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Abstract

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ABSTRACT

As funding of optometric care by third parties and the government increases, more regulation of vision care is anticipated. Utilization of cost effectiveness studies may largely determine methods of optometric care provided by third parties and government. Consequently, a method of determining cost effectiveness of optometric procedures is developed and applied to three models of optometric care. Data taken from a review of patient records are used to develop quantifiable cost criteria for a specified patient group. These criteria include actual cost, patient acceptance (satisfaction), and professional acceptance of prescribed therapy. These criteria are then applied to each model of patient care to quantify the most cost effective model.

The Cost Effectiveness of Selected Optometric Procedures

The rising cost of health care in this country is currently a major topic of discussion.[1-4] Much of the debate centering on cost effectiveness stems from the growing third party payment of ever increasing health care costs.[5-10] Additionally a greater percentage of that care is paid through the public sector. Such government fundings come from Medicare, Medicaid, the Veteran's Administration, the Department of Defense, and other agencies. In the future the government will likely provide an even larger percentage of the health care dollar.[17]

In recent years, health care professionals have questioned the cost effectiveness of several time-honored procedures.[11-15] An example from the medical field is pap smear screening for cervical cancer. Traditionally, doctors suggested that a woman have a pap smear every year. Current studies, however, indicate that having a pap smear that often does not detect enough new cancers to warrant the cost involved. The American Cancer Society now recommends that a woman get a pap smear every three to four years.[16]

The optometrist plays an increasingly important role in the health care community and with this role comes the responsibility to examine the procedures utilized and to make them as cost effective as possible. The purpose of this paper is to determine the cost effectiveness of three models of optometric care that might be utilized in a large scale health delivery system such as a government health insurance plan or a health maintenance organization.

When assessing health costs for large populations, the importance of the individual is obscured. It is understood that from the practitioner's point of view, the individual patient is of paramount concern; however, broad cost effective studies require the need to generalize about patient populations and their service needs. Additionally, government policy, by its very nature, must direct the population as a whole. This paper should be considered accordingly.

Theroetical Cost Effective Systems

The majority of cost effectiveness systems developed or adapted for use in the health care field are systems of professional opinions; they are quantified by averaging the number of favorable or negative opinions on a given issue.

The Criterion Function method of determining cost effectiveness allows for quantification of data usually expressed in qualitative terms. This method allows for the evaluation of a number of different models by utilizing a predetermined set of criteria. The criteria may be tangible such as the actual cost of care, or intangible such as the quality of care offered. For each criterion a numerical value is determined. Then each criterion is weighted according to its relative importance. The sum of the weighted criteria can be expressed in the formula:

$$CF = W_1K_1 + W_2K_2 + W_3K_3 \dots + W_nK_n$$

where CF is the criterion function value of the model, W is the weighting for the criterion, K is the numerical value of the criterion, and n is the number of criteria utilized. Percentages or other ratios are used to allow addition of criterion values.

Models Proposed

Three models of general optometric care were chosen to test for their cost effectiveness. These models involve two basic examination sequences and a reexamination sequence.

A complete examination consists of case history, visual acuities, cover test, ocular health examination, subjective to best visual acuity (SBVA), far and near phorias and ductions, positive and negative relative accommodation tests, and the amplitude of accommodation test. For this study, by definition, the complete exam provides adequate information to give all patients the appropriate therapy.

A modified examination includes case history, visual acuities, cover test, ocular health examination, and SBVA. The reexamination sequence includes case history, visual acuities, and tests of the complete exam not included in the modified exam. This study assumes that a complete exam or a reexam is necessary to correctly prescribe vision training, prism, near point Rx, part time wear lenses or distance lens significantly different than the SBVA.

These models also differentiate between symptomatic and asymptomatic patients. Asymptomatic patients are defined in this study as those with only constant distant blur or no complaint. Because constant distant blur is corrected with the subjective in each model, it is not considered as a symptom. Symptomatic patients were those with any other symptom possibly associated with the eyes or visual perception including headache, eye strain or "pulling", watering, tearing, redness, photophobia, and double vision.

Model I. In this model all patients receive a modified exam. The SBVA is the endpoint of the testing and becomes the prescribed therapy for the patient. No further testing is provided unless the patient returns with symptoms. The returning patient receives the reexamination sequence. The patient may receive further therapy based on the reexamination.

Model II. In this model, symptomatic patients receive the complete exam and asymptomatic patients receive the modified exam.

Model III. In this model all patients receive the complete examination.

Method

To develop actual data to evaluate the three models, information was accumulated from selected patient records in the files of Pacific University clinic in Forest Grove. Only patients from 25 to 35 years of age were considered, since this group is visually stable with relatively few symptoms. Patient records were screened, and those with the following conditions were ommitted:

1) pathology
2) strabismus
3) acuity uncorrectable to 20/20 OD, OS
4) current contact lens wearers

To insure reliability of the data the following standards were met for each record accepted into the useable data group.

a) Each record accepted required two signatures by licensed optometrists (staff of Pacific University). One signature certified accuracy of the ocular health report; the second signature certified staff review of the case, accuracy of findings, and staff agreement with prescribed therapy.

b) Each case record was required to show all the data from the complete exam and the subsequent recommended therapy. This requirement allowed us to compare therapy the patient would have received from the modified exam, to therapy actually given with a complete exam.

Accepted cases were grouped into categories of symptomatic and asymptomatic patients. These groups were then divided according to therapy prescribed. If the therapy prescribed was the SBVA only, the case was included in the group labeled "therapy = SBVA." The following differences from the SBVA in prescribed therapy were considered equivalent to the SBVA:

1) $\pm$ .25 D sphere
2) $\pm$ .25 D cylinder
3) $\pm 10^{\circ}$ axis on .50 D cylinder or less
4) $\pm 5^{\circ}$ axis on more than .50 D cylinder

Any case showing lenses or therapy prescribed other than the SBVA for full time wear was included in the group labeled "therapy $\neq$ SBVA." These cases were of patients who received therapy of vision training, prism, bifocals, near point nelses, part time wear lenses, or habitual or no lenses outside the SBVA limits.

The following matrix shows the number of accepted cases.

	therapy = SBVA	therapy $\neq$ SBVA	TOTAL
symptomatic	30	37	67
asymptomatic	31	22	53
TOTAL	61	59	120

The above table indicates that approximately half of the patients used in this study were prescribed a SBVA lens (within SBVA limits) and half were given some other therapy. Additionally, approximately 56% presented with symptoms (as defined) and the remainder were asymptomatic. These data were then applied to the criteria discussed below.

Criteria

The three criteria selected for this cost effectiveness determination are: actual cost (K_1), patient acceptance (K_2), and professional acceptance (K_3).

Cost. The actual dollar expense of providing care was selected as the most important criterion in this study, because it is directly related to cost effectiveness. The cost of seeing a group of patients is determined from the cost per patient. This value is found from cost per hour, hours per patient, and average lens cost per patient (in this study we assume other ophthalmic goods are dispensed at cost). The following formula gives total cost for the patient group:

$$\# \text{ patients} \times (\text{cost/hour} \times \text{hours/patient} + \text{average lens cost/patient}) = \text{total cost}$$

Cost per hour was estimated by the following formula:

$$\frac{\text{doctor's income} + \text{benefits} + \text{staff} + \text{overhead}}{\text{doctor's hours of pt. care} + \text{staff hours of pt. care}} = \text{cost per hour}$$

For example: $$\frac{\$40{,}000 + \$10{,}000 + \$30{,}000 + \$70{,}000}{2{,}000 \text{ hrs.} + 500 \text{ hrs.}} = \$60\text{/hr of pt. care}$$

To reduce initial cost per patient, a doctor could shorten the exam time by eliminating some procedures; however, if the shorter exams did not provide proper patient care, further testing and materials may ultimately be more expensive. The number of patients who return for further testing was estimated by assuming that symptomatic patients who do not receive the appropriate therapy would return. Additionally, asymptomatic patients would not return whether therapy was entirely appropriate or not. By adding the expenses of returning patients to the cost of the initial group's expenses, the total cost for the group was found.

To determine the cost per patient, cost per hour was estimated at $60.00, modified exam time at .5 hours, complete exam time at .75 hours, and average lens cost per patient at $20.00 .

	cost/hr		hrs/pt		average lens cost/pt		cost/pt
modified exam---	$60.00	x	.5	+	$20.00	=	$50.00
complete exam---	$60.00	x	.75	+	$20.00	=	$65.00
reexam----------	$60.00	x	.5	+	$20.00	=	$50.00

The above costs were then applied to each model.

	patients		cost/pt		cost
Model I					
all receive modified exam	120	x	$50.00	=	$6000.00
reexam for dissatisfied	37	x	$50.00	=	$1850.00
total					$7850.00
Model II					
asymptomatic get modified exam	53	x	$50.00	=	$2650.00
symptomatic get complete exam	67	x	$65.00	=	$4355.00
total					$7005.00
Model III					
all receive complete exam	120	x	$65.00	=	$7800.00

In order to add the cost criterion to other criteria, the actual dollar amounts were transformed into ratios:

	cost ratio		K_1
Model I	$\frac{7005}{7850}$	=	0.89
Model II	$\frac{7005}{7005}$	=	1.00
Model III	$\frac{7005}{7800}$	=	0.90

Note that these values were designated the K_1 values of the cost criterion in each model.

Patient Acceptance. Though not directly a cost consideration, this criterion has important effects on the cost of optometric care. The patient acceptance criterion is a measure of patient satisfaction with the care given. Adequate epidemiological data are not currently available to determine how many patients actually are not satisfied with the care they receive or what their response may be to inadequate care. This criterion is not as important as that of actual cost and therefore the weighting assigned to it should reflect this difference.

Patient acceptance is reduced for those patients who return for reexamination, not having received the optimum therapy. In Model I, 37 of the patients would return because they should have received therapy other than the SBVA given by the modified exam. This leaves 83 patients who would not return with symptoms. The K_2 value for Model I would then be 83/120 or o.69 . In Model II all symptomatic patients would receive the appropriate therapy and thus no patients would return. The K_2 value would therefore be 1.00 . In Model III, all would receive the appropriate therapy and thus no patients would return. The patient acceptance criterion value would again be 1.00 .

Professional Acceptance. This factor, like patient acceptance, is not strictly a matter of cost. Professional acceptance needs consideration because vision care planners should take into account the feelings and opinions of those who will provide the care.

The professional acceptance criterion is a measure of the quality of care provided. If patients receive inadequate care, the doctor would be dissatisfied and professional acceptance is reduced. Professional acceptance is quantified by estimating the percent of patients who receive the level of care appropriate for their needs. Again, as in patient acceptance, this criterion's weighting should not equal the cost criterion's weighting, and should reflect the difference in perceived importance.

This criterion is figured similarly to patient acceptance but from the point of view of the doctor and the quality of patient care. In Model I the doctor, who is concerned with quality, would not be satisfied that 59 of 120 patients received a "less than optimum" prescription, thus the K_3 value is 61/120 or o.51 . In Model II, 22 of the 120 patients would not have been properly prescribed for and thus doctor acceptance is 98/120 or 0.82 . In Model III all patients receive an acceptable prescription so professional acceptance is at the highest point and the K_3 value is 1.00 .

Weightings. Weightings were determined according to the importance of each criterion. A weighting of 1.00 was selected for the cost criterion, as it is the most important consideration for a government optometric health care model. Patient acceptance was estimated as only half as important as cost and so it received a weighting of 0.50 . Professional acceptance for the purpose of this study was considered one third as important and was therefore weighted at 0.33 .

Results

Insertion of criteria and weighting values into the CF equations for each model resulted in the following:

	cost		pt. accept.		prof. accept.		CF factors
Model I	0.89 x 1.00	+	0.69 x 0.50	+	0.51 x 0.33	=	1.40
Model II	1.00 x 1.00	+	1.00 x 0.50	+	0.82 x 0.33	=	1.77
Model III	0.90 x 1.00	+	1.00 x 0.50	+	1.00 x 0.33	=	1.73

The CF factors are dimensionless and can only be compared one to another. The higher the CF factor, the more cost effective is that model compared to the others.

Conclusion

When comparing the CF factors above, Model II is shown as the most cost effective. Note that if the professional acceptance weighting is over 0.55 , then Model III becomes the most cost effective. In some cases this higher weighting may be more appropriate; for example, practitioners subject to peer review boards may place an increased importance on quality of care. Adjusting the patient acceptance weighting has little effect on the CF relationships. Model I is always least cost effective of the three, no matter how the weightings are adjusted. Either Model II or Model III is most cost effective, depending on the weighting attached to the professional acceptance criterion.

There are any number of patient care models that one could devise, depending on what is considered as a satisfactory selection of optometric procedures. Depending on a doctor's technique, experience and expertise, several acceptable models can be tailored and examined for cost effectiveness. Further, other criteria could be added to the CF formula to allow for cost or benefit factors not considered in this study.

Further studies of interest include the comparison of similar models for other age groups such as children ages 8 to 12, teenagers and presbyopes, or for groups of myopes, hyperopes, and emmetropes.

In an era where third party payments are becoming a principle source of health care dollars, cost effectiveness studies will become important and valuable procedures for us all.

REFERENCES

1. Notkin, Herbert and Meader, Leland V., "Health Care Cost Containment", Personnel Administrator, 24(3) 41-43, 58-60, Mar. 1979.

2. Armistead, Robert A. and Hofmann, Paul B., "Involving the Physician in Cost Containment", Hospital Financial Management, 35(1) 52-56, Jan. 1981.

3. Wendorf, Barbara, "Is Quality Assurance Really Worth It?", Quality Review Bulletin, 7(2) 23-28, Feb. 1981.

4. Saloway, Henry B., "Rh Immune Globulin: A Ton of Prevention?", Medical Laboratory Observer, pp. 21-25, June 1981.

5. Levin, John H., "National Health Insurance: The Debacle Down Under", Medical Economics, pp. 41-56, 02 Feb. 1981.

6. Britt, A.E., et. al., "The Early and Periodic Screening, Diagnosis, and Treatment Program for Eligible Individuals Under Age 21. A Twenty Year Cost/Benefit Analysis", NTIS, PB-296 408/8ST, Mar. 1974.

7. Holoweiko, Mark, "The Nation's Bitterest Health Planning Battle", Medical Economics, pp. 31-50, 08 June 1981.

8. Haleman, John F., "NHI May Be Dying - But What About State Health Insurance?", Medical Economics, pp. 177-181, 20 July 1981.

9. Lavin, John H., "Can Advocates of Competition Make Their Health Plans Fly?", Medical Economics, pp. 37-54, 13 Apr. 1981.

10. Bell, Donald R., "Dental and Vision Care Benefits in Health Insurance Plans", Monthly Labor Review, 103(6) 22-26, June 1980.

11. Royce, P.C., et. al., "Value of Postirradiation Screening for Thyroid Nodules", Journal of the American Medical Association, 242:2675-2678, 1979.

12. Harnes, J.R., "Second and Subsequent Periodic Examination", New York State Journal of Medicine, 76:891-897, 1979.

13. Bharath, S. and Goodman, Morton, "Colorectal Cancer Screening", Journal of the American Medical Association, 242(2) 140, 13 July 1979.

14. Hauner, J.H., et. al., "The Evaluation of Performance and Cost in a Hypertension Control Program", Medical Care, 18(5) 485-502, May 1980.

15. Bryers, Felicity and Hawthorne, Victor M., "Screening for Mild Hypertension--Costs and Benefits", Journal of Epidemiology and Community Health, 32(3) 171-174, 1978.

16. "Cancer of the Cervix", CA - Cancer Journal for Clinicians, 30(4), July 1980.

17. Newcomb, Robert D. and Jolley, Jerry L., Public Health and Community Optometry, Charles C. Thomas Publisher, Springfield, Illinois, USA, p. 237, 1980.