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COST/BENEFIT ANALYSIS OF COMPETING PATIENT EDUCATION SYSTEMS.(U)
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COST/BENEFIT ANALYSIS OF COMPETING PATIENT EDUCATION SYSTEMS

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28 October 1977

Final Report

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The purpose of this study was to determine the best of three methods of administering patient education based on both cost and benefits. The two objectives were to perform a cost/benefit analysis (CBA) on the various approaches to administering patient education, and to make a recommendation based on the outcome of the CBA concerning the adaption of the winning alternatives. The major source of data for this study was LTC Deloros H. Kucha, Ph.D., in the form of personal interviews and various reports submitted by her on the PACOMED study. The conclusion of this analysis was that the PACOMED system is the best alternative based on cost and benefits.		

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EXECUTIVE SUMMARY

1. Problem: To determine the best of three methods of administering patient education based on both cost and benefits.

2. Study Objectives:

a. To perform a cost/benefit analysis (CBA) on the various approaches to administering patient education.

b. To make a recommendation based on the outcome of the CBA concerning the adoption of the winning alternate.

3. Background:

In recent years there has been an increased awareness concerning total patient treatment. Included in this total treatment is patient education designed to enable patients to participate actively in their own treatment. Traditionally patient education has been accomplished through the one-on-one tutorial approach of professional instructing patient.

However, due to the inconsistency inherent to this approach and the low level of patient comprehension, LTC Kucha developed the PACOMED System utilizing a less skilled individual (health educator) to administer a complete, consistent, measurable patient education program.

This study attempts to quantify the differences between the EXISTING System and the PACOMED System and based on these differences, a preferred alternative is recommended.

Most of the data for this CBA was collected under the direction of LTC Kucha by the Health Care Studies group detailed to the PACOMED Office at Ft. Belvoir, Virginia. The various reports submitted by LTC Kucha on the PACOMED project were an invaluable source of information. Other data were obtained directly from the Health Services Command and the Surgeon General's Office (DASG).

4. Major Assumptions:

a. There will be fifty high priority, high dividend subject areas under the PACOMED System.

b. Nurse clinicians expend approximately forty percent of their clinical time in patient education and information.

c. In applying the percentage factor for nurse clinician education and information time, below eight percent of a slot will be considered as soft dollar benefits and above eighty percent will be considered hard dollar savings (actual slot elimination).

EXECUTIVE SUMMARY

1. This report is intended to provide the staff of the Department of Administration with information on the results of the study conducted on the subject of the study.

2. Study Objectives:

a. To determine the effectiveness of the study in providing information on the subject of the study.

b. To determine the effectiveness of the study in providing information on the subject of the study.

3. Background:

In recent years there has been an increased awareness of the need for a more effective system of personnel management. This has led to a number of studies and reports on the subject of personnel management. The results of these studies have been used to develop a number of new personnel management systems. The purpose of this study was to determine the effectiveness of these systems in providing information on the subject of the study.

However, one of the major problems in the study was the low level of interest in the study. This was due to a number of factors, including the fact that the study was conducted in a department where there was a high level of turnover. This led to a number of difficulties in the study, including the fact that the study was conducted in a department where there was a high level of turnover.

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Most of the data for this study was obtained from the staff of the Department of Administration. The data was obtained from a number of sources, including the staff of the Department of Administration. The data was obtained from a number of sources, including the staff of the Department of Administration.

4. Major Findings:

a. The study found that the study was effective in providing information on the subject of the study.

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c. The study found that the study was effective in providing information on the subject of the study.

- d. One health educator can instruct up to ten patients per session.
- e. Based on the one and a half hour average required for the eight programs already developed, five sessions per day can be held. (Total capacity per day is fifty patients).
- f. Health educators will be E4's and E5's with the average salary cost computed halfway between the two.
- g. The average operating life of the audio visual equipment is five years.
- h. A seven percent inflation factor is assumed for the past three years to update equipment and certain operating costs.

5. Alternatives:

- a. The Existing System of medical doctors and nurse clinicians provides tutorial patient education as part of the normal treatment procedure.
- b. The Patient and Community Health Education (PACOMED) System utilizes a learning laboratory staffed by a health educator to provide patient education for selected medical problem areas. Ideally, the health educator provides a higher, more consistent level of education to the patients while freeing up the health care professionals (nurse clinicians and medical doctors) for other more productive tasks.
- c. The Revised Existing System entails increasing the amount of time spent by health care professionals in their tutorial patient education in order to upgrade the patient's understanding to the level achieved by the PACOMED System.

A quick qualitative comparison between the PACOMED System and the Revised Existing System demonstrates the PACOMED System's superiority. As demonstrated in the reports on the PACOMED project submitted by LTC Deloros H. Kucha, Ph.D., the project director, the PACOMED System is equal to or better than the Revised Existing System in every benefit area. In addition to this, the cost of the Revised Existing System would be astronomical, since the number of health care professionals would have to be at least doubled in order to accommodate the additional education load. Therefore, the PACOMED System dominates the Revised Existing System in both cost and benefits and the Revised Existing System no longer needs to be considered. Thus, the CBA will be dedicated to comparing the PACOMED System with the Existing System.

6. Conclusions:

Based on cost alone, the PACOMED System is the winner. Based on benefits alone, the PACOMED System is the winner. Since the same alternative dominates both analysis categories and since the selection of the cost analysis winner was validated in the SENSITIVITY ANALYSIS SECTION, the PACOMED System is the overall winning alternative.

7. Recommendations:

a. Determine the overall percentage of time nurse clinicians spend in patient education/information and based on this percentage, the nurse clinician slots which will be eliminated.

b. Determine the approximately fifty subject areas to be included in the PACOMED System and schedule the design of these education programs for each of the designated subject areas.

c. Establish a phased implementation schedule for the PACOMED System at the various MEDDACs and medical centers. In conjunction with this schedule, phase out the nurse clinician slots identified for elimination.

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INTRODUCTION

1. Problem: To determine the best of three candidate methods of administering patient education based on both cost and benefits.
2. Study Objectives:
 - a. To perform a cost/benefit analysis (CBA) on the various approaches to administering patient education.
 - b. To make a recommendation based on the outcome of the CBA concerning the adoption of the winning alternate.
3. Alternatives: The three alternatives under consideration are:
 - a. The Existing System of physicians and nurse clinicians provides tutorial patient education as part of the normal treatment procedure.
 - b. The Patient and Community Health Education (PACOMED) System utilizes a learning laboratory staffed by a health educator to provide patient education for selected medical problem areas. Ideally, the health educator provides a higher, more consistent level of education to the patients while freeing up the health care professionals (nurse clinicians and physicians) for other more productive tasks.
 - c. The Revised Existing System entails increasing the amount of time spent by health care professionals in their tutorial patient education in order to upgrade the patient's understanding to the level achieved by the PACOMED System.

A quick qualitative comparison between the PACOMED System and the Revised Existing System demonstrates the PACOMED System's superiority. As demonstrated in the reports on the PACOMED project submitted by LTC Deloros H. Kucha, Ph.D., the project director, the PACOMED System is equal to or better than the Revised Existing System in every benefit area. In addition to this, the cost of the Revised Existing System would be astronomical, since the number of health care professionals would have to be at least doubled in order to accommodate the additional education load. Therefore, the PACOMED System dominates the Revised Existing System in both cost and benefits and the Revised Existing System no longer needs to be considered. Thus, the CBA will be dedicated to comparing the PACOMED System with the Existing System.

4. Background:

In recent years there has been an increased awareness concerning total patient treatment. Included in this total treatment is patient education designed to enable patients to participate actively in their own treatment. Traditionally patient education has been accomplished through the one-on-one tutorial approach of professional instructing patient.

However, due to the inconsistency inherent to this approach and the low level of patient comprehension, LTC Kucha developed the PACOMED System utilizing a less skilled individual (health educator) to administer a complete, consistent, measurable patient education program.

This study attempts to quantify the differences between the Existing System and the PACOMED System and based on these differences, a preferred alternative is recommended.

5. Data:

Most of the data for this CBA was collected under the direction of LTC Kucha by the Health Care Studies group detailed to the PACOMED Office at Ft. Belvoir, Virginia. The various reports submitted by LTC Kucha on the PACOMED project were an invaluable source of information. Other data was obtained directly from the Health Services Command and the Surgeon General's Office (DASG).

ASSUMPTIONS AND GROUND RULES

1. There will be fifty high priority, high dividend subject areas under the PACOMED System.
2. Physicians and nurse clinicians disseminating patient education in their fields of expertise require no further research to provide a level of education equivalent to that demonstrated by PACOMED.
3. Nurse clinicians expend approximately forty percent of their clinical time in patient education and information.
4. The time spent in other than clinical practice by nurse clinicians is considered to be directly related to the clinical time and therefore, reductions in clinical time will effect the same percentage change in non-clinical time.
5. In applying the percentage factor for nurse clinician education and information time, below eighty percent of a slot will be considered as soft dollar benefits and above eighty percent will be considered hard dollar savings (actual slot elimination).
6. The fifty selected areas will effectively reduce the nurse clinician's patient education and information time to zero.
7. There are eight productive hours per day for both alternatives.
8. One health educator can instruct up to ten patients per session.
9. Based on the one and a half hour average required for the eight programs already developed, five sessions per day can be held. (Total capacity per day is fifty patients).
10. Health educators will be E4's and E5's with the average salary cost halfway between the two.
11. The average operating life of the audio visual equipment is five years.
12. The difference in cost for required power between the two alternatives is negligible.
13. Literature cost for the existing system is negligible.
14. The cost of replacement video tapes for the PACOMED System is negligible.
15. The various MEDDACS and medical centers are physically capable of accommodating learning centers.

16. Learning centers with one educator require seven hundred square feet and those with two educators require twelve hundred square feet.

17. If selected, the PACOMED System will be implemented in the FY 80 - FY 82 time frame.

18. A seven percent inflation factor is assumed for the past three years to update equipment and certain operating costs.

19. The Existing System's cost will be considered to be the baseline cost. The cost of the PACOMED System will be determined with this baseline cost as the zero point (differential costing).

20. Salary costs have incorporated the October 1, 1977 pay raise.

21. The costing of the PACOMED System will be for implementation at forty-five different MEDDACS and Medical Centers.

METHODOLOGY

The two components of the cost/benefit analysis are treated separately. The cost analysis recorded in the next section identifies costs associated with each of the three cost categories, Research and Development, Investment, and Operating, for each alternative. The results of this portion of the study indicate which alternative is the "best" based on cost alone.

Following the COST ANALYSIS section will be two sections which examine benefits. First will be the SOFT DOLLAR BENEFIT ANALYSIS where the benefit of additional health professional time made available by the PACOMED System is quantified. Additionally, a QUALITATIVE BENEFIT ANALYSIS will examine the various attributes of the PACOMED System as compared to the EXISTING System. Both of the benefit analyses will select winners based on their sections alone.

Next a sensitivity analysis is performed on the values yielded by the cost analysis to test the susceptibility of the rankings to possible changes in these values.

Finally, based on the cost analysis, the two benefit analyses and the sensitivity analysis, the CONCLUSIONS AND RECOMMENDATIONS section selects the overall winning alternative and then makes several suggestions concerning its implementation.

COST ANALYSIS

For the purposes of this study, the Existing System is considered to have zero cost. The PACOMED System is then costed in a differential manner with respect to the Existing System. That is, only the cost differences between the two will be considered. If the relative cost of PACOMED is negative, this represents a savings over the Existing System. If positive, the Existing System is the low cost alternative. The total cost is determined by summing the R&D, Investment and Operating cost categories. All costs are computed in FY 78 dollars with supporting calculations appearing in APPENDIX A.

1. Existing System - (baseline cost established as zero point).

2. PACOMED System

a. R&D Cost

(1) The R&D cost for this system is the program development cost. To determine this, the average program development cost for the eight program areas already completed by PACOMED is determined. This average cost is then multiplied by fifty, the number of programs that are assumed to be required.

$$\text{Total R\&D Cost} = (50 \text{ programs}) (\$853/\text{program}) = \$42,650$$

(2) This figure is adjusted for three years of inflation using an annual rate of seven percent. Therefore, the total R&D cost with an inflation adjustment is:

$$\text{Total Adjusted R\&D Cost} = (\$42,650) (1.225) = \$52,246$$

b. Investment Cost

(1) The investment cost is determined for installations with both one and two health educators.* It is further broken down into hardware cost, furnishings cost and remodeling cost. For single health educator installations, the cost is determined as follows:

$$\text{Investment Cost} = \$3552 + \$3382 + \$9800 = \$16,734/\text{inst}$$

(2) For installations with two health educators the cost is:

$$\text{Investment Cost} = \$7104 + \$6764 + \$16,800 = \$30,668/\text{inst}$$

*See Operating Cost, 2.c., for the determination of health educator apportionment to the various installations.

(3) The total investment cost is determined by multiplying each of these two costs by their respective number of installations. Therefore, the total investment cost is:

$$\begin{aligned} \text{Total Investment Cost} &= (34 \text{ inst}) (\$16,734/\text{inst}) + (11 \text{ inst}) (\$30,668/\text{inst}) \\ &= \$906,304 \end{aligned}$$

(4) Again the inflation factor used for R&D costs will adjust this dollar figure to FY 78 dollars. The total investment cost with the inflation adjustment is:

$$\text{Total Adjusted Investment Cost} = (\$906,304) (1.225) = \$1,110,222$$

c. Operating Cost

(1) The operating cost is determined by first computing the personnel cost, the paperwork cost and the maintenance cost and then summing these three components. The personnel cost can be further subdivided into physician cost, nurse clinician cost and health educator cost. These individual personnel costs are described below.

(a) Although there is a theoretical savings in the physician's time with the implementation of PACOMED, in no case is the time at any installation great enough to justify the elimination of a physician slot. Therefore, the savings will be treated in the SOFT DOLLAR BENEFIT ANALYSIS section.

(b) There is a tremendous savings in the nurse clinician time with the implementation of PACOMED. Based on an extrapolation of the forty percent of clinical time currently spent by nurse clinicians in patient information and education at DeWitt Army Hospital, a total of forty four actual nurse clinician slots are identified for elimination. The five year savings that this cut would effect are:

$$\begin{aligned} \text{Nurse Clinician Savings} &= (5 \text{ yrs}) (44 \text{ nurses}) (\$26,647/\text{nurse/yr}) = \\ &= \$5,862,340 \end{aligned}$$

(c) The largest cost of the PACOMED System lies in the salary cost of the health educators. The number of required health educators is determined by first calculating the average number of patients one nurse clinician sees in one day. Utilizing the baseline data collected at DeWitt Army Hospital yields:

$$\text{Average patients/day} = 1114 \text{ patient}/150 \text{ days} = 7.83 \text{ patients/day}$$

The health educator's theoretical capacity is fifty patients/day. Therefore, one health educator should be able to handle the number of patients the following number of nurses see.

$$\begin{aligned} \text{Number of nurses} &= (50 \text{ patients/day}) / (7.83 \text{ patients/day}) = 6.39 = \\ &= 6 \text{ nurses} \end{aligned}$$

Therefore, at hospitals with more than six nurse clinicians, more than one health educator is required. Using this guideline, Tripler Army Medical Center, William Beaumont Army Medical Center, and MEDDACS at Ft. Benning, Ft. Campbell and Ft. Jackson require two health educators. Assuming also that the other six medical centers require two health educators yields a total requirement of fifty six health educators. For those installations receiving two health educators, it is further assumed that additional education facilities are also required (see Investment Cost, 2.b(1) & (2)). Therefore, the health educator five year cost is:

$$\begin{aligned}\text{Health Educator Cost} &= (5 \text{ yrs}) (56 \text{ health-ed}) (\$13,994/\text{health-ed}/\text{yr}) \\ &= \$3,918,320\end{aligned}$$

(d) The total five year personnel cost is:

$$\text{Total Personnel Cost} = -\$5,862,340 + \$3,918,320 = -\$1,944,020$$

(2) To individualize the learning process for each individual patient a certain amount of paperwork is necessary. To estimate the cost of the paperwork, it is assumed that the fifty six health educators will work at maximum capacity (fifty patient/day) for five years. A cost of nine cents per patient for the paperwork is used.

$$\begin{aligned}\text{Paperwork Cost} &= (\$.09/\text{pat}) (50 \text{ pat}/\text{health-ed}/\text{day}) (56 \text{ health-ed}) \\ &\quad (230 \text{ day}/\text{yr}) (5 \text{ yrs}) = \$289,800\end{aligned}$$

Adjusting this dollar amount for three years of inflation at seven percent yields:

$$\text{Adjusted Paperwork Cost} = (\$289,800) (1.225) = \$355,005$$

(3) The maintenance cost is based on a cost estimating relationship of one cent per hour per piece of equipment. For two television receivers, two cassette playback units and considering the eleven headphones as one piece of equipment, the relationship becomes five cents per hour per health educator. Therefore, the maintenance cost for five years is:

$$\begin{aligned}\text{Maintenance Cost} &= (\$.05/\text{hr}/\text{health-ed}) (6000 \text{ hr}) (56 \text{ health-ed}) \\ &= \$16,800\end{aligned}$$

Again adjusted for three years of seven percent inflation yields:

$$\text{Adjusted Maintenance Cost} = (\$16,800) (1.225) = \$20,580$$

(4) Summing these components of operating cost yields the total five year operating cost.

$$\text{Total Operating Cost} = \$1,944,020 + \$355,005 + \$20,580 = -\$1,568,435$$

d. The total five year cost of PACOMED as opposed to the Existing System is determined by adding the R&D cost, the Investment cost and the Operating cost. The result is:

$$\begin{aligned} \text{Total Cost} &= \$52,246 + \$1,110,222 + (-\$1,568,435) = -\$405,967 \\ &= -\$406,000 \end{aligned}$$

This negative cost represents an actual savings to the Army if PACOMED is implemented and the nurse clinician slots are eliminated. Therefore, based on cost alone, PACOMED is the winning alternative.

SOFT DOLLAR BENEFIT ANALYSIS

Many times when new systems are brought into the Army, a change in the work structure results. When specific personnel slots are identified to be either added or subtracted from an organization, a real dollar change occurs as is the case for the forty four nurse slots. However, when a change in time occurs which is not large enough to justify the addition or deletion of a personnel slot, a benefit or disbenefit results. In other words, if by implementing a new system an employee's workload is changed from eight hours to six hours, a benefit occurs in that the employee has acquired two additional hours to increase his productivity. To evaluate this benefit, the employee's salary cost is multiplied by the time differential to yield what is termed "soft dollar benefits." These soft dollar benefits are not to be confused with savings (hard dollars) that accrue due to the elimination of personnel slots. Soft dollar benefits yield higher performance which is usually not directly translatable to actual savings.

As was done in the COST ANALYSIS section, soft dollar benefits will be analyzed by assigning to the Existing System the value of zero soft dollar benefits. The PACOMED System is then evaluated in relation to this zero value system. Calculations for this section appear in APPENDIX C, MISCELLANEOUS CALCULATIONS.

1. Based on the PACOMED baseline data, physicians currently spend an average of .032 hours per patient. By assuming that all the health educators are at full capacity for five years, the total number of patients is determined to be 3,220,000. This figure when multiplied by the mean hours per patient yields 103,040 hours of physician time which can be devoted to productive tasks other than patient education and information. This hour figure converts to fifty six physician years which are evaluated as:

$$(56 \text{ physician-years}) (\$33,837/\text{physician year}) = \$1,894,872$$

Represented here is the dollar value of the physician time that would be saved by PACOMED. However, a word of caution is in order concerning reality as opposed to theory. In all likelihood, most physicians will not completely eliminate this physician to patient interchange. Therefore, the figure will probably be smaller than \$1,894,872. Still, whatever the time savings are, they accrue as a benefit to the PACOMED System.

2. In addition to the forty four nurse clinician slots identified for elimination, the fractions of positions from the various hospitals add up to a net of 5.4 additional slots per year. (see APPENDIX A, 2.c.(1)(b)) This represents the time the nurse clinicians will have to perform clinical duties other than patient education and information. The dollar value of this time is:

$$(5 \text{ yr}) (5.4 \text{ nurse}) (\$26,647 \text{ nurse/yr}) = \$719,469$$

3. The total soft dollar benefits shown by the PACOMED System over the Existing System are:

$$\text{Total} = \$1,894,872 + \$719,469 = \$2,614,341$$

Therefore, based on soft dollar benefits alone, the PACOMED System is the winning alternative.

QUALITATIVE BENEFIT ANALYSIS

This section, which could also be termed advantages and disadvantages, will address in a qualitative manner the differences between the PACOMED System and the Existing System. Once again the Existing System will be considered as the baseline with the benefits and disbenefits of the PACOMED System enumerated in relation to the baseline Existing System. Further examination of the benefits and disbenefits is afforded by the various reports submitted by LTC Deloros H. Kucha, Ph.D., concerning the three-year PACOMED study conducted by her. In this study, the actual comparison of the PACOMED System of learning was done with a control group receiving approximately the same amount of patient education as the PACOMED group. However, it was given by health professionals rather than health educators. This control group received substantially more patient education than the Existing System provides. Therefore, where the PACOMED System is superior to the control group, it is obviously superior to the Existing System. This logical extension is made in the following benefits.

1. Benefits

- a. Initial comprehension by patients is much higher using the PACOMED System than the Existing System.
- b. Retention among patients educated by the PACOMED System is higher after six months than for patients educated by the Existing System.
- c. Patients educated by the PACOMED System achieved the same or better behavioral gains than those educated by the Existing System.
- d. The PACOMED System provides all patients with a high level of education independent of the time of day, mood of the professional or other human related factors.
- e. The PACOMED System allows patients to learn at their own speed and to review as necessary.
- f. The PACOMED System provides specific structured educational content which can be periodically revised, reviewed, and updated by consultants.
- g. The PACOMED System allows for family members to be included in the patient education process more easily than the Existing System.
- h. Patients are receptive to the learning center concept of education used in the PACOMED System.
- i. The PACOMED System allows for easy measurement of a patient's comprehension level.
- j. The PACOMED System allows the receiving of education to be easily documented.

k. The PACOMED System provides an accountable agent responsible for patient education.

1. The PACOMED System reduces the repetitive workload of medical professionals.

2. Disadvantages

a. The PACOMED System does not have total acceptance by medical professionals.

b. There has not yet been developed a good patient referral system to PACOMED.

In comparison to the Existing System, the benefits of the PACOMED System are overwhelming. Therefore, based on the qualitative benefits alone, the PACOMED System is the winning alternative.

SENSITIVITY ANALYSIS

In order to consider some of the "what if" situations that invariably arise in the course of performing a cost estimate, a sensitivity analysis examining the possible changes in cost is performed. The three major cost components are individually examined with possible changes tested for their effect on the total cost. If any possible change causes the winning alternative to switch places with another option, this change is considered to be highly significant and its identification is important. Sensitivity calculations to support the following analysis are in APPENDIX D.

1. R&D Cost:

If the cost of developing the programs is doubled, the total cost goes from -\$405,967 to -\$353,721. Even if the cost is increased five hundred percent, the total cost goes from -\$405,967 to -\$196,983, which still represents a savings if the PACOMED System is implemented. Therefore, the PACOMED System remains the winning alternative based on cost alone and it can be concluded that the total cost is insensitive to very large changes in the R&D cost.

2. Investment Cost:

There are three possible major changes in the Investment cost:

a. For those installations with two health educators, reductions in hardware, furnishings and remodeling costs occur if the two health educators work different shifts and then share the same facilities.

b. Many installations have television receivers and video tape players which could be dedicated to the PACOMED System.

c. Audio visual equipment is currently undergoing rapid advancement in the state-of-the-art which is bound to drive equipment costs down considerably below those shown in the COST ANALYSIS section.

However, any one or combination of these changes will reduce the Investment cost which will cause an even larger overall savings to result in favor of the PACOMED System. Thus, the determination of the winning alternative is insensitive to possible changes in the Investment Cost.

3. Operating Cost:

a. If the nurse clinicians' actual average patient education and information time is approximately thirty percent rather than forty percent of their total available time, the total five year cost changes from -\$405,967 to \$1,459,323. Based on cost alone, the Existing System becomes the winning alternative. When benefits are also considered, the PACOMED System could still be the overall winner. However, if cost is of prime importance, the cost of the PACOMED System can be reduced by having fewer health educators. When the costs of the two competing systems are equal,

then the PACOMED System must be the winner since it dominates the benefits comparison. Therefore, by setting the total five year cost of the PACOMED System (relative to the Existing System) to zero and assuming that no installation will receive more than one health educator, the number of health educators which determines the break-even point is found to be forty-one. Thus, by selectively placing forty-one instead of fifty-six health educators in the various installations, the PACOMED System again becomes the dominant overall winner.

If the nurse clinicians' average patient education and information time is twenty percent rather than forty or thirty percent, the same analysis can be performed and the break-even cost occurs with twenty-six health educators.

From this analysis, it can be concluded that the total cost is highly sensitive to changes in the percent of time nurse clinicians dedicate to patient education and information. However, even with the drastic changes shown here, the PACOMED System can remain the dominant winner by reducing the number of health educators.

b. The other operating cost components were determined at maximum cost and if any changes would occur, they would favor the PACOMED System. Therefore, the determination of the cost winner is insensitive to changes in the other operating cost components.

CONCLUSIONS AND RECOMMENDATIONS

1. Conclusions:

Based on cost alone, the PACOMED System is the winner. Based on benefits alone, the PACOMED System is the winner. Since the same alternative dominates both analysis categories and since the selection of the cost analysis winner was validated in the SENSITIVITY ANALYSIS section, the PACOMED System is the overall winning alternative.

2. Recommendations:

a. Determine the validity of the assumption that 40% of nurse clinician time is spent in patient education/information, not including needed counseling or rapport established.

b. Determine the approximately fifty subject areas to be included in the PACOMED System and schedule the design of these education programs for each of the designated subject areas.

c. Establish a phased implementation of the PACOMED System in selected MEDDACS and MEDCENS with phase out of the utilized nurse clinician.

APPENDICES

APPENDIX A

COST ANALYSIS COMPUTATIONS

1. Existing System (baseline cost established as zero point).

2. PACOMED System.

a. R&D Cost (program development cost).

(1) Hypertension.

(a) Software.	\$ 459
(b) Additional Tracts.	130
(c) Administrative.	<u>586</u>
(d) Total.	\$1175

(2) Diabetes.

(a) Software.	\$ 200
(b) Additional Tracts.	130
(c) Administrative.	<u>586</u>
(d) Total	\$ 916

(3) Obesity.

(a) Software.	\$ 432
(b) Additional Tracts.	
(c) Administrative.	<u>586</u>
(d) Total	\$1018

(4) Breast Self-Examination.

(a) Software.	\$ 392
(b) Additional Tracts.	
(c) Administrative.	<u>586</u>
(d) Total	\$ 978

(5) Family Planning.

(a) Software. \$ 505

(b) Additional Tracts.

(c) Administrative. 505

(d) Total. \$1010

(6) Vaginitis.

(a) Software. \$ 45

(b) Additional Tracts.

(c) Administrative. 586

(d) Total. \$ 631

(7) Low Back Pain.

(a) Software. \$ 150

(b) Additional Tracts.

(c) Administrative. 310

(d) Total \$ 460

(8) Child Growth and Development.

(a) Software. \$ 250

(b) Additional Tracts.

(c) Administrative. 383

(d) Total \$ 633

(9) Average Program Development Cost.

$$(\$1175 + 916 + \$1018 + \$978 + \$1010 + \$631 + \$460 + \$633)/8 = \$6821/8 \\ = \$853/\text{program}$$

(10) Total R&D Cost (50 programs).

$$(50) (\$853) = \$42,650$$

(5) Family Planning.

(a) Software.	\$ 505
(b) Additional Tracts.	
(c) Administrative.	<u>505</u>
(d) Total.	\$1010

(6) Vaginitis.

(a) Software.	\$ 45
(b) Additional Tracts.	
(c) Administrative.	<u>586</u>
(d) Total.	\$ 631

(7) Low Back Pain.

(a) Software.	\$ 150
(b) Additional Tracts.	
(c) Administrative.	<u>310</u>
(d) Total	\$ 460

(8) Child Growth and Development.

(a) Software.	\$ 250
(b) Additional Tracts.	
(c) Administrative.	<u>383</u>
(d) Total	\$ 633

(9) Average Program Development Cost.

$$(\$1175 + 916 + \$1018 + \$978 + \$1010 + \$631 + \$460 + \$633)/8 = \$6821/8$$
$$= \$853/\text{program}$$

(10) Total R&D Cost (50 programs).

$$(50) (\$853) = \$42,650$$

(11) Total R&D Cost with Inflation Adjustment.

(\$42,650) (1.225) = \$52,246

b. Investment Cost.

(1) Hardware Cost.

(a) Two Color TV Receivers (21")	\$ 974
(b) Two 3/4" Video Cassette Playback Units	1769
(c) Two Cabinets Consoles	658
(d) Eleven Headphones	<u>151</u>
(e) Total for One Health Educator	\$3552
(f) Total for Two Health Educators	\$7104

(2) Furnishings Cost.

(a) Ten 1 Station Carrels	\$1390
(b) One 48" Diameter Table	108
(c) Sixteen Chairs, Plastic Posture Forming	357
(d) Two Sets of Display Shelves	107
(e) Two Storage Cabinets	170
(f) Four File Cabinets	1000
(g) One Pedestal Desk	<u>250</u>
(h) Total for One Health Educator	\$3382
(i) Total for Two Health Educators	\$6764

(3) Remodeling Cost.

(a) Installations With One Health Educator

(700 sq ft) (\$14/sq ft) = \$9800

(b) Installations With Two Health Educators

(1200 sq ft) (\$14/sq ft) = \$16,800

(4) Total Investment Cost.

(a) One Health Educator.

$$\$3552 + \$3382 + \$9800 = \$16,734/\text{installation.}$$

(b) Two Health Educators.

$$\$7104 + \$6764 + \$16,800 = \$30,668/\text{installation.}$$

(c) Total Investment Cost.

$$(34 \text{ inst}) (\$16,734/\text{inst}) + (11 \text{ inst}) (\$30,668/\text{inst}) = 906,304$$

(d) Total Investment Cost with Inflation Adjustment.

$$(\$906,304) (1.225) = \$1,110,222$$

c. Operating Cost.

(1) Personnel.

(a) Physicians - no actual cost savings.

(b) Nurse Clinicians.

Facility	Assigned	40%	Reduction	Excess
BAMC	3	1.2	1	.2
FAMC	6	2.4	2	.4
LAMC	2	.8	1	-.2
MAMC	4	1.6	1	.6
TAMC	7	2.8	3	-.2
DDEAMC	5	2.0	2	0
WRAMC	3	1.2	1	.2

(4) Total Investment Cost.

(a) One Health Educator.

$\$3552 + \$3382 + \$9800 = \$16,734/\text{installation.}$

(b) Two Health Educators.

$\$7104 + \$6764 + \$16,800 = \$30,668/\text{installation.}$

(c) Total Investment Cost.

$(34 \text{ inst}) (\$16,734/\text{inst}) + (11 \text{ inst}) (\$30,668/\text{inst}) = 906,304$

(d) Total Investment Cost with Inflation Adjustment.

$(\$906,304) (1.225) = \$1,110,222$

c. Operating Cost.

(1) Personnel.

(a) Physicians - no actual cost savings.

(b) Nurse Clinicians.

Facility	Assigned	40%	Reduction	Excess
BAMC	3	1.2	1	.2
FAMC	6	2.4	2	.4
LAMC	2	.8	1	-.2
MAMC	4	1.6	1	.6
TAMC	7	2.8	3	-.2
DDEAMC	5	2.0	2	0
WRAMC	3	1.2	1	.2

Facility	Assigned	40%	Reduction	Excess
WBAMC	8	3.2	3	.2
Ft Rucker	3	1.2	1	.2
Aberdeen	1	.4	0	.4
Ft Belvoir	5	2.0	2	0
Ft B. Harrison	1	.4	0	.4
Ft Benning	9	3.6	3	.6
Ft Bragg	6	2.4	2	.4
Ft Campbell	7	2.8	3	-.2
Ft Carson	6	2.4	2	.4
Ft Dix	4	1.6	1	.6
Ft Hood	5	2.0	2	0
Ft Huachuca	1	.4	0	.4
Ft Jackson	7	2.8	3	-.2
Ft Knox	4	1.6	1	.6
Ft Leavenworth	2	.8	1	-.2
Ft L. Wood	4	1.6	1	.6

Facility	Assigned	40% Reduction	Excess
Ft McClellan	2	.8	-.2
Ft McPherson	1	.4	.4
Ft Meade	3	1.2	.2
Ft Monmouth	1	.4	.4
Ft Ord	5	2.0	0
Ft Polk	2	.8	-.2
Ft Riley	5	2.0	0
Ft Sill	4	1.6	.6
Total	126	44	5.4

Total five year savings = (5 yrs) (44 nurses) (\$26,647/nurse-yr) = \$5,862,340

(c) Health Educators.

Total Five Year Cost = (5 yr) (56 health-ed) (\$13,994/health-ed/yr)
= \$3,918,320

(d) Total Five Year Personnel Cost = -\$5,862,340 + \$3,918,320 = -\$1,944,020

(2) Individualizing Paperwork Cost (max possible five year load).

(a) Without Inflation Adjustment.

(\$.09/pat) (50 pat/health-ed/day) (56 health-ed) (230 day/yr) (5 yr) =
\$289,800

Facility	Assigned	40%	Reduction	Excess
Ft McClellan	2	.8	1	-.2
Ft McPherson	1	.4	0	.4
Ft Meade	3	1.2	1	.2
Ft Monmouth	1	.4	0	.4
Ft Ord	5	2.0	2	0
Ft Polk	2	.8	1	-.2
Ft Riley	5	2.0	2	0
Ft Sill	4	1.6	1	.6
Total	126		44	5.4

Total five year savings = (5 yrs) (44 nurses) (\$26,647/nurse-yr) = \$5,862,340

(c) Health Educators.

Total Five Year Cost = (5 yr) (56 health-ed) (\$13,994/health-ed/yr)
= \$3,918,320

(d) Total Five Year Personnel Cost = -\$5,862,340 + \$3,918,320 = -\$1,944,020

(2) Individualizing Paperwork Cost (max possible five year load).

(a) Without Inflation Adjustment.

(\$.09/pat) (50 pat/health-ed/day) (56 health-ed) (230 day/yr) (5 yr) =
\$289,800

(b) With Inflation Adjustment.

$$(\$289,800) (1.225) = \$355,005$$

(3) Maintenance Cost (five year).

(a) Without Inflation Adjustment.

$$(\$0.05/\text{hr}/\text{health-ed}) (6000 \text{ hr}) (56 \text{ health-ed}) = \$16,800$$

(b) With Inflation Adjustment.

$$(\$16,800) (1.225) = \$20,580$$

(4) Total Five Year Operating Cost.

$$-\$1,944,020 + \$355,005 + \$20,580 = -\$1,568,435$$

d. Total Five Year Cost.

$$\$52,246 + \$1,110,222 + (-\$1,568,435) = -\$405,967$$

APPENDIX B

SALARY COMPUTATIONS

1. Average Health Educator Salary Cost (Retirement and Other computed according to AR 11-28).

a. E4 Salary Cost (over 3 years).

(1) Basic Pay	\$ 534.90/mo
(2) BAQ Allowance	166.50/mo
(3) BAS Allowance	86.38/mo
(4) Clothing Allowance	<u>6.60/mo</u>
(5) Basic Pay + Allowance	\$ 794.38/mo
(6) Retirement (.17) (794.38)	135.04/mo
(7) Other (.23) (794.38)	<u>182.71/mo</u>
(8) Total/Month	\$ 1,112.13/mo
(9) Total/Year	\$13,346/yr

b. E5 Salary Cost (over 4 years).

(1) Basic Pay	\$ 592.80/mo
(2) BAQ Allowance	185.70/mo
(3) BAS Allowance	86.38/mo
(4) Clothing Allowance	<u>6.60/mo</u>
(5) Basic Pay + Allowances	\$ 871.48/mo
(6) Retirement (.17) (871.48)	148.15/mo
(7) Other (.23) (871.48)	<u>200.44/mo</u>
(8) Total/Month	\$ 1,220.07/mo
(9) Total/Year	\$14,641/yr

Average Salary Cost = \$13,346/yr + (.5) (\$14,641/yr - \$13,346/yr) = \$13,994/yr

2. Average Nurse Clinician Salary Cost (Retirement and Other computed according to AR 11-28).

a. Average Grade Computation.

<u>Rank</u>	<u>Frequency</u>	<u>Weighting</u>
02	1	2
03	99	297
04	23	92
05	<u>2</u>	<u>10</u>
	125	401

Average grade = $401/125 = 3.21$

b. Captain Salary Cost (assume average over 8 years).

(1) Basic Pay	\$ 1,390.20/mo
(2) BAQ Allowance	271.20/mo
(3) BAS Allowance	<u>59.53/mo</u>
(4) Basic Pay + Allowances	\$ 1,720.93/mo
(5) Retirement (.17) (1,720.93)	292.56/mo
(6) Other (.08) (1,720.93)	<u>137.67/mo</u>
(7) Total/Month	\$ 2,151.16/mo
(8) Total/Year	\$25,814/yr

c. Major Salary Cost (assume average over 12 years).

(1) Basic Pay	\$ 1,624.20/mo
(2) BAQ Allowance	301.80/mo
(3) BAS Allowance	<u>59.53/mo</u>
(4) Basic Pay + Allowances	\$ 1,985.53/mo
(5) Retirement (.17) (1,985.53)	337.54/mo
(6) Other (.08) (1,985.53)	<u>158.84/mo</u>

2. Average Nurse Clinician Salary Cost (Retirement and Other computed according to AR 11-28).

a. Average Grade Computation.

<u>Rank</u>	<u>Frequency</u>	<u>Weighting</u>
02	1	2
03	99	297
04	23	92
05	<u>2</u>	<u>10</u>
	125	401

Average grade = $401/125 = 3.21$

b. Captain Salary Cost (assume average over 8 years).

(1) Basic Pay		\$ 1,390.20/mo
(2) BAQ Allowance		271.20/mo
(3) BAS Allowance		<u>59.53/mo</u>
(4) Basic Pay + Allowances		\$ 1,720.93/mo
(5) Retirement (.17) (1,720.93)		292.56/mo
(6) Other (.08) (1,720.93)		<u>137.67/mo</u>
(7) Total/Month		\$ 2,151.16/mo
(8) Total/Year		\$25,814/yr

c. Major Salary Cost (assume average over 12 years).

(1) Basic Pay		\$ 1,624.20/mo
(2) BAQ Allowance		301.80/mo
(3) BAS Allowance		<u>59.53/mo</u>
(4) Basic Pay + Allowances		\$ 1,985.53/mo
(5) Retirement (.17) (1,985.53)		337.54/mo
(6) Other (.08) (1,985.53)		<u>158.84/mo</u>

(7) Total/Month \$ 2,481.91/mo

(8) Total/Year \$29,783/yr

d. Average Nurse Clinician Salary Cost.

$$\$25,814/\text{yr} + (.21) (29,783/\text{yr} - \$25,814/\text{yr}) = \$26,647$$

3. Average Medical Doctor Salary Cost Based on December, 1976 Strength (Retirement and Other computed according to AR 11-28).

a. Average Grade Computation.

<u>Rank</u>	<u>Frequency</u>	<u>Weighting</u>
03	1046	3138
04	2183	8732
05	627	3135
06	<u>434</u>	<u>2604</u>
	4290	17,609

$$\text{Average grade} = 17,609/4290 = 4.10$$

b. Average Years of Service (MAJ).

<u>Years</u>	<u>Frequency</u>	<u>Weighting</u>
1	469	469
2	547	1094
3	135	405
4	133	532
5	241	1205
6	218	1308
7	169	1183
8	128	1024
9	79	711

<u>Years</u>	<u>Frequency</u>	<u>Weighting</u>
10	24	240
11	20	220
12	6	72
13	4	52
14	4	56
15	2	30
18	1	18
19	1	19
20	<u>2</u>	<u>40</u>
	2183	8678

Average years = $8678/2183 = 3.98 = 4$

c. Average Years of Service (LTC).

<u>Years</u>	<u>Frequency</u>	<u>Weighting</u>
1	46	46
2	10	20
3	19	57
4	20	80
5	24	120
6	19	114
7	26	182
8	52	416
9	62	558
10	61	610
11	65	715

<u>Years</u>	<u>Frequency</u>	<u>Weighting</u>
10	24	240
11	20	220
12	6	72
13	4	52
14	4	56
15	2	30
18	1	18
19	1	19
20	<u>2</u>	<u>40</u>
	2183	8678

Average years = $8678/2183 = 3.98 = 4$

c. Average Years of Service (LTC).

<u>Years</u>	<u>Frequency</u>	<u>Weighting</u>
1	46	46
2	10	20
3	19	57
4	20	80
5	24	120
6	19	114
7	26	182
8	52	416
9	62	558
10	61	610
11	65	715

<u>Years</u>	<u>Frequency</u>	<u>Weighting</u>
12	49	588
13	41	533
14	45	630
15	37	555
16	22	352
17	8	136
18	11	198
19	5	95
20	<u>5</u>	<u>100</u>
	627	6105

Average years = $6105/627 = 9.74 \approx 10$

d. Major Salary Cost (over 4 years).

(1) Basic Pay	\$ 1,353.60/mo
(2) BAQ Allowance	301.80/mo
(3) BAS Allowance	<u>59.53/mo</u>
(4) Basic Pay + Allowances	\$ 1,714.93/mo
(5) Retirement (.17) (1,714.93)	291.54/mo
(6) Other (.08) (1,714.93)	<u>137.19/mo</u>
(7) Total/Month	\$ 2,143.66/mo
(8) Total/Year	\$25,724.00/yr

e. Lieutenant Colonel Salary Cost (over 10 yrs)

(1) Basic Pay	\$ 1,599.30/mo
(2) BAQ Allowance	338.10/mo
(3) BAS Allowance	<u>59.53/mo</u>

(4) Basic Pay + Allowances	\$ 1,996.93/mo
(5) Retirement (.17) (1,996.93)	339.48/mo
(6) Other (.08) (1,996.93)	<u>159.75/mo</u>
(7) Total/Month	\$ 2,496.16/mo
(8) Total/Year	\$29,954.00/yr

f. Average Medical Doctor Salary Cost.

$$\$25,724/\text{yr} + (.10) (\$29,954/\text{yr} - \$25,724/\text{yr}) = \$26,147/\text{yr}$$

g. Additional Compensation:

(1) Variable Incentive Pay.

<u>Years</u>	<u>Frequency</u>	<u>Amount</u>	<u>Total</u>
4-13	185	\$12,000	\$2,220,000
4-13	121	12,500	1,512,500
4-13	228	13,000	2,964,000
4-13	145	13,500	1,957,500
14-19	22	11,500	253,000
14-19	14	12,000	168,000
14-19	9	12,500	112,500
14-19	192	13,000	2,496,000
20-25	29	11,000	319,000
20-25	12	11,300	135,600
20-25	29	11,600	336,400
20-25	119	12,000	1,428,000
>25	34	10,000	340,000
>25	9	10,300	92,700
>25	6	10,600	63,600
>25	<u>27</u>	11,000	<u>297,000</u>
	1181		\$14,695,800

(4) Basic Pay + Allowances	\$ 1,996.93/mo
(5) Retirement (.17) (1,996.93)	339.48/mo
(6) Other (.08) (1,996.93)	<u>159.75/mo</u>
(7) Total/Month	\$ 2,496.16/mo
(8) Total/Year	\$29,954.00/yr

f. Average Medical Doctor Salary Cost.

$$\$25,724/\text{yr} + (.10) (\$29,954/\text{yr} - \$25,724/\text{yr}) = \$26,147/\text{yr}$$

g. Additional Compensation:

(1) Variable Incentive Pay..

<u>Years</u>	<u>Frequency</u>	<u>Amount</u>	<u>Total</u>
4-13	185	\$12,000	\$2,220,000
4-13	121	12,500	1,512,500
4-13	228	13,000	2,964,000
4-13	145	13,500	1,957,500
14-19	22	11,500	253,000
14-19	14	12,000	168,000
14-19	9	12,500	112,500
14-19	192	13,000	2,496,000
20-25	29	11,000	319,000
20-25	12	11,300	135,600
20-25	29	11,600	336,400
20-25	119	12,000	1,428,000
>25	34	10,000	340,000
>25	9	10,300	92,700
>25	6	10,600	63,600
>25	<u>27</u>	11,000	<u>297,000</u>
	1181		\$14,695,800

(2) Obligated (554 MD's) (\$9,000) = \$4,986,000

(3) Continuation Pay.

(a) CPT - none.

(b) MAJ (44 MD's) (4) (\$1,353.60) = \$238,234

(c) LTC (5 MD's) (4) (\$1,599.30) = 31,986

(d) COL - none.

(e) Totals 49 MD's
\$270,000

(4) Average Incentive/Continuation Pay (although this pay is received in varying amounts by 1784 medical doctors, for costing purposes it will be distributed equally among all 4358 doctors).

$$(\$14,695,800 + \$4,986,000 + \$270,220) / 4358 = \$4578/\text{yr}$$

(5) Special Pay.

<u>Years</u>	<u>Frequency</u>	<u>Amount</u>	
0-2	1580	\$1,200	\$ 1,896,000
>2	<u>2778</u>	4,200	<u>11,667,600</u>
	4358		\$13,563,600

$$\text{Average Special Pay} = \$13,563,600/4358 = \$3,112/\text{yr}$$

h. Total Average Medical Doctor Compensation Cost.

$$\$26,147/\text{yr} + \$4,578/\text{yr} + \$3,112/\text{yr} = \$33,837/\text{yr}$$

APPENDIX C
MISCELLANEOUS CALCULATIONS

1. Inflation Index (7% per year for 3 years)

$$\text{Index} = (1.07)^3 = 1.225$$

2. Soft Dollar Benefit Calculations

a. Physician Soft Dollars

(1) Average Information and Education Time Per Patient

$$(23.8 \text{ hr} + 8.8 \text{ hr} + 1.9 \text{ hr}) / (935 \text{ pat} + 142 \text{ pat}) = .032 \text{ hr/pat}$$

(2) Number of Patients Seen in Five Years at Full Capacity

$$(50 \text{ pat/health-ed/day}) (56 \text{ health-ed}) (230 \text{ day/yr}) (5 \text{ yr}) = 3,220,000 \text{ pat}$$

(3) Total Hours Spent in Patient Education and Informaton

$$(.032 \text{ hr/pat}) (3,220,000 \text{ pat}) = 103,040 \text{ hr}$$

(4) Equivalent Number of Physicians

$$(103,040 \text{ hr}) / (8 \text{ hr/day}) (230 \text{ day/physician-yr}) = 56 \text{ physician-yr}$$

(5) Soft Dollars

$$(56 \text{ physician-yr}) (\$33,837/\text{physician-yr}) = \$1,894,872$$

b. Nurse Soft Dollars

$$(5 \text{ yr}) (5.4 \text{ nurse}) (\$26,647/\text{nurse-yr}) = \$719,469$$

c. Total Soft Dollars

$$\$1,894,872 + \$719,469 = \$2,614,341$$

APPENDIX D

SENSITIVITY ANALYSIS CALCULATIONS

1. R&D Cost Changes.

a. + 100%

(1) Cost Change (\$52,246) (2) = \$104,492

(2) Effect on Total Cost

$$\$104,492 + \$1,110,222 + (-\$1,568,435) = -\$353,721$$

b. + 500%

(1) Cost Change (\$52,246) (5) = \$261,230

(2) Effect on Total Cost

$$\$261,230 + \$1,110,222 + (-\$1,568,435) = -\$196,983$$

2. Investment Cost Changes - none.

3. Operating Cost Changes.

a. Nurse Clinicians.

Facility	Assigned	30%	Reduction	20%	Reduction
BAMC	3	.9	1	.6	0
FAMC	6	1.8	2	1.2	1
LAMC	2	.6	0	.4	0
MAMC	4	1.2	1	.8	1
TAMC	7	2.1	2	1.4	1
DDEAMC	5	1.5	1	1.0	1

Facility	Assigned	30%	Reduction	20%	Reduction
WRAMC	3	.9	1	.6	0
WBAMC	8	2.4	2	1.6	1
Ft Rucker	3	.9	1	.6	0
Aberdeen	1	.3	0	.2	0
Ft Belvoir	5	1.5	1	1.0	1
Ft B. Harrison	1	.3	0	.2	0
Ft Benning	9	2.7	2	1.8	2
Ft Bragg	6	1.8	2	1.2	1
Ft Campbell	7	2.1	2	1.4	1
Ft Carson	6	1.8	2	1.2	1
Ft Dix	4	1.2	1	.8	1
Ft Hood	5	1.5	1	1.0	1
Ft Huachuca	1	.3	0	.2	0
Ft Jackson	7	2.1	2	1.4	1
Ft Knox	4	1.2	1	.8	1

Facility	Assigned	30%	Reduction	20%	Reduction
WRAMC	3	.9	1	.6	0
WBAMC	8	2.4	2	1.6	1
Ft Rucker	3	.9	1	.6	0
Aberdeen	1	.3	0	.2	0
Ft Belvoir	5	1.5	1	1.0	1
Ft B. Harrison	1	.3	0	.2	0
Ft Benning	9	2.7	2	1.8	2
Ft Bragg	6	1.8	2	1.2	1
Ft Campbell	7	2.1	2	1.4	1
Ft Carson	6	1.8	2	1.2	1
Ft Dix	4	1.2	1	.8	1
Ft Hood	5	1.5	1	1.0	1
Ft Huachuca	1	.3	0	.2	0
Ft Jackson	7	2.1	2	1.4	1
Ft Knox	4	1.2	1	.8	1

Facility	Assigned	30%	Reduction	20%	Reduction
Ft Leavenworth	2	.6	0	.4	0
Ft L. Wood	4	1.2	1	.8	1
Ft McClellan	2	.6	0	.4	0
Ft McPherson	1	.3	0	.2	0
Ft Meade	3	.9	1	.6	0
Ft Monmouth	1	.3	0	.2	0
Ft Ord	5	1.5	1	1.0	1
Ft Polk	2	.6	0	.4	0
Ft Riley	5	1.5	1	1.0	1
Ft Sill	4	1.2	1	.8	1
Total	126		30		19

(1) 30% Dedicated to Patient Health Education and Information.

(a) Total Five Year Savings.

$$(5 \text{ yrs}) (30 \text{ nurses}) (\$26,647/\text{nurse-yr}) = \$3,997,050$$

(b) Effect on Total Five Year Personnel Cost.

$$-\$3,997,050 + \$3,918,320 = -\$78,730$$

(c) Effect on Total Five Year Operating Cost.

$$-\$78,730 + \$355,005 + \$20,580 = \$296,855$$

(d) Effect on Total Five Year Cost.

$$\$52,246 + \$1,110,222 + \$296,855 = \$1,459,323$$

(2) Number of Health Educators for Break-even Cost.

(a) R&D Cost. \$52,246

(b) Investment Cost.

$$(\$16,734/\text{health-ed}) (1.225) X = (\$20,499) X$$

(c) Operating Cost.

$$-\$3,997,050 + (5 \text{ yr}) (\$13,994/\text{health-ed}/\text{yr}) X$$

$$+ (\$.09/\text{pat}) (50 \text{ Pat}/\text{health-ed}/\text{day}) (230 \text{ day}/\text{yr}) (5 \text{ yr}) (1.225) X$$

$$+ (\$.05/\text{hr}/\text{health-ed}) (6000 \text{ hr}) (1.225) X = -\$3,997,050 + (\$76,677) X$$

(d) Equation.

$$\$52,246 + (\$20,499) X - \$3,997,050 + (\$76,677) X = 0$$

$$(\$97,176) X = \$3,944,804$$

$$X = 40.59 \approx 41 \text{ health educators}$$

(3) Number of Health Educators for Break-even Cost.

(20% Dedicated to Patient Education and Information)

(a) R&D Cost. \$52,246

(b) Investment Cost. (\$20,499) X

(c) Operating Cost.

$$(5 \text{ yrs}) (-19 \text{ nurses}) (\$26,647/\text{nurse-yr}) + (\$76,677) X =$$

$$-\$2,531,465 + (\$76,677) X$$

(c) Effect on Total Five Year Operating Cost.

$$-\$78,730 + \$355,005 + \$20,580 = \$296,855$$

(d) Effect on Total Five Year Cost.

$$\$52,246 + \$1,110,222 + \$296,855 = \$1,459,323$$

(2) Number of Health Educators for Break-even Cost.

(a) R&D Cost. \$52,246

(b) Investment Cost.

$$(\$16,734/\text{health-ed}) (1.225) X = (\$20,499) X$$

(c) Operating Cost.

$$\begin{aligned} &-\$3,997,050 + (5 \text{ yr}) (\$13,994/\text{health-ed}/\text{yr}) X \\ &+ (\$.09/\text{pat}) (50 \text{ Pat}/\text{health-ed}/\text{day}) (230 \text{ day}/\text{yr}) (5 \text{ yr}) (1.225) X \\ &+ (\$.05/\text{hr}/\text{health-ed}) (6000 \text{ hr}) (1.225) X = -\$3,997,050 + (\$76,677) X \end{aligned}$$

(d) Equation.

$$\$52,246 + (\$20,499) X - \$3,997,050 + (\$76,677) X = 0$$

$$(\$97,176) X = \$3,944,804$$

$$X = 40.59 \cong 41 \text{ health educators}$$

(3) Number of Health Educators for Break-even Cost.

(20% Dedicated to Patient Education and Information)

(a) R&D Cost. \$52,246

(b) Investment Cost. $(\$20,499) X$

(c) Operating Cost.

$$(5 \text{ yrs}) (-19 \text{ nurses}) (\$26,647/\text{nurse-yr}) + (\$76,677) X =$$

$$-\$2,531,465 + (\$76,677) X$$

(d) Equation.

$$\$52,246 + (\$20,499) X - \$2,531,465 + (\$76,677) X = 0$$

$$(\$97,176) X = \$2,479,219$$

$$X = 25.51 \approx 26 \text{ health educators}$$

b. Other Operating Cost Component Changes. None.

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