) During the year that the learning center was fully operational, July '76 to Aug '77, it was felt that perhaps the non-professional health educator could also function in the area of program planning. It was found that this was not the case.

(2) In order to successfully formulate and gain acceptance of new policies in an organization, a person must have knowledge of the decision-making structure and how it operates. The larger and more diffuse organizations present complicated problems of analysis in terms of identifying the leadership and in using influence. To successfully maneuver through such complexities, in order to obtain program support across the many networks, requires competencies in analytical and organizational areas.

(3) Program planning requires skills applicable to all settings. These include knowledge of how to work with committees in the selection and recruitment of members; determination of goals; agenda building; development of appropriate background information; report writing; follow-up procedures; and solicitation of feedback.

(4) The program planner should possess facilitation skills necessary for effective problem analysis, decision-making, and problem solving. These processes require a person who is creative and receptive to input from many sources.

(5) Implied in the above are written and verbal communications skills as well as an understanding of ways interpersonal relationships are established and maintained. It is also important to have a knowledge of the health field in terms of the patterns of organizations, professional orientations, and role relationships and a knowledge of the culture of hospitals.[9]

(6) Finally, professional assertiveness is essential in order to introduce new concepts with broad-based support. Additionally, in the military because of the rank structure, there are some tasks enlisted people are "not allowed" to do even if they possess the ability. This became very apparent when the health educator for PACOMED attempted to initiate a feature story and follow-up in the Fort Belvoir newspaper, The Castle. At other times, people were not so blatant, but the nuances were apparent. The project director was approached on numerous occassions throughout this phase of the study with "Don't you think it would be better for an officer to present this?"

g. Costs.

The cost effectiveness of the prototype will be addressed in a separate report. However, it can be noted that by using an E/4 or E/5 in the position of health educator the cost in labor was 50 percent or less than by using an O/3 or O/4 Army Nurse Corps officer or 300 to 400 percent less than by using a Medical Corps officer O/4 or O/5 based on their respective hourly wages for mean time in grade. That doesn't take into consideration the advantages or benefits of the prototype in addition to the savings.[10]

5. CONCLUSIONS.

a. A graduate of the 91C20, clinical specialist course should be considered as the potential (non-professional paramedical) health educator for the PACOMED prototype.

b. The health educator is qualified to perform the functions of: learning center operator, counselor, records manager, and coordinator of the learning center activities.

c. The health educator should not function in the role of program planning.

d. The cost control potential of utilizing a non-professional in the role of health educator remains high.

[9]Patient Education Workshop: Summary Report, U.S. Department of Health, Education, and Welfare; Public Health Service, Center for Disease Control, Atlanta, Georgia, 1976, 8-9.

[10]Kucha, D.H. and Everett, S.W., Strategy for Instructional Systems Design Process and Formative Evaluation, Final Report, HCSD, prepared for HSC (HSA-PA-A) FSHTX, July 1976, Appendix 9.

e. Added are the advantages of increasing the comprehensiveness of benefits to patients and professional users alike.

6. RECOMMENDATIONS.

a. The feasibility of utilizing civilian LPN's rather than 91C20's as health educators should be given first priority. This would eliminate prerequiste training costs, cost of military benefits, retaining the person in the system, career options, and the wage paid the LPN would ultimately be lower.

b. The feasibility of utilizing a 91B10, basic medical specialist as health educator should be studied.

c. The chief, occupational health and environment (Army Health Nurse) or chief, nursing education and training (Educational Coordinator) should be considered for overall supervisor, coordinator, budgeting, and program planner for the individual MEDDAC learning centers.

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APPENDIX G

PHYSICAL FACILITIES

APPENDIX G

PHYSICAL FACILITIES

1. INTRODUCTION.

The systematic human engineering of customized learning centers and spaces remains as a challenge to educators, health care workers, and vendors. The state of the art in learning environments and carrel design shows contrasting opinions on some very fundamental issues.[1]

Learning center and carrel design is not yet based on soundly derived empirical principles, but rather implements the untested notions of the persons planning or buying customized learning centers and carrels. Performance, it is assumed, is influenced by the degree to which the physical facilities fit the needs of the patients.[2] Factors which may impact on the design of patient learning centers are discussed, and recommendations for future AMEDD patient learning centers are given.

a. Purpose.

The learning center and carrels offer a specialized learning area that facilitates the activities for patient learning.

Use of the learning center and carrels as the focus of the instructional effort is based upon a family of philosophical assumptions such as would be articulated in a systems approach to learning. These assumptions include the application of technology to learning for achieving instructional efficiency and effectiveness.[3] A patient centered philosophy of instruction places the responsibility on the patient for his own performance and usually permits some level of patient self-pacing.[4]

Instructional activities designed to meet clearly stated and well defined objectives are modularized and built upon previously achieved goals. Presentation of information in multiple sensory modalities is often included as in the requirement for patient involvement in learning by doing.

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[1]Ellsworth, R.E., Academic Library Buildings (Boulder, CO, The Colorado Associated University Press, 1973).

[2]Canter, D., "Office Size," Architects Journal, 24 April 1968, Sfb (92): Aa3: UDC 725-23-301.151, 881-888.

[3]Vogel, C.W., "A Prolegomenon to Study Carrel Planning," Educational Product Report, 1968, 2(Z): 8-13.

[4]Amaria, R.P., Biran, L.A., and Leith, G.O.M., "Individual Versus Cooperative Learning," Educational Research, 1968/9, 11: 905-1103.

b. Background.

The casual visitor, and even primary health care providers are sometimes deceived by the smoothness with which patient learning activities are managed in the PACOMED learning center. Patients and health educator(s) work together, use materials, operate equipment, discuss, read, listen and view audio visual programs, and engage in a variety of activities - all with a minimum of confusion or delay.

Things running so smoothly do not "just happen." The very important logistical management of the patient educational process requires careful planning, organization, teamwork, financial support, and professional insight. But perhaps equally important, it also requires an adequate physical environment.[5] This environment must be recognized as a crucial element of the "system" that affects patients and health educator(s) in many ways.

2. OBJECTIVES.

a. To engineer requirements for a patient learning center;

b. To pilot test the existing patient learning center;

c. To recommend general requirements for a patient learning center based on empirical evidence derived from summative evaluation.

3. METHODOLOGY.

a. The PACOMED learning center, and additional rooms, was located in the Outpatient Facility, adjacent to the Family Practice Clinic, U.S. Army MEDDAC, DeWitt Army Hospital, Fort Belvoir, VA 22060. Seven rooms were needed in total for the developmental evaluation support, i.e., project director's office, administrative and computational offices. Four of the seven rooms were used for patient education purposes.

b. The physical facilities of the PACOMED learning center were based on the project director's prior experience, field trips to instructional media centers, review of the literature, and space allocations, supply and service, budget and personnel constraints.

c. The PACOMED learning center and facilities were developed, as described Sept '74 -- Jul '75.

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[5]Van der Ryn, S. and Silverstein, M., "The Room, A Student's Personal Environment," In R. Gutman (Ed.), People and Buildings (New York, Basic Books, 1972), 370-383.

d. The findings, discussion, conclusions, and recommendations were drawn based on utilization of the facilities from Jul '75 -- Jul '76, formative evaluation phase and during Jul '76 -- Jul '77, summative evaluation phase.

e. Description of the PACOMED Learning Center.

(1) The PACOMED learning center, was approximately 23' deep X 10' wide. Cool biscayne blue walls complimented the four double rows of fluorescent lights, providing excellent lighting of the entire room.

(2) The room was furnished from back to front with a 54" circular mahagony top table with four deep blue posture conforming chairs. Against the left wall were five rows (from floor to ceiling) of 48" shelves, one 5 drawer legal size file cabinet, three study carrels with deep blue posture conforming chairs, an attractive mahagony lectern on wheels, and another set of 48" shelves. The right wall contained one 18" X 35" X 60" grey steel storage cabinet, a 5 drawer legal size file cabinet, and three study carrels. A Sony video cassette player and monitor contained within a wheeled metal cabinet was against the wall next to the door for good visual contact for all patients.

(3) The shelves nearest the door contained video cassettes, film strips and cassettes, programmed study booklets, "Betsi" breast teaching models, and screens for the relevant visual system.

(4) The shelves at the far end contained projector/recorder cartridges, programmed study booklets, cassette tape recorders, a 3m sound on slide projector recorder, a 3m sound on slide playback unit, film strips, and recorded cassettes.

(5) Contained within the storage cabinet were additional educational materials including; pamphlets, booklets, video cassettes, etc..

(6) The file cabinets contained blank forms for each of the eight systems, to be used in patient charts.

(7) Strategically placed around the learning lab were SPENCO visual educational aids addressing drug abuse, smoking, family planning, alcoholism, and a guide to coronary care.

(8) Each learning carrel contained a note pad, pencil, privacy act statement, and an audio head set for individualized internal sound.

f. Primary Learning Center: (Room #1)

(1) Size -- 10' X 23': was large enough to accommodate six patients comfortably. However, may seat ten patients.

(2) Furniture and Facilities.

(a) one 54" circular table with four posture conforming chairs,

(b) two sets of five wall mounted shelves,

(c) one lectern,

(d) two legal size five drawer file cabinets,

(e) six study carrels with posture conforming chairs,

(f) one metal cabinet (LUXOR, Portable) A/V, containing Sony television monitor unit and a Sony 3/4" video cassette play back unit, and

(g) one 18" X 35" X 60" metal, double door storage cabinet.

SEE DIAGRAM 1: Primary Learning Center, p. 162.

g. Secondary Learning Center: (Room #2)

(1) Size -- 6' X 12': was large enough to accommodate one patient comfortably. Also used for storage.

(2) Furniture and Facilities.

(a) one study carrel,

(b) two posture conforming chairs,

(c) one metal cabinet (LUXOR, portable) containing a Sony television monitor and a Sony 3/4" video cassette playback unit.

(d) one 2' X 5½' built in storage cabinet with stainless steel sink, and

(e) two 25" X 31" wall hung metal cabinets.

SEE DIAGRAM 1: Secondary Learning Center, p. 162.

h. Secondary Learning Center: (Room #3)

(1) Size -- 7' X 9': large enough to accommodate two patients.

(2) Furniture and Facilities.

(a) two study carrels.

(b) one metal cabinet (LUXOR, portable) containing a Sony television monitor and a Sony 3/4" video cassette playback unit,

(c) one 24" X 37" X 38" built in storage cabinet with stainless steel sink, and

(d) one 13" X 32" X 36" wall hung metal cabinet with sliding glass door.

SEE DIAGRAM 1: Secondary Learning Center, p. 162.

i. Health Educator's Office.

(1) Size: 9' X 11'

(2) Furniture and Facilities.

(a) one study carrel,

(b) two 18" X 28" legal size five drawer file cabinets,

(c) one 34" X 44" single pedestal desk,

(d) three posture conforming chairs,

(e) four rows of 12" X 48" wall hung shelves,

(f) one 24" X 37" X 38" built in storage cabinet with stainless steel sink,

(g) one 13" X 32" X 36" wall hung metal cabinet with sliding glass doors, and

(h) one T.V. monitor.

SEE DIAGRAM 1: Health Educator's Office, p. 162.

j. General description common to learning center and additional facilities:

(1) Room size and Cloistering: Although several separate rooms satisfactorily fulfilled the learning center requirements, one large learning center would have been more desirable.

(2) Wiring: Adequate double outlets were not present. The deficiency was compensated for by purchasing several spider boxes. Raceways were provided for in the construction of the new outpatient facility.

(3) Artificial Light Control: Adequate, all rooms had four double rows of diffused flourescent lights. However, a dimmer switch was lacking.

(4) Acoustical Conditioning: None, very distracting.

(5) Air Control: Provided by engineer controlled thermostats. Very poor.

(6) Color: The rooms had cream colored walls but were very soiled. The PACOMED staff painted (and the project director paid for) the walls a biscayne blue.

(7) Reflective Surfaces: Adequate. A dimmer switch was needed to enhance the visual presentations.

(8) Rest Room Facilities: Co-educational.

(9) Seating and Table Surfaces: Excellent.

(10) Study Carrels: Excellant.

(11) Audio-visual Hardware: Excellent.

4. FINDINGS.

The existing patient learning center and accompanying office spaces functioned fairly well as small-groups*, and individual study facilities. The physical limitations soon become apparent, but did not hamper the main evaluative efforts.

5. DISCUSSION.

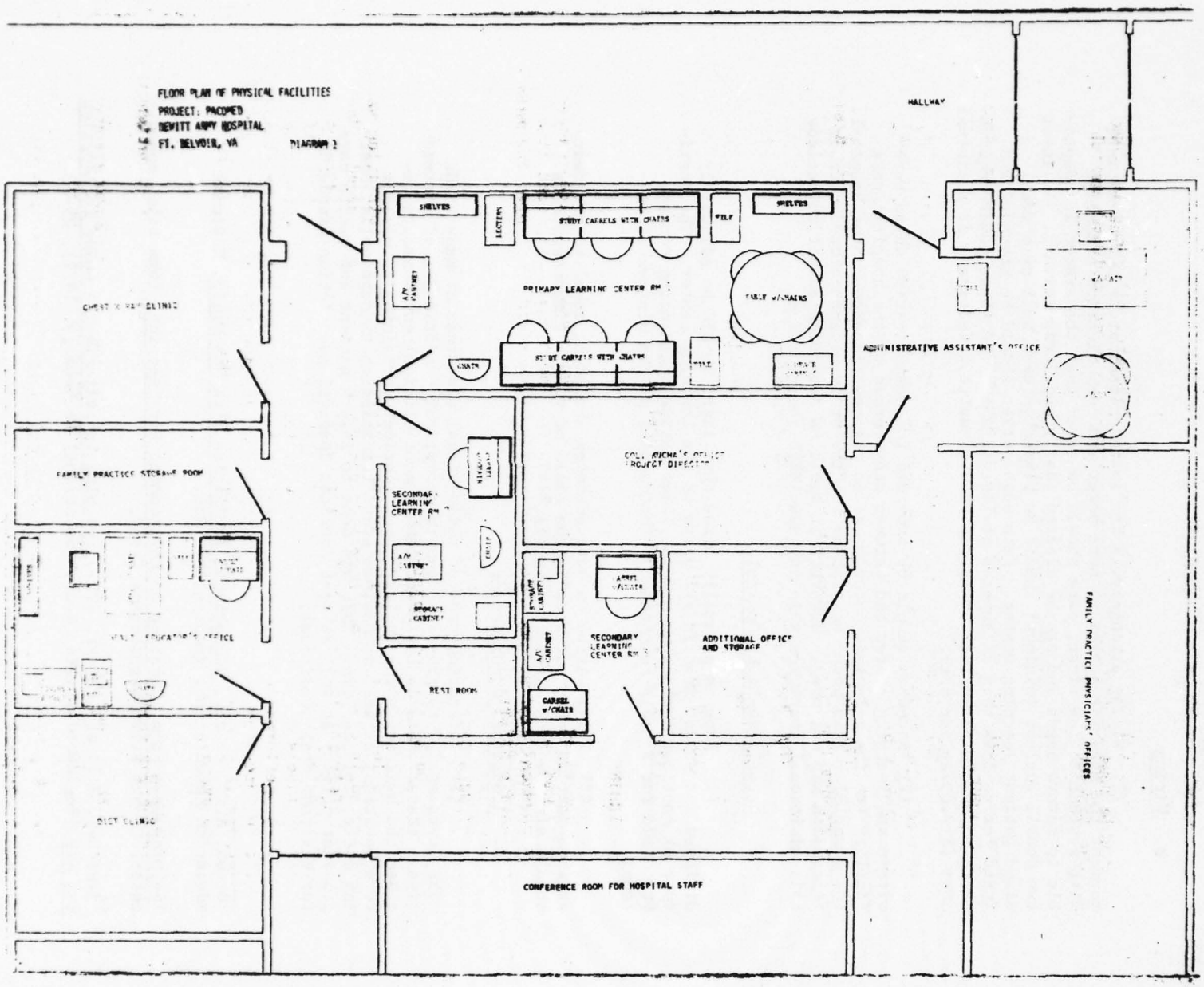
a. Room Size and Cloistering.

In the main PACOMED learning center the issue of cloistering was reflected in the level and manner of seclusion provided by a carrel. Unfortunately portions of the pilot test of the existing patient learning center were hampered due to room size. For example, the effects of different levels of cloistering and size of the cloistered area effects on patient performance could not be readily tested. Nor could the revalidation of previous studies be conducted, that suggest that performance decreases as room size increases because of the time and space constraints of the overall study.[6,7]

*Small-group facilities (Typically designed to accommodate 5 to 10 patients).

[6]Rapaport, A. and Kantor, R.E., "Complexity and Ambiguity in Environmental Design," American Institute of Planners Journal, 1967, 33: 210-221.

[7]Sommer, R., Personal Space: The Behavioral Basis of Design (Englewood Cliffs, N.J., Prentice Hall, 1969).


FLOOR PLAN OF PHYSICAL FACILITIES
PROJECT: PACOPED
DEWITT ARMY HOSPITAL
FT. BELVOIR, VA
DIAGRAM 1
HALLWAY
SHELVES
LECTERN
STUDY CARRELS WITH CHAIRS
FILE
SHELVES
A/V CABINET
PRIMARY LEARNING CENTER RM 1
TABLE W/CHAIRS
CHEST X-RAY CLINIC
STUDY CARRELS WITH CHAIRS
FILE
CHAIR
ADMINISTRATIVE ASSISTANT'S OFFICE
FAMILY PRACTICE STORAGE ROOM
SECONDARY LEARNING CENTER RM 2
COL. MICHAL'S OFFICE PROJECT DIRECTOR
A/V CABINET
SPEAKER CABINET
SECONDARY LEARNING CENTER RM 3
A/V CABINET
ADDITIONAL OFFICE AND STORAGE
REST ROOM
CARREL W/CHAIR
DIET CLINIC
CONFERENCE ROOM FOR HOSPITAL STAFF
FAMILY PRACTICE PHYSICIANS' OFFICES

b. Wiring.

(1) Wiring arrangements for instructional areas must take into account the need for access to both power and communication channels. With respect to the first, care should be taken that the system is adaptable to future needs and can be altered easily and inexpensively. At least two double outlets (minimum) should be placed on each wall of a small sized patient learning center. Each such outlet should be grounded and fused for no less than 20 amperes at 110 volts AC. If these power requirements do not exist, spider boxes can be used quite effectively at a minimal cost ($12.00/spider box).[8]

(2) Raceways should be provided for communication units both within the learning center and between other areas of the hospital care facility (to the television studio, as in the new Eisenhower Army Hospital, for example). This posed no problem for the study because closed circuit television was not used. However, it would be shortsighted not to include this additional contingency in any new AMEDD construction.

c. Artificial-Light Control.

(1) Experts generally agree that light should be adequately diffused and shadow-free in all parts of the learning center. The Institute of American Architects and the Illuminating Engineering Society Standards for Schools recommend 30 footcandles as the minimum light level.

(2) Illumination on work surfaces should be equal to or greater than that on other surfaces in the field of view. Dimmer switches should also be considered in planning.[9,10]

d. Acoustical Conditioning.

(1) Increasing uses of audio-visual resources of many kinds make it essential to provide adequate acoustical conditioning of instructional areas. This is not a problem in most clinical environments because the building plans include specifications pertaining to maximum reverberation, as well as maximum sound transmission through walls, heating ducts, and the like. This was done to insure patient and health care provider privacy as well as meet American Hospital Association Standards for environmental conditions.

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[8]Green, A.C., et al., Educational Facilities With New Media, National Education Association, Washington, 1966.

[9]Setting Up A Room: Creating An Environment For Learning, 16mm film, sound, color, Campus Film Distributors, 1967.

[10]Teachey, W.G. and Carter, J.B., Learning Laboratories: A Guide to Adoption and Use (Englewood Cliffs, N.J., Educational Technology, 1972), 29-32.

(2) This did present a problem for PACOMED in that the study area was the only area in the new outpatient facility at DeWitt Army Hospital, Ft Belvoir, VA that had not had acoustical conditioning. But, because of the deficiency the noise level factor was able to be examined. Additionally it is recommeded that rugs be put on the floors to improve room acoustics, thus heightening the effectiveness of various communications experiences. Again, this does not represent an additional problem or cost, most modern health care facilities are using carpeting to muffle sound and lower maintenance and housekeeping costs.

(3) The room noise level itself should be no greater than 35 to 40 decibels.[11] If acoustical conditioning is not possible (as was the situation for PACOMED) it is felt that the use of individual headphones is an efficient cost effective way to reduce distraction and enhance patient concentration.

(4) This phase of the study demonstrated by observation, not by measurement, that for many patients, noise stands out more and is more distracting against a background of silence than one of general ordered activity. It was also noted that unexpected noise distractions detrimentally affected task performance efficiency and decreased the tolerance for frustration. These findings are congruent with studies conducted by Sanders, 1961, and more recently Theologus and others, 1974.[12,13] Their data show that unexpected noise distraction or unexpected variations in noise level appear to require some adaptation by the individual at some psychic cost. Dansereau and others (1975) developed and assessed a learning strategy program that included practice in coping with distractions while applying techniques to help the learning of prose materials (three 1,000--word passages under different levels of audio distraction). During post-hoc analysis they found that the mean total performance of Rotter scale division externals was significantly lower than internals when reading under conditions of audio distraction.[14]

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[11]Ibid.

[12]Sanders, A.E., "Influence of Noise On Two Discrimination Tasks," Ergonomics, 1961, 4: 243-257.

[13]Theologus, G.C., Wheaton, G.R., and Fleishman, E.A., "Effects of Intermittent, Moderate Intensity Noise Stress On Human Performance," Journal Of Applied Psychology, 1974, 59(5): 539-547.

[14]Dansereau, D.F. and others, Development and Assessment of An Effective Learning Strategy Program, AFHRL-TR-75-41, Lowry AFB, CO, Technical Training Division, Air Force Human Resources Laboratory, June 1975.

It was noted by observation that the PACOMED subjects in the hypertension study that scored high on internals also performed better under conditions of distraction.[15] It could probably be inferred that the internals are better able to concentrate. The effects of distraction on learning would appear to require further careful study noting that individual differences would be involved.[16]

e. Air Control.

(1) Heating, cooling, and ventilating systems should cause neither drafts nor noise. Each health educator should be able to control ventilation in the patient learning center. At any one time, a ventilation system should provide six to ten complete changes of air per hour, and at least 10 cubic feet of air per patient each minute.[17]

(2) The air control for PACOMED was very poor and dependent upon the monitoring of the hospital engineers. During the summer months it was especially close, causing discomfort for all participants.

f. Color.

(1) Biscayne blue was the color of the PACOMED rooms. The color was attractive and offered a non-competing background for the health education posters and realia that brightened the areas.

(2) Room colors should be chosen with careful consideration to room orientation and general effects required. Colors may vary considerably, depending upon the room's exposure. Pastel colors are suggested to help with lighting and light control.[18]

g. Reflective Surfaces.

(1) Reflective surfaces did not present a problem because only a television receiver was used. However, the use of a dimmer would have provided more optimum conditions. For effective use of most projected material, illumination in the room, and on the screen itself, should not exceed 1/10 footcandles.[19]

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[15]Kucha, D.H., A Comparative Evaluation of the Traditional Versus a Systems Approach for Hypertensive Patient Education, Final Report, Aug 1977, HCSD, AHS, FSHTX, 47-49.

[16]Glass, D.C. and others, "Psychic Cost of Adaption to an Environmental Stressor," Journal of Personality and Social Psychology, 1969, 12: 200-210.

[17]Brown, J.W., Lewis, R.B., and Harcleroad, F.F., AV Instruction Media and Methods (New York, McGraw-Hill Book Company, 3rd Edition, 1969), 72-75.

[18]Ibid.

[19]Ibid.

i. Study Carrels.

(1) The patients and staff felt the study carrels used for the pilot test were adequate.

(2) When constructing a study carrel, Orr (1972) states that there is no need to make vertical dividers over two feet above the table, since the possibility of visual distraction is restricted while avoiding a claustrophobic situation.[20] Brucker (1970) compared learning performance in a carrel to learning performance in a small seminar room. He found that high anxiety (Sixteen Personality Factor Questionnaire median split) subjects in an enclosed environment (carrels) performed significantly poorer than the other three groups. Personality and environment interact, and sometimes negatively.[21]

(3) It can be concluded that while privacy does not have a high absolute positive value in and of itself, when there is limited choice, properly designed study facilities to ensure individual seclusion would be extremely important for some patients. Since certain kinds of tasks performed during learning would require disciplined concentration, seclusion can be of assistance.[22]

j. Social Interaction.

(1) High levels of individualized seclusion inhibit social interaction. One potentially critical interaction is between the patient and the health educator. When the carrel design does not permit patient/health educator interaction, another location must be provided. PACOMED found that having a separate health educator's office was highly successful. It afforded privacy for individual patient counseling, enhanced the authoritative role of the health educator, provided the patient assurance of help when required, and provided variety in the learning locale.[23]

[20]Orr, J.M., Designing Library Building for Activity (New York, Academic Press, 1972).

[21]Brucher, P.J., "Effects of an Enclosed Individual Learning Environment Interacting With Two Personality Traits on the Achievement and Opinion of College Students Learning Through the Use of Programmed Instruction," Dissertation Abstracts, 1970, 31: 52A-53A.

[22]Jussim, E., "Personal Space and the Media Center," School Media Quarterly, 1974, 2(3): 189-193.

[23]Hall, E.T., "Environmental Communication," In A. Esser (Ed.), Behavior and Environment (New York, Plenum Press, 1977), 247-256.

(2) Throughout the project it was customary to have six to ten patients per session, however at times due to professional priorities or minimum referrals, the scheduling was arranged with just one patient. It was difficult to detect if the isolation inhibited the learning process. Whether patients learn best by themselves remains in doubt.[24] Sullivan and others (1974) report in their survey of learning centers that when the program of the learning center isolates students during instruction, those objectives in which personal interaction is an important element may be ignored.[25] Lee (1968) emphasizes the need for grouping in an individualized program as she suggests that groups are formed differently, for different lengths of time.[26] Payne (1968) observes that with programmed materials the most satisfactory social group contains between four and ten pupils.[27]

(3) It was apparent through observation by the PACOMED staff that group size, in the PACOMED Learning Center was dependent upon the topic area and the social characteristics of its constituents.[28] It was very desirable to have group interaction after individual study with the breast self examination module. However, individual study alone was much preferred for the vaginitis module.

k. Seating and Table Surfaces.

(1) The chairs, desks, and tables ordered for PACOMED were not designed to be easily movable. Not infrequently the patients and health educators complained. Therefore, it was agreed that seats and tables should be movable (designed for flexible groupings), quiet, comfortable (the right height with good posture support). Swivel chairs with casters would be ideal.[29]

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[24]Love, W.P., "Individual Versus Paired Learning of an Abstract Algebra Presented by Computer Assisted Instruction," Tallahassee, CAI Center, Florida State University, 1969, (AD 696-126).

[25]Sullivan, D. and others, A Survey of the Present-State-of-the-Art in Learning Center Operations, AFHRL-TR-74-11, Lowry AFB, CO, Technical Training Division, Air Force Human Resources Laboratory, 1974.

[26]Lee, D., "Do We Group in an Individualized Program," Childhood Education, 1968, 45: 197-199.

[27]Payne, K., "Social Factors in the Classroom," In W. Dunn and C. Holroyd (Eds), Aspects of Educational Technology (Vol 2, London, Methuen and Co.,,1968).

[28]James, J., "A Preliminary Study of the Size Determinant in Small Group Interaction," American Sociological Review, 1951, 16: 474-477.

[29]Van Cott, H. and Kinkade, R.G., Human Engineering Guide to Equipment Design, Washington D.C., U.S. Government Printing Office, 1972, (Ref. Ed.).

6. CONCLUSIONS.

The approach was to design, pilot test, and recommend general requirements for a patient learning environment that would optimize the learning process for the specific selected learning activities. Based on the observations and experience of the PACOMED staff and a study of the literature the following criteria for the physical facilities of a learning center are listed.

a. Physical Facilities.

(1) General Requirements.

(a) Size. A small-group facility would be designed to accomodate six to ten patients. The minimum room size would be 300 square feet, preferably 450 square feet (15' X 30'). The size will be dependent on space allocations, type of installation, and patient flow.

(b) Wiring. Minimum requirements of a small sized learning center would be two double outlets on each wall. The outlets should be within easy access to each study carrel and either end of the room. Raceways should be provided for communications units both within the learning center and between other areas of the hospital care facility.

(c) Artificial-Light Control. The light should be adequately diffused and shadow free in all parts of the learning center. Thirty (30) footcandles is recommended as the minimum ligh level. Light control with dimmer switch should be in the immediate area of the health educator's station.

(d) Acoustical Conditioning. The acoustical conditioning should be controlled by wall coverings (acoustical tile or plaster) and rugs on the floors plus the use of headphones for each patient. Cutting down on the reverberation and noise level improves room "climate" and reduces tensions.

(e) Air Control. Heating, cooling, and ventilating systems should cause neither drafts nor noise. The temperature range as per governmental energy control standards, should be from 68 degrees F. in the winter to 78 degrees F. in the summer and the humidity between 45 and 55 percent with adequate air circulation. It should also be thermostatically controllable and monitored by the health educator.

(f) Color. Colors may vary considerably, depending upon the room's exposure. Pastel colors are suggested to help with lighting and light control.

(g) Reflective Surfaces. For effective use of most projected material, illumination in the room should not exceed 1/10 footcandle.

(h) Rest Room Facilities. Should be provided for both men and women in the immediate area.

b. Furniture and Arrangement.

(1) Carrels. To afford flexibility a "mix" of types of carrels is recommended, rather than a standardized type. The vertical dividers should not be over two feet above the table area. Study carrels should be used for individualized instruction with a minimum of six and preferably ten patients per small sized learning center.

(2) Cloistering of Carrels. If feasible the carrels should be broken up visually so that they do not have a barnlike, regimented appearance. If space is at a premium there should be no more than five carrels along one wall. Carrels should be arranged to ease the traffic flow, since patients leave at different times.

(3) Social Interaction and Group Size. The interaction and size of the group is dependent upon the topic area (disease entity) and the social characteristics of the patients. The optimum group size is between six to ten patients.

(4) Conference Table. At least one round conference table should be included in the furniture to provide opportunities for various forms of interaction and face-to-face learning activities. When patients are in the carrels the conference table may also serve as the health educator's station.

(5) Seating and Table Surfaces. Seats and table should be movable (designed for flexible grouping), quiet, comfortable, the right height, with good posture support. Swivel chairs with casters are suggested.

(6) Learning Materials Storage. The learning center should include shelving both open and visible and hidden (cabinets) shelves to store booklets, 3/4" audiovisual cassettes, etc.

SEE DIAGRAM 2: General Requirements for a Patient Learning Center, p. 170.

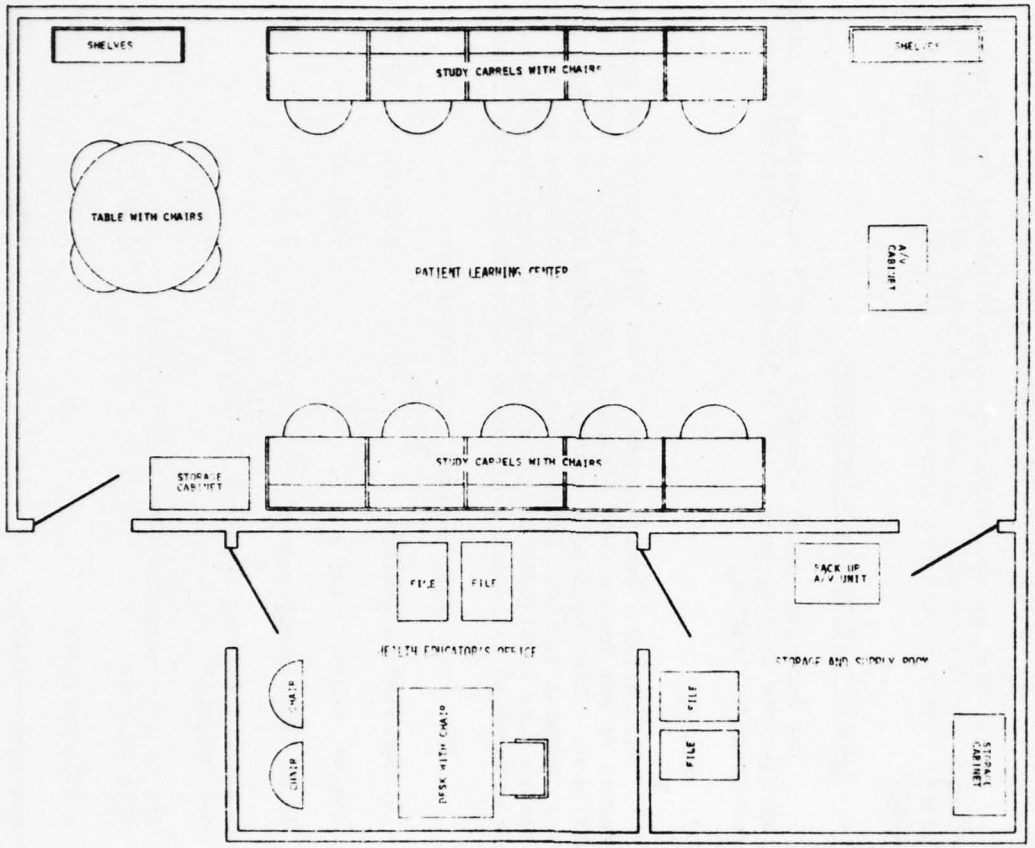
c. Additional Facilities.

(1) Health Educator's Office. Should include a desk, two chairs, and a minimum of two file cabinets. The number of file cabinets would be dependent on the patient case load. This office is essential for baseline collection and individual counseling.

(2) Storage Area and Supply Room. Should be large enough to adequately store blank forms, patient charts, and additional (back-up) audiovisual equipment, including two file cabinets. The recommended room size is 9' X 11'. However, it may be smaller.

SEE DIAGRAM 2: General Requirements for a Patient Learning Center, p. 170.

GENERAL REQUIREMENTS
FOR A PATIENT
LEARNING CENTER DIAGRAM 2



d. Audiovisual Hardware. See Appendix E, Communications Media, p. for an indepth discussion.

(1) 3/4" video cassette playback unit, 21" color T.V. receiver and console. This proved to be the most cost effective and reliable mode. In addition it is recommeded to have the hardware stored in a console for safety, dust free environment and flexibility of movement. Units have been known to fail, so having a backup component is advised.

(2) Headphones. Should be used to afford the patients a better opportunity to concentrate. Eleven for a small sized learning lab is recommended. Ten for patients plus one for the health educator's monitoring function.

e. Location of the Learning Center.

The learning center should be readily accessible to patients and have an adequate waiting area. And if possible a physical location that is convenient for parking.

f. Costs.

(1) General Requirements. Space allocations and general requirements do not have a cost attached because existing resources will be utilized. This would be a cost to the AMEDD with or without the patient learning center. Pointed out in the discussion was the fact that all health care facilities have similar general requirements because of American Hospital Association Standards and other clinical factors.

(2) Furniture, Shelves, and Cabinets

(a)	10, one station carrels	@139.00	$1,390.00
(b)	one 48" diameter table	@107.50	107.50
(c)	16 chairs-plastic posture forming shell	@ 22.39	356.84
(d)	2 sets of display shealves (5 shelves/set and hangers)	@ 53.60	107.20
(e)	two storage cabinets (18" X 35" X 60") with shelves	@ 85.00	170.00
(f)	4 file cabinets	@250.00	1,000.00
(g)	one desk--Pedestal	@250.00	250.00
		cost	$3,381.64

(3) Audiovisual Hardware

(a)	2 color T.V. receivers--21" screen	@487.00	$ 974.00
(b)	two 3/4" video cassette playback units	@884.30	1,768.60
(c)	2 cabinet, consoles	@329.00	658.00
(d)	11 headphones	@ 13.70	150.70
		cost	$3,551.30
Estimated Maximum Cost		Approximately	$7,000.00

7. RECOMMENDATIONS.

a. Unfortunately, many existing AMEDD health facilities will not have the potential to develop the patient learning center and additional facilities just described. In most cases some of the desirable requirements will be lacking, or else they will fall far below the standards suggested here. Some space allocations may have lights but no power outlets, others may need paint, or lack proper ventilation. Such problems need not keep the conscientious health care worker from making adequate use of patient education media. Inventive health care workers all over the country have devised ways to use media despite unfavorable conditions. An environment favorable to learning can be created in almost any room in a health care facility. All that may be needed is some "creative imagination." The general requirements and costs were based on the maximum needed, not the minimum. For example, the PACOMED project did not purchase all the furniture or audiovisual hardware to conduct the study. most of the furniture and equipment was borrowed very easily because of under-utilization of existing resources. Two 3/4" video cassette playback units, two, 21" television receivers and two consoles were loaned to the project for two years. The space allocations given to conduct the study were rooms previously used by another study group, plus two vacant storage rooms. When requirements couldn't be met any other way improvisations were accomplished. Even in older buildings, relatively inexpensive improvements can be made to facilitate the patient education process.

b. The maximum requirements would not cost more than $7,000.00 to set up a patient learning center, health educator's office and storage. Or to draw an analogy, not more than the existing cost for patient information (given by physicians and nurse clinicians based on Hypertensive and Diabetic patient case load) in one month for the Internal Medicine Clinic at DeWitt Army Hospital, Fort Belvoir, Virginia.

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GLOSSARY OF TERMS

1. ADHERES TO LOW SODIUM DIET: If the response, adheres to low sodium diet, was positive, examples had to be provided, i.e., does not use salt shaker, omits salt from cooking and does not eat foods and snacks that are highly salted such as pretzels, potato chips, salted pork, ham, etc.

2. BASELINE DATA: Behavioral measures taken prior to beginning a new learning experience (i.e. blood pressure reading, weight, etc.).

3. BEHAVIORAL CHANGES: The amount of change in the direction of desired behavioral outcomes (i.e. knows drugs and action, takes medication, diets (if indicated) low sodium, etc.) possessed by patients six months after the termination of a method of teaching.

4. COMPLIES WITH LAB/ANCILLARY TESTS: Did patient present him/herself for scheduled lab tests or diagnostic procedures.

5. COMPREHENSION: The amount of hypertension information (general information, sodium restricted diet, medications) possessed by patients immediately after the termination of a method of teaching.

6. CRITERION-REFERENCED MEASURES: Measures used to ascertain an individual's status with respect to some criterion, i.e. performance standard. It is because the individual is compared with some established criterion, rather than other individuals, that these measures are described as criterion-referenced.

7. EDUCATIONAL TECHNOLOGY: The application of science-based or science-derived concepts and techniques in a systematic way to the practical task of education.

8. FREQUENCY OF PHYSICAL ACTIVITY: Daily, twice weekly, or weekly.

9. INVESTMENT COSTS: Costs necessary to implement the program. Equipment purchases and the costs of running a workshop to train staff are examples of investment costs.

10. KNOWS DRUGS AND ACTIONS: Must be able to name or identify the name of their medication from a list provided and be able to state the medications side effects.

11. MEDICAL ADVICE: Giving a limited, unstructured explanation or directions using professional knowledge or intuition on some aspect of health care or behavior.

12. NON-PROFESSIONAL PARAMEDIC: A graduate of the 91C20, clinical specialist course, a civilian licensed practical nurse, or a 91B20 who has had prior clinical experience.

13. NORM-REFERENCED MEASURES: Measures used to ascertain an individual's performance in relationship to the performance of other individuals on the same measuring device.

14. NUMBER CUPS OF COFFEE PER DAY: (Actual number) decafinated coffee was not considered.

15. NUMBER OF CIGARETTES PER DAY: (Actual number).

16. OPERATING COSTS: Recurring costs required to operate the program, over time, maintenance of equipment, salaries of personnel, and the cost of supplies are examples.

17. PATIENT HEALTH EDUCATION: Using structured information with scientific assessment and teaching strategies. Those strategies encompass the cognitive, psychomotor, and affective domains to alter an individual's attitudes and behavior in favor of improved health.

18. PATIENT INFORMATION: Showing a film, distributing pamphlets, giving classes or counseling patients, etc. about a given health area, service or problem without regard to prespecified terminal objectives in the cognitive, psychomotor or affective domains. The emphasis is on unstructured information without utilization of scientific assessment and teaching strategies.

19. POST-TEST: A set of criterion questions identical to those given on the pre-test, administered to determine the extent of the patient's comprehension of desired information after completing a new learning experience.

20. PRE-TEST: A set of criterion questions directly related to the content of the learning experience administered to determine the extent of the patient's comprehension of desired information prior to beginning a new learning experience.

21. RESEARCH AND DEVELOPMENT COSTS: Resources required to develop the program to the stage where it can be introduced into the system. For example, the time an instructional designer spends validating a learning system, money to hire consultants, and evaluation efforts.

22. RETENTION: The amount of hypertension information (general information, sodium restricted diet, medications) possessed by patients six months after the termination of a method of teaching.

23. SYSTEMS APPROACH: A devised and designed regular or special method or plan or methodology or procedure; the organization of hardware, software, and people for cooperative operation to complete a set of tasks for desired purposes. It is denoted as SA in the remainder of this report.

24. TAKES MEDICATION: If medications were prescribed, were they taken in the proper amounts and times.

25. TRADITIONAL HEALTH TEACHING: Planned sequence of didactic and demonstration instruction with supplemental handouts (with the exact teaching objectives as the systems approach method) given by a physician or nurse clinician. It is denoted as T in the remainder of this report.

26. TYPE OF PHYSICAL ACTIVITY: If an exercise program was maintained, what type:

Sedentary: walking slowly (1/2 mile or less), light gardening.

Light: roller skating, walking slowly (more than 1/2 mile).

Moderate: walking moderately fast, heavy gardening, cutting grass, bowling, golfing (with cart).

Vigorous: golfing (without cart), walking fast, dancing, bicycling, sit-ups, push-ups.

Strenuous: swimming, tennis, jogging, football, basketball.

27. VALIDATED INSTRUCTION: Instruction that does in fact accomplish that for which it was designed; that causes the learner to demonstrate the performance at the mastery level consistently.

28. WAS TENSION EXPERIENCED: Was tension experienced at home or on the job. If the response was positive, were medications taken to control tension.

LIST OF ABBREVIATIONS, ACRONYMS, AND SYMBOLS

1. AHS: Academy of Health Sciences
2. AMEDD: Army Medical Department
3. ANC: Army Nurse Corps
4. DAH: DeWitt Army Hospital
5. FSHTX: Fort Sam Houston, Texas
6. HCSD: Health Care Studies Division
7. I/E Scale: Rotter's Internal - External Scale
8. LOC: Locus of Control
9. N: Number of patients in a described group
10. PACOMED: Patient and Community Health Education Model: A Developmental and Evaluation Project Study
11. SA group: Systems Approach group or Experimental group
12. T group: Traditional group or Control group
13. USMEDCEN: United States Medical Center
14. USMEDDAC: United States Medical Activity
15. $\leq$: Equal to or less than
16. $>$: Greater than

8. DISTRIBUTION:

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Commander, USAMEDDAC, Fort Devens, MA 01433 (1)
Commander, USAMEDDAC, Fort Dix, NJ 08640 (1)
Commander, USAMEDDAC, Fort Eustis, VA 23604 (1)
Commander, USAMEDDAC, Fort George G. Meade, MD 20755 (1)
Commander, USAMEDDAC, Fort Hood, TX 76544 (1)
Commander, USAMEDDAC, Fort Huachuca, AZ 85613 (1)
Commander, USAMEDDAC, Fort Jackson, SC 29207 (1)
Commander, USAMEDDAC, Fort Knox, KY 40121 (1)
Commander, USAMEDDAC, Fort Leavenworth, KS 66027 (1)
Commander, USAMEDDAC, Fort Lee, VA 23801 (1)
Commander, USAMEDDAC, Fort Leonard Wood, MO 65473 (1)
Commander, USAMEDDAC, Fort McClellan, AL 36201 (1)
Commander, USAMEDDAC, Fort Monmouth, NJ 07703 (1)
Commander, USAMEDDAC, Fort Ord, CA 93941 (1)
Commander, USAMEDDAC, Fort Polk, LA 71459 (1)
Commander, USAMEDDAC, Fort Riley, KS 66442 (1)
Commander, USAMEDDAC, Fort Sheridan, IL 60037 (1)
Commander, USAMEDDAC, Fort Sill, OK 73503 (1)
Commander, USAMEDDAC, Fort Stewart, GA 31313 (1)
Commander, USAMEDDAC, Fort Wainwright, Fairbank, AK 99703 (1)
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