The Controlled Clinical Trial and Decision Making in Family Practice

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This study attempts to measure the extent to which the family physician's therapeutic and strategic decisions in selected areas are in accordance with the findings of controlled clinical trials and cohort studies bearing on the decision problem. A questionnaire was designed to present a clinical problem and elicit a choice of therapy, test, or management for that particular clinical situation, the choice being capable of classification as concordant (in best agreement with the results of pertinent cohort studies) or nonconcordant.

There were 70 respondents. Out of 8 possible responses, the number of concordant responses per individual ranged from 0 to 5, with a mean of 2.57 ± 1.2. No significant difference in concordance of response per individual by years of clinical experience (as measured by age), region of practice location, or region of medical school attendance was found. Only 18 percent of the sample had ratios (concordant/all responses) greater than 0.50. Likewise, for only one clinical area did concordance of response exceed 50 percent. As a measure of the penetrance of the clinical trial and cohort study into the practice of primary care, these data suggest that they do not exert a major influence in clinical decision making.

The prospective controlled clinical trial and cohort study are recognized as effective methods for validating the efficacy of a therapeutic intervention and for defining the natural history of a disease process.[1-4] Many of the standard therapeutic regimens in clinical practice, however, have not been validated by clinical trials.[1-5] Furthermore, there are examples of therapies demonstrated not to be effective that are abandoned with great reluctance or that remain in common use.[5]

The purpose of this study was to determine, in a preliminary way, the extent to which the family physician makes therapeutic choices consistent with the results of cohort studies and clinical trials, and to test whether clinical experience is a determinant of the number of concordant choices.

Methods

To compare physicians' therapeutic decisions with the results of controlled trials and cohort studies, a questionnaire was developed that contained eight questions covering selected aspects of

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the following clinical problems: mild hypertension in the adult, the use of antibiotics in acute cholecystitis, the use of nonsteroidal anti-inflammatory agents in rheumatoid arthritis, and elevated blood pressure in the adolescent population. For each topic, the English language literature was reviewed for the years 1950 to 1980. *Index Medicus* was the primary source of references. Those prospective studies bearing on the clinical areas covered by the questionnaire constituted the basis for the questions subsequently developed.

The format of each question included (1) a statement of the clinical problem, and (2) four multiple choice answers, one consistent with the results of the appropriate cohort study. When a management decision or strategy decision was requested (as opposed to a fact), methods of decision analysis were used to help determine the choice consistent with cohort studies.

The *Directory of the American Academy of Family Physicians, 1979-80* was used to obtain a random sample of 180 physicians, 60 in each of three categories: Group 1 (39 years old or younger), Group 2 (40 to 49 years), and Group 3 (50 years and older).

The questionnaire was mailed to the entire sample selected. An initial response period of approximately four weeks was allowed; nonrespondents were recontacted by mail and supplied with a second questionnaire.

The k-sample chi-square test was used to compare concordance of response by age group, region of practice, and region of medical school attendance. Characteristics of responders and nonresponders were compared using the same test.

For each individual question in the questionnaire, the number of concordant responses was considered a binomial random variable. The probability of a concordant response was estimated. Confidence limits were computed using the normal approximation to the binomial cumulative distribution function.[6]

Results

Response Rates and Characteristics of Responders and Nonresponders

The response rate to the questionnaire was 38.9 percent (70/180). Response rates by age group were: group 1, 31.7 percent (19/60); group 2, 41.7 percent (25/60); group 3, 43.3 percent (26/60).

Thirty states and 62 cities were represented among the responders. The average age of responders was 46.7 years. Women constituted 4.3 percent (3/70) of the responders.

Nineteen percent (21/110) of the nonresponse was attributable to incorrectly listed addresses and/or changes in address. Fifteen of these 21 undeliverable questionnaires were addressed to individuals in group 1. An additional six physicians in the sample replied, stating various reasons for not wanting to participate (average age 61.8 years). The average age of this entire group of nonresponders (total of 27) was 45.6 years.

Eighty-two members of the sample (45.6 percent) received two questionnaires and did not reply. This category of nonresponse was divided as follows: group 1, 26/60; group 2, 32/60; group 3, 24/60. Thirty-three states and 82 different cities were represented among these nonresponders. Women constituted 4.8 percent (4/82) of the nonresponders. The average age of this group (total of 82) was 46.1 years. The differences between responders and nonresponders were minimal, with the exception of a higher response rate for physicians in the Northeast. No significant differences were demonstrated.

Concordance of Response

In the sample, the mean number of concordant responses per individual was 2.57 ± 1.2 standard deviation (SD) (Table 1). Thus the ratio of concordant responses/all responses has mean 0.32 ± 0.16 SD.

Assuming that the age of the respondent is a measure of his or her clinical experience, the groups were compared with one another to test the hypothesis that clinical experience is a determinant of the concordance of response. No difference could be found at the 5 percent significance level ($\chi^2 = 4.16$, 4 *df*). Similarly, when looking at responses by region of the practitioner, Northeast, South, Midwest, and West, the number of concordant responses per individual were not significantly different ($\chi^2 = 1.87$, 6 *df*). The probability of type II (beta) error was calculated for each comparison between groups by age and region because of the small sample sizes. For the comparison by age groups, the probability of a type II error ranged from 28 percent to 32 percent, assuming a

Table 1. Distribution of Concordant Responses per Individual by Age Group

Number of Concordant Responses	Number of Responders		
	Group 1 (≤ 39 years)	Group 2 (40-49 years)	Group 3 (≥ 50 years)
0	0	0	1
1	4	4	7
2	5	3	6
3	6	13	8
4	3	4	2
5	1	1	2
6	0	0	0
7	0	0	0
8	0	0	0
Total	19	25	26
Mean	2.6	2.8	2.4
SD	1.2	1.04	1.3

true difference of one concordant response. The comparisons by region gave type II errors of 21 percent to 47 percent.

Response Concordance by Category

Elevated Blood Pressure in Adolescents

Question 1: This question presented a 12-year-old girl, without previous medical problems, who complained of symptoms of a urinary tract infection and demonstrated pyuria and mild elevation of blood pressure on initial examination. After a urine culture was obtained and antibiotic therapy was started, a choice of appropriate follow-up evaluation was asked for with regard both to the infection and the elevated blood pressure.[7-15] For this question there was 61.4 percent concordance. Choices included no follow-up, evaluation with an intravenous pyelogram in three months, repeat blood pressure measurements over a period of three or four weeks to determine if sustained blood pressure elevation were present, and suggestions for weight reduction, salt restriction, and intermittent blood pressure checks over several months.

Question 2: This question presented an asymptomatic 17-year-old woman who had been found on routine examination to have a mildly elevated blood pressure. Sustained mild hypertension was confirmed by repeated measurements. The respondent was asked to indicate his choice of appropriate laboratory evaluation.[9,12-14] The concordance rate for this question was 18.6 percent. Choices offered were various combinations of the following tests: urinalysis, electrocardiogram, serum chemistries, chest x-ray examination, urinary catecholamine, and intravenous pyelogram.

Antibiotics in Acute Cholecystitis

Question 3: A 45-year-old woman with epigastric and right upper quadrant abdominal pain was presented in this problem. She was febrile and had right upper quadrant tenderness, but no peritoneal signs. After admission to hospital, evaluation was commenced. A choice of the appropriate initial management with regard to antibiotics was asked for.[16-19] Here the concordance rate was 34.3 percent. Choices included no antibiotics, ampicillin, a cephalosporin and aminoglycoside, or antibiotic other than those above.

Question 4: This question continued question 3.

Further evaluation of that patient showed the diagnosis to be acute cholecystitis. She improved with medical management and refused surgery. Fifteen years later she presented with a similar episode. With a presumptive diagnosis of recurrent acute cholecystitis, the respondent was again asked to choose appropriate antibiotics as a part of initial management.[20-23] The rate of concordance was 20 percent. Choices were no antibiotics, ampicillin, a cephalosporin and aminoglycoside, or any one of the antibiotics mentioned (including chloramphenicol or a sulfonamide) without a preference.

Mild Hypertension in Adults

Question 5: This question presented a 45-year-old man with hypertension (average blood pressure, 156/102 mmHg), gouty arthritis, and asthma. Physical examination and initial laboratory evaluation were normal. The respondent is asked to choose the initial management plan.[24-32] The concordance rate was 33 percent. Choices included weight reduction and salt restriction only, these plus a diuretic, these plus methyldopa or prazosin.

Question 6: The patient presented in question 5 was again discussed; on the chosen management regimen, his blood pressure averaged 149/98 mmHg. A choice of possible changes in management regimen was asked for. The concordance rate was 15.7 percent. Additions offered were a thiazide diuretic, propranolol, prazosin or methyldopa, or no change in regimen.

Nonsteroidal Anti-Inflammatory Agents

Question 7: A 54-year-old man with symptoms consistent with rheumatoid arthritis was presented in this question. Initial therapy with aspirin was successful; however, gastrointestinal upset supervenes. This patient's past medical history revealed ischemic heart disease; he was status post myocardial infarction with two documented episodes of congestive heart failure. From a list of four nonsteroidal anti-inflammatory agents, the respondent is asked to choose one which would be relatively contraindicated in the described patient.[33-36] The rate of concordance was 30 percent. Fenoprofen, tolmetin, naproxen, and sulindac were the drugs listed.

Question 8: In this question the respondent was asked to choose a nonsteroidal anti-inflammatory agent for the patient presented in question 7, considering cost, effectiveness, and side effects.[37-50] The concordance rate was 44.3 percent. The same drugs listed in question 7 were listed for this question.

Discussion

The cohort study may be considered a technology available to the medical community that performs those functions stated in the introduction. This study attempted to measure the extent to which this technology has penetrated the practice of primary care. The number of concordant responses per individual and the concordance rate were used as measures of this penetrance. There are limitations associated with this method of measurement, which assumes that (1) the available prospective studies clearly delineate the benefits or risks of alternate courses of action, and (2) that the questionnaire reflects the experience provided by these studies. Although the delineation is not absolute, no strong objection to the first assumption can be raised. It is, in fact, a premise that the clinical trial and cohort study best delineate these benefits and risks.

The accuracy of the second assumption is more problematic. The issue of whether the questionnaire reflects the experience of the appropriate studies can be separated into two parts. First, do the responses labeled concordant truly reflect the experience of the trials? Second, does any aspect of the questionnaire prejudice the respondent against choosing the concordant responses? The answer to the first question must be sought in the method by which the questionnaire was constructed. This is described in Methods. A brief discussion of the questionnaire is included, which may allow the reader to answer for himself the second question.

The method of measurement used here incorporates an additional premise in which the concept of penetrance is defined. The question can be raised as to whether a respondent's answers to a questionnaire reflect his choices in real-life clinical situations. It may even be asked whether his choices in actual situations reflect a knowledge and understanding of the experience of controlled trials and cohort studies validating those choices. The additional premise referred to is that penetrance implies that both types of choices are affected.

Despite these difficulties, the findings of this study are in agreement with previous discussions and studies of this question.

Chalmers[5] measured the impact of clinical trials on the practice of medicine by considering the sales of a drug or the number of prescriptions written for a drug after the efficacy of that drug had been brought into question by a controlled clinical trial. He also looked at orders written for selected nondrug interventions shown not to be effective. He concluded that there was little evidence that controlled clinical trials were influencing the practice of medicine.

Hiatt,[3] in discussing the competition for resources among the various branches of medical endeavor, used the same measures as Chalmers. Coronary care units and coronary artery bypass graft surgery were cited as examples of practices widely adopted yet lacking in proof of superiority over the practices they supplant.

The findings of this study also give evidence of a minimal effect of clinical trials and cohort studies in the process of clinical decision making. Only 18 percent of the respondents showed 50 percent or greater agreement with cohort studies in the choices they made.

Two points should be made. First, these results do not necessarily indicate that physicians make therapeutic decisions contrary to the welfare of their patients. Most therapies have not been subject to trials, and factors other than the therapy prescribed may be more limiting to the outcome. On this point, however, a caveat is in order. When a cohort study appropriately designed and with sufficient numbers of subjects has shown no benefit to the patient from a specific therapeutic intervention, then harm may be done by continuing in that practice. Second, several factors have been advanced to explain the behavior of physicians demonstrated in these results, and these factors seem amenable to change. They are that the rate and extent to which new medical technologies spread (and therefore new diagnostic and therapeutic interventions spread) are dependent on forces other than objective evaluation of their efficacy,[4] and a knowledge of the status of a medical practice, with regard to its efficacy, is hampered by several factors, some of which are (1) an inability on the part of the physician to evaluate the published prospective studies, (2) a reliance upon commentaries on and interpretations of the studies rather than the original material itself, and (3) an urge to perform some therapeutic intervention on behalf of the patient even if the effectiveness of that intervention is in doubt.[5] All these factors must be examined and transformed if a change in physician behavior with regard to decision making based upon controlled trial and cohort study experiences is to occur.

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