

# CHARACTERISTICS and ATTITUDES of PHYSICIANS ASSOCIATED with the PRESCRIBING of CHLORAMPHENICOL



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**D**RUG THERAPY is a critical component in the health professional's armamentarium and an undisputed contributor to man's well-being in the prevention, control, and treatment of disease. Unfortunately, drug therapy also provides risk of inappropriate prescribing, dispensing, administration, and ingestion of drugs, as well as of toxic effects from medications prescribed correctly or incorrectly. These facts comprise a public health problem of increasing concern to the general public and to the health professions. In particular, problems resulting from what Brodie (1) has termed "the apparent irresponsible prescribing habits of many physicians" must be examined as an important part of the evaluation of the quality of medical practice (2).

Perhaps the least serious problem is errors in prescribing which result in the consumption of drugs merely ineffective in ameliorating the conditions for which they are used. Brodie (1a) has estimated such "drug waste" at about 25 percent of all drug therapy, costing between \$1 billion and \$2 billion annually. Data on adverse drug reactions, however, clearly depict the more harmful

outcomes of the great volume of drugs currently prescribed (3, 4).

Cluff (5) asserts that approximately 1.5 million hospital admissions each year are caused by adverse drug reactions, while Seidl and associates (6) estimate that duration of hospitalization is about 40 percent longer than the average hospital stay for those persons sustaining a serious drug reaction during hospitalization. Further, it is alleged that approximately 10 percent of all hospitalized patients incur deleterious side effects, resulting in annual costs in excess of \$1 billion for all adverse drug reactions. These costs do not include the economic loss caused by mortality, reduced income, and lowered productivity (1b).

Figures of this sort are extrapolations from specific small-scale studies, and at best, represent rough estimates. Also, these data do not distinguish between unavoidable side effects from impeccable prescribing and toxicity from indefensible prescribing habits. Nevertheless, a vast problem remains.

Reviewing data on erroneous use of drugs, Brodie concluded (1b, c):

. . . Adverse drug reactions cannot be eliminated as a possible event in drug therapy but the impact that they have on public health is such that major efforts should be made to obtain scientific information that will lead to a minimal incidence rate. . . .

Therefore, it would appear that if significant improvement is to be made in the control of drug costs, greater knowledge of patterns of drug utilization than presently exists, must be acquired. . . .

This paper reports findings from research which attempted to evaluate selected demographic, situational, and attitudinal factors as predictors of the extent to which a physician in private practice prescribed a controversial antibiotic, chloramphenicol (trade name Chloromycetin).

An effective, broad-spectrum antibiotic, chloramphenicol was introduced in 1948 and was widely used for many kinds of infections before the discovery that it could sometimes cause severe bone marrow depression and subsequent aplastic anemia (7). Despite periodic warnings (distributed by the manufacturer, the Food and Drug Administration (FDA), and the American Medical Association Council on Drugs) concerning the risks of using chloramphenicol, approximately 1,250,000 prescriptions for the capsule form were filled in 1968 (8, 9). Moreover, it has been reported that most patients with recorded cases of aplastic anemia received the drug for trivial infections that could have been treated effectively by

other agents (10). The generally accepted indications for prescribing chloramphenicol now include only a few rare and serious diseases.

The dangers of chloramphenicol and recommendations for restricting its use have been so widely publicized and recognized over the past decade (the FDA requires that all advertising and package inserts contain a prominently displayed warning) (11) that it was felt the prescribing patterns for this drug might provide a criterion of the physician's perception and judgment. However, it should be noted that Meade (12) studied chloramphenicol prescribing among British general practitioners and was unable to support his hypothesis that the physician's skill and training were predictors of the number of such prescriptions.

Size of practices vary, and different patient populations may require differing amounts of antibiotic therapy. Further, the physician can, when considering chloramphenicol, frequently select from among other equally efficacious antibiotics with varying potential for toxicity. To control for variance in numbers and types of patients, the study measure of prescribing patterns for chloramphenicol is the number of prescriptions for chloramphenicol written by each physician as a percentage of his total number of prescriptions of antibiotics.

## Review of Literature

In view of the manifest importance of decisions about drug therapy in the provision of health care, it is surprising that so few studies exist concerning factors influencing prescribing. Most of these studies have been conducted in the United Kingdom.

A study of prescribing habits of general practitioners in three industrial towns in northern England concluded that the environment of the physician (for example, his medical associates) tended to affect his prescribing practices more than his medical school training and, further, that the drug detail man is a powerful influence on patterns of prescribing (13, 14). In another study of British general practitioners, Wilson and associates (15, 16) found that sources of information about drugs and the ensuing selection of drug therapy differed depending on the type of illness. Drug choice in the treatment of psychiatric illness was likely to reflect consultants' opinions, while drug choice for an infection was likely to be influenced by journal advertising, promotional mailing, or detail men.

Joyce and his colleagues (17) interviewed Eng-

lish general practitioners in an attempt to relate conditions of practice and certain personal characteristics of the physicians to their prescribing habits. However, they employed relatively few measures and were unable to discern many correlates of prescribing, with the exceptions of "education," "quality of practice," and "whole-person orientation."

Martin (18) analyzed a large number of prescriptions issued by practitioners under the National Health Service in the early 1950's. He found striking regional differences in prescribing; a high volume of prescriptions was filled over the years in certain English towns, while other towns had a low-volume pattern. He concluded that "local custom" which "embraces not only attitudes toward illness and medical care but the psychological climate within which all prescribing takes place" was the most important determinant of differences in prescribing.

The Ministry of Health in the United Kingdom (19) explored trends in prescribing by analyses of prescriptions submitted to the National Health Service for reimbursement. The Ministry found no significant difference in prescribing patterns among physicians who graduated from different medical schools; however, older physicians prescribed less than younger physicians, and female physicians issued more prescriptions per patient than male physicians.

The best known study in the United States focused on the diffusion of drug information among physicians, but did not attempt to assess judgment of the physicians. Coleman and co-workers (20) concluded that the number of informal colleague relationships a physician had within the medical community, as well as his medical background, type of practice, and orientation toward patients and profession helped to predict the time at which he would use a new drug (the informal relations providing support and information for early adoption). The authors viewed the time of initial use as a measure of the physician's "innovativeness" in comparison with his peers.

## Methods

*Respondents.* The study was conducted in a county with approximately 112,000 persons, located in a Middle Atlantic State. The area was selected because prescription records for all physicians practicing in the county were available and also because we had established excellent rapport with the local and regional medical associations.

There are several medium-sized cities in the county, containing a total of three hospitals, but none with a university medical center. Of the 91 practicing physicians in the county, 47 are specialists. The general population is approximately 97 percent white, including a substantial number of persons of Italian and East European descent.

When this study began in early 1970, there were 44 actively practicing primary care physicians. Thirty-seven of the 44 agreed to participate in the investigation, a cooperation rate of approximately 84 percent. Reasons for nonparticipation included lack of interest in such a study and the pressure of other time commitments. The final group of participants included 29 general practitioners, five osteopaths, and three internists.

*Data collection.* Data presented in this paper were gathered by personal interview and a self-administered questionnaire. Ultimately, 34 completed questionnaires were obtained. Information was sought on the physicians' backgrounds, medical training, professional experience, conditions of present practice, characteristics of their patients, and sources of drug information.

In addition, a number of attitude scales were used to measure the physicians' perceptions of their community, patients, and practice, as well as their orientation toward psychosocial dimensions of care, drug costs, Government regulation relevant to therapeutics, the drug industry, and other areas likely to be related to prescribing behavior. Many of these scales benefited from the inclusion (with modifications) of questions developed by Darsky and co-workers (21) in their study of Windsor Medical Services, and Coleman and colleagues (20) in their study of medical innovation. In the scales that follow, questions from these studies will be identified with a (D) or (C), respectively.

*Identifying prescribing patterns.* Since 1963, under the sponsorship of a grant from the Public Health Service, the department of pharmaceutical economics at the University of Pittsburgh School of Pharmacy has had access to 85 percent of all prescriptions filled in pharmacies in the research community (22).

For the current study, prescriptions written by all general practitioners, osteopaths, and internists practicing in the study area were collected from pharmacies during 1968, and computer-generated prescribing profiles for these physicians were examined for that entire year. These profiles enabled us to compute various rates for each physician,

such as average number of prescriptions per patient and total prescribing of particular drugs within therapeutic categories. Thus, the tables that follow show the physicians' actual prescribing patterns for chloramphenicol.

During 1968, 639 prescriptions for chloramphenicol were dispensed by pharmacies in the study community. Chloramphenicol was the 64th most frequently dispensed prescription drug in the area, as well as one of the most popular antibiotics. While chloramphenicol may be a drug of choice in the treatment of typhoid fever, no cases of typhoid fever were reported in this area in 1968.

Hypotheses were elaborated for each measure and will be found (with direction indicated) just below each variable in the tables. Finally, since osteopaths prescribe drugs in ways that differ markedly from the general patterns of other physicians, only data pertaining to M.D.'s are reported.

## Results and Discussion

The researchers had hypothesized that relatively younger physicians, because of their more recent medical training, would be less likely to prescribe chloramphenicol, and the data in table 1 support that prediction. Of course, this hypothesis implies that these physicians who less frequently prescribe chloramphenicol will also have spent relatively fewer years in practice (total years and

**Table 2. Associations between general conditions of practice and actual prescribing patterns for chloramphenicol**

Conditions of practice <sup>1</sup>	Actual chloramphenicol prescribing	
	Gamma	Number
Number of visits in average week to		
(more → +)....		
{ home.....	<sup>2</sup> 0.502	28
{ hospital.....	<sup>2</sup> .512	28
{ office.....	<sup>3</sup> .646	28
{ total.....	<sup>3</sup> .547	28
Size of practice compared to 2		
years ago (same or		
increased → +).....	<sup>3</sup> .555	28
Average amount of time spent with		
patient (more → +).....	<sup>3</sup> -.600	28
Group or solo practice		
(group → +).....	<sup>3</sup> .636	28
Number of ancillary personnel		
(more → +).....	<sup>3</sup> .615	28
Management of practice scale.....	.012	28
Adequate time free from worry of		
practice (yes → +).....	<sup>2</sup> -.478	26
Engaged in medical activity outside		
practice (yes → +).....	<sup>2</sup> .576	27
Average seeking of consultation per		
month (more → +).....	<sup>3</sup> .650	28
Percent of patients referred per		
month (more → +).....	.408	28

<sup>1</sup> Hypotheses appear in parentheses after each variable. For example, Number of visits (more → +) means that if (as predicted) physicians with more visits per week prescribe relatively less chloramphenicol, the correlation will be positive.

<sup>2</sup> Denotes correlations statistically significant at  $P < 0.05$ .

<sup>3</sup> Denotes correlations statistically significant at  $P < 0.01$ .

years in the study community). These findings suggest that more extensive practical experience need not necessarily lead to more selective prescribing of drugs.

Special courses and postgraduate training might be expected to be related to superior prescribing behavior. However, it was surprising to learn that physicians who prescribed chloramphenicol less frequently were more likely to have resided in the community before beginning practice there.

The predilection of physicians for settling in large urban areas is well documented (23), as is the relationship between relative geographic isolation and low innovativeness (24). Perhaps, given the many possible reasons for practicing in the study community, familiarity with the region or previously established personal relationships are factors least likely to be associated with "poor" prescribing habits. Neither the location of the medical school nor number of memberships in medical associations was significantly correlated with the nature of physicians' prescriptions.

From the observations concerning conditions of

**Table 1. Associations between background variables and actual prescribing patterns for chloramphenicol**

Background variables <sup>1</sup>	Actual chloramphenicol prescribing	
	Gamma	Number
Age (younger → +).....	<sup>2</sup> 0.468	28
Year received M.D. degree (more recent → +).....	<sup>3</sup> .558	28
Location of medical school (further away from county → +).....	.326	28
Took special courses or postgraduate training (yes → +).....	<sup>3</sup> .648	28
Years in practice (fewer → +).....	<sup>2</sup> .500	28
Years in practice in present community (fewer → +).....	<sup>2</sup> .441	28
Lived there before he practiced (no → +).....	-.455	28
Number of medical association memberships (fewer → +).....	-.325	27

<sup>1</sup> Hypotheses appear in parentheses after each variable. For example, Age (younger → +) means that if (as predicted) younger physicians prescribe relatively less chloramphenicol, the correlation will be positive.

<sup>2</sup> Denotes correlations statistically significant at  $P < 0.05$ .

<sup>3</sup> Denotes correlations statistically significant at  $P < 0.01$ .

practice (table 2), it appeared that physicians who less frequently prescribed chloramphenicol maintained larger, more hurried practices, some of which were still increasing. Despite the assistance of additional supportive staff, these physicians spent relatively less time with each patient and reported that they lacked sufficient time free from the worries of practice. Ability to manage the practice efficiently did not seem related to the pattern of prescribing. The scale for determining efficient practice management included maintaining an appointment system, taking regular time off and vacations, and using nonmedical professionals to manage the business aspects of the practice.

It is often asserted that the best approach to improving the quality of medical services outside

the hospital is a group practice (25-27). The advantages of group practice over solo practice include setting or possibly improving standards for medical procedures, more complete and accurate recordkeeping, and at least the potential for continual exchange of judgment and criticism with colleagues. The significant positive correlation between membership in a group practice and less frequent prescribing of chloramphenicol suggests that a physician may indeed be more hesitant to select a controversial drug when fellow professionals will be aware of his prescribing behavior.

Additional evidence of the effect of contact with other professionals on prescribing practices is implied from the correlations concerning whether the physician engages in medical activity outside his practice and from information about his consultation patterns. The more cautious prescribers are more likely to have some outside medical involvement; and the nature of prescribing is also shown to be positively associated with a propensity to seek consultation from, and a willingness to refer more patients to, other physicians.

Examination of conditions of practice specifically related to therapeutics (table 3) reveals that the physician who seldom prescribes chloramphenicol writes fewer prescriptions on the average, and is relatively more reluctant than his peers to prescribe by telephone. As with medical consultation in general, physicians who prescribe chloramphenicol relatively less often are more willing to seek advice concerning therapeutics from others, and frequently serving as therapeutic consultants is linked to prescribing chloramphenicol infrequently.

Finally, prescribing is shown to be affected by the physician's sources of prescribing information. Thus, physicians who rely upon journal articles to learn about the uses and efficaciousness of drugs and who tend to be disdainful of journal ads and retail pharmacists as sources of such information are less likely to prescribe chloramphenicol.

The study respondents were asked to estimate the proportion of their patients in various demographic and social categories, and several of the investigators predicted that "poorer" prescribing behavior would be found most frequently where a relatively greater proportion of the practice consisted of patients with problems such as minority group membership, low income (especially when care is financed by a public agency), and little formal education. However, except for the relationship between the proportion of nonwhite pa-

**Table 3. Associations between conditions of practice related to therapeutics and actual prescribing patterns for chloramphenicol**

Conditions of practice related to therapeutics <sup>1</sup>	Actual chloramphenicol prescribing	
	Gamma	Number
Percent of office visits resulting in prescriptions (more → +) . . . . .	<sup>2</sup> -0.554	28
Percent of all prescribing done by telephone (more → +) . . . . .	<sup>3</sup> -.460	27
Average number of consultations per month sought concerning therapeutics (more → +) . . . . .	<sup>2</sup> .552	26
Average number of times per month respondent is consulted concerning therapeutics (more → +) . . . . .	<sup>3</sup> .518	27
Average number of visits per month received from detail men (fewer → +) . . . . .	.236	27
Use of journal articles as source of prescribing information (frequently → +) . . . . .	<sup>3</sup> .629	25
Use of journal articles to learn about usefulness of new drugs (frequently → +) . . . . .	<sup>3</sup> .600	24
Use of journal ads as source of prescribing information (almost never → +) . . . . .	-.186	24
Use of journal ads to learn about usefulness of new drugs (almost never → +) . . . . .	<sup>3</sup> .510	24
Use of retail pharmacists as source of prescribing information (almost never → +) . . . . .	.329	26
Use of retail pharmacists to learn about usefulness of new drugs (almost never → +) . . . . .	<sup>3</sup> .592	25

<sup>1</sup> Hypotheses appear in parentheses after each variable. For example, Percent of visits resulting in prescriptions (more → +) means that if (as predicted) physicians who write more prescriptions per visit also prescribe relatively less chloramphenicol, the correlation will be positive. In this instance, the negative correlation shows that, in fact, fewer prescriptions per visit is associated with less frequent prescribing of chloramphenicol.

<sup>2</sup> Denotes correlations statistically significant at  $P < 0.01$ .

<sup>3</sup> Denotes correlations statistically significant at  $P < 0.05$ .

tients in the practice and use of chloramphenicol, none of the correlations in table 4 is statistically significant at  $P < 0.05$ . Moreover, most of these gammas are in directions that would contradict the hypotheses.

If, indeed, the hypotheses are valid, the two factors which might explain nonsignificance and reversed direction are (a) the percentages are based on physicians' fairly rough estimates of the composition of their practices (also, while reasonable variance among practices was reported, the absolute range of proportions in each problem category was not great); and (b) given the relationship between infrequently prescribing chloramphenicol and younger physicians with relatively new or developing practices, it might be expected that such practices would contain somewhat higher percentages of patients with problems.

Many questions were devoted to measuring the physicians' attitudes on a multiplicity of dimensions, which the investigators thought might be related to prescribing behavior. The attitude scales employed fall into these broad categories.

1. General orientations and predispositions (for example, toward preventive medical services and quality of care)

2. Relative satisfaction (for example, with practice and patients)

**Table 4. Associations between patient characteristics and actual prescribing patterns for chloramphenicol**

Patient characteristics <sup>1</sup>	Actual chloramphenicol prescribing	
	Gamma	Number
Religion:		
(fewer → +) <sup>2</sup> { Protestant.....	-0.022	25
{ Catholic.....	-.145	25
{ Jewish.....	.236	25
Percent nonwhite (fewer → +)..... <sup>3</sup>	-.441	27
Percent paid for by outside agency (fewer → +).....	-.404	27
Percent 45 years or older (fewer → +).....	.216	26
Percent completed high school (more → +).....	.219	25
Percent comfortable income (more → +).....	-.418	25

<sup>1</sup> Hypotheses appear in parentheses after each variable. For example, Percent nonwhite (fewer → +) means that if (as predicted) physicians with a lower percentage of nonwhite patients also prescribe relatively less chloramphenicol, the correlation will be positive. In this instance, the negative correlation shows that, in fact, having a higher percentage of nonwhite patients is associated with less frequent prescribing of chloramphenicol.

<sup>2</sup> No specific hypothesis, so all correlations were run in the same direction.

<sup>3</sup> Denotes correlation statistically significant at  $P < 0.05$ .

3. Opinions concerning drugs (for example, toward generic drugs and the pharmaceutical industry).

Most of the scales were constructed by obtaining the physician's report of the extent to which he either agreed or disagreed with various statements of opinion.

For example, the "cosmopolitanism" scale assessed the degree to which the physician seeks guidance and satisfaction from his profession (rather than from his local situation) by presenting statements such as the following.

I usually prefer to spend my free time with other doctors rather than with non-doctors. (C)

While both are important, it is more important that a physician devote more time to his patients than to keeping himself informed on new scientific developments.

In the same manner, different aspects of "being modern" were ascertained with statements such as the following.

In recent years, there has been too much emphasis on the role of emotions in illness.

I tend to have more respect for a physician who exhibits a readiness to try out new forms of treatment, than for one who makes sure to follow only practices which have been well tried and tested. (C)

One set of questions was directed to the physician's level of interest in the psychodynamics of illness. The following statement is an example from this "psychosocial orientation" scale.

Physicians in practice today should use the techniques and methods of psychiatry and psychology. (D)

Similarly, the respondent's concern with "quality of care" is sampled by the degree to which he does or does not concur with statements reflecting current thought on the provision of good medical care.

If a patient insists on some relatively harmless medication, the doctor might as well give it to him, even though he knows it will not do any good.

All other things being equal, a physician who bases his diagnoses mainly on laboratory tests is more likely to give better medical care than one who bases his diagnoses mainly on clinical signs and the patient's history. (C)

It is clear from table 5 that the four scales described are fairly useful predictors of prescribing patterns (although "cosmopolitanism" was not found to be significantly related to actual prescribing of chloramphenicol). The physician's attitudes toward the value of preventive care (for example, "We should encourage adult patients to get routine, annual checkups, even if the patient has no complaint or history of serious diseases" (D)),

**Table 5. Associations between scores on selected attitude scales and actual prescribing patterns for chloramphenicol**

Attitude scales (more → +) <sup>1</sup>	Actual chloramphenicol prescribing	
	Gamma	Number
Cosmopolitanism.....	0.393	27
Being modern.....	<sup>2</sup> .562	27
Preventive orientation.....	.013	27
Psychosocial orientation.....	<sup>3</sup> .448	27
Orientation to patients.....	.301	27
Quality-of-care orientation.....	<sup>2</sup> .571	27
Liberality of political choice.....	-.091	27

<sup>1</sup> It was hypothesized that higher scores on each scale would be associated with less frequent prescribing of chloramphenicol. For example, Cosmopolitanism (more → +) means that if (as predicted) physicians who are more cosmopolitan also prescribe less chloramphenicol, the correlation will be positive.

<sup>2</sup> Denotes correlations statistically significant at  $P < 0.01$

<sup>3</sup> Denotes correlation statistically significant at  $P < 0.05$

toward his patients (for example, "In general, my patients have a high degree of knowledge and sophistication concerning medication"), and his general political stance do not enable us to distinguish between those who do and those who do not avoid prescribing chloramphenicol. In the case of preventive care, the relative lack of association may be caused by the infrequent prescribers being aware of the current controversy concerning the value of providing such services. The research also included variables relating to the physician's satisfaction with his community and his practice, and the relevant findings are presented in table 6.

The first scale, "community characteristics," emphasized the relatively small size of the county, its somewhat isolated location, and the characteristics of the population. We assumed that the more "cosmopolitan" the physician, the more dissatisfied he would be with these characteristics of the study community. Further, a "satisfaction with community" scale permitted the physician to rate his community in terms of his medical colleagues, types of medical facilities, and as a place to live. Finally, the physician was asked, if he had the opportunity to do it over, whether he would still locate his practice in the study community.

The picture that emerges is of a consistent relationship between relative unhappiness with the setting and prescribing chloramphenicol infrequently. This dissatisfaction extends to physicians' perceptions of patients as well. To create a "satisfaction with patients" scale, the respondent was given a list of nine patient behaviors (for example, not following advice, shopping around for

medical advice and care, demanding inappropriate services and treatment) and was asked to evaluate each behavior as a problem in his current practice.

It is evident from table 6 that relative dissatisfaction with patients is associated with infrequent prescribing of chloramphenicol. On the other hand, the amount of "satisfaction with practice" (for example, perceptions of difficulty of starting practice, competition for patients, or the area as a place to practice medicine) does not differentiate on the dimension of prescribing behavior.

Respondents were also requested to self-rate the adequacy of their formal medical training and to indicate whether they wished their future practice to be of a size different from that at present. Physicians who presented more positive evaluations of their general training and who indicated a desire to maintain or increase the size of their practices in the future were those who tended to refrain from prescribing chloramphenicol.

One might expect that those attitude scales using statements dealing directly with drugs and prescribing would be most likely to be predictive of prescribing behavior; and, indeed, only two of the 13 scales presented in table 7 yielded gammas not significantly related to the actual prescribing patterns. Thus, the less frequent prescribers of chloramphenicol appear only slightly more likely to feel that adverse drug reactions are a significant

**Table 6. Associations between scores on satisfaction scales and actual prescribing patterns for chloramphenicol**

Satisfaction scale <sup>1</sup>	Actual chloramphenicol prescribing	
	Gamma	Number
Community characteristics (cosmopolitan → +).....	<sup>2</sup> 0.522	28
Satisfaction with community (more → +).....	<sup>3</sup> -.637	28
Would locate here again (yes → +).....	<sup>2</sup> -.481	27
Satisfaction with patients (more → +).....	<sup>2</sup> -.504	27
Satisfaction with practice (more → +).....	.014	27
Adequacy of formal medical training.....	<sup>2</sup> .451	27
Desired future practice size (same or increased → +).....	<sup>2</sup> .508	27

<sup>1</sup> Hypotheses appear in parentheses after each variable. For example, Community characteristics (cosmopolitan → +) means that if (as predicted) physicians who are more cosmopolitan (and therefore more dissatisfied with their community) also prescribed relatively less chloramphenicol, the correlation will be positive.

<sup>2</sup> Denotes correlations statistically significant at  $P < 0.05$ .

<sup>3</sup> Denotes correlation statistically significant at  $P < 0.01$

problem in private practice. Because this concern may be related to the number of side or toxic effects observed by the respondent in his practice, it may be that the lack of correlation is explained by the most frequent prescribers' seeing a greater number of these negative therapeutic outcomes in their practices. Also, the less frequent prescriber of chloramphenicol tends (but not significantly) to be more willing to support Government intervention in terms of regulating drug prices, providing insurance for drug costs, and resolving other problems related to drugs.

Otherwise, the findings in table 7 show the more cautious prescriber of chloramphenicol to be the physician with a more positive evaluation of his training in therapeutics, who is relatively more worried about the general level of quality in current prescribing, and who most often seeks information on a drug's contraindications or side ef-

fects. Further, the infrequent prescriber of chloramphenicol advocates revision or expansion of present sources of prescribing information and feels that drug compendiums should be updated more often.

Few chloramphenicol prescriptions seems also to be related to a more modern orientation to therapeutics, whereby the physician advocates informing the patient of the medication being prescribed, indicating the name of the drug on the prescription label, and alerting the patient to possible side effects of the drug.

While the relatively frequent prescribers of chloramphenicol display a general distrust of generic drugs, their less frequently prescribing peers perceive these drugs as being at least as efficacious, reliable, and safe as their brand name counterparts. Also, in light of the link between generic drugs and the problem of drug costs, it is interesting to note that the physicians who prescribed less of the drug were more likely to indicate that the average cost of generic drugs is lower, and more often reported that, when prescribing, they consider both the patient's income and the use of less expensive substitutes.

Since the drug manufacturers have a clear interest in creating and continuing positive perceptions and extensive use of their products, and since they are the major source of encouragement (through their promotional literature and detail men) to prescribe drugs (including chloramphenicol), the investigators hypothesized that the more sagacious physicians would be more skeptical toward the pharmaceutical industry. Data from the remaining three scales in table 7 support this hypothesis. The less frequent prescribers consistently reported their agreement with statements such as: "There are too many drugs on the market for the same indications," "Contributions of the pharmaceutical houses to research and development are not very great," and "Drug firms have an unsatisfactory public image." Similarly, these physicians said that (a) they received too many visits from detail men, (b) that detail men sometimes de-emphasized the side effects of a drug they were promoting and tended to indicate more uses for a drug than could be substantiated clinically, and (c) these physicians felt that they would not lose an important source of prescribing information if they did not receive visits from detail men.

The association between skepticism and the dependent variable is highest for the last scale in table 7. The physicians who prescribe more care-

**Table 7. Associations between scores on therapeutic-related attitude scales and actual prescribing patterns for chloramphenicol**

Therapeutic-related attitude scales <sup>1</sup>	Actual chloramphenicol prescribing	
	Gamma	Number
Adequacy of therapeutic training (more → +).....	<sup>2</sup> 0.667	27→
Quality of prescribing (more concern → +).....	<sup>3</sup> .633	27→
Information is sought most often on contraindications or side effects (more → +).....	<sup>3</sup> .526	26→
Evaluation of existing sources of prescribing information (revise or expand → +).....	<sup>3</sup> .534	27→
Drug compendium brought up to date (more frequently → +).....	<sup>2</sup> .607	26→
Adverse drug reactions seen as significant problem in practice today (yes → +).....	.103	26→
Modern therapeutics (more → +).....	<sup>3</sup> .529	28→
View of generic drugs (like → +).....	<sup>3</sup> .516	27→
Cost of drugs (concern → +).....	<sup>3</sup> .492	27→
Government participation (more → +).....	.256	27→
Pharmaceutical industry image (poor → +).....	<sup>2</sup> .653	27→
Perceptions of detail men (poor → +).....	<sup>2</sup> .625	27→
Use of detail men as sources of prescribing information concerning new drugs (not good → +).....	<sup>2</sup> .737	26→

<sup>1</sup> Hypotheses appear in parentheses after each variable. For example, Adequacy of therapeutic training (more → +) means that if (as predicted) physicians who rate their training in therapeutics as relatively more adequate also prescribe relatively less chloramphenicol, the correlation will be positive.

<sup>2</sup> Denotes correlations statistically significant at  $P < 0.01$ .

<sup>3</sup> Denotes correlations statistically significant at  $P < 0.05$ .



fully felt that detail men were unreliable sources of prescribing information concerning new drugs.

### Summary and Conclusions

With more than 22,000 drugs and drug products from which to choose, the practicing physician must master a body of knowledge concerning therapeutics that is both massive and disorganized. The public health problem that ensues has often been blamed on such factors as inadequate undergraduate and postgraduate medical curriculums, unsatisfactory sources of drug information, and lack of time and training necessary to evaluate the promotional activities of the pharmaceutical industry (28). The current study attempted to predict the prescribing behavior of primary care physicians in private practice by examining its relationship to conditions of practice, patients' characteristics, and physicians' training, experience, and attitudes about the prescribing of chloramphenicol.

Relative youth and recency of graduation from medical school and fewer years of practice but more postgraduate training were characteristics correlated with reluctance to prescribe chloramphenicol. That a physician can be in practice many years and overprescribe chloramphenicol (by general academic and FDA standards) can be attributed to both lack of continuing education in therapeutics, and to the difficulty of "learning therapeutics" from a single practice (which represents a small patient sample).

Less frequent prescribers of chloramphenicol had larger, more hurried practices. Although they employed a greater number of ancillary personnel, these physicians had relatively less time to give to each patient and felt that they did not have adequate time free from the worries of practice. Despite this situation, these physicians were inclined to write fewer prescriptions per visit, and order a smaller percentage of their prescriptions over the telephone. Finally, they were likely to be in group practices, and the size of their practices had tended to increase over the past 2 years.

The more frequent prescribers of chloramphenicol were often reluctant to seek consultation and usually were not consulted themselves. These factors are indicators of their relative localism and isolation and may also be seen as indirect measures of the more general ways in which they relate to available sources of information. Physicians who fail to consult may do so for a variety of psychological reasons, such as difficulty in

relating to other physicians and unwillingness to betray a lack of knowledge concerning some subjects. Failure to consult may also reflect a general reluctance to use the usual scientific sources of information in treating a patient.

The negative relationship between infrequent prescribing of chloramphenicol and use of retail pharmacists to learn about new drugs reflects the current prototype of the pharmacist as merely a counter of pills and typer of labels. It may be possible to develop additional areas of worthwhile activity for the pharmacist (29); for example, Kunin and Dierks (30) have sent pharmacy students into physicians' offices as detail men to inform physicians about certain drug uses or side effects and have demonstrated a subsequent change in prescribing behavior.

In terms of attitudes, the more cautious physicians are relatively more cosmopolitan and modern in their approach to medical care. They maintain a heightened concern for quality of care and for the psychosocial dimensions of treatment. The physicians who considered themselves well-trained (both generally and in therapeutics) also prescribed less chloramphenicol.

The relatively greater interest of physicians who less often prescribe chloramphenicol in contraindications and side effects is, however, dampened by their somewhat negative evaluations of sources available to give them this information. The less frequent prescriber also gives his patients more information about the medications he prescribes, is concerned about the cost of drugs, and sees generic drugs as appropriate alternatives to brand name counterparts.

Finally, the physician who prescribed chloramphenicol less frequently was generally dissatisfied with his community as a place to live and to practice medicine and was also unhappy about various behaviors of his patients. He was rather skeptical of the image and activities of the pharmaceutical industry and was especially wary of detail men as sources of prescribing information.

Various methods of influencing prescribing patterns have been tried, but few have been evaluated. For example, both the FDA and the British Commission on Safety of Drugs have sent specific informational mailings to physicians, warning of the danger of prescribing chloramphenicol for trivial infections, with subsequent transitory drops in volume of prescriptions for chloramphenicol. Findings from this investigation suggest the following additional mechanisms of intervention, including:

1. Providing continuing education concerning therapeutics.
2. Increasing the quantity and quality of clinical pharmacology training in medical school.
3. Directing efforts and interventions toward relatively older physicians.
4. Encouraging group practice.
5. Encouraging the seeking of medical consultations.
6. Providing concise and readable authoritative sources of drug information and revising the data frequently.
7. Encouraging (as part of medical training) greater concern for quality of care and for the psychodynamics of the patient-practitioner relationship, greater skepticism toward sources of drug information other than reports from medical institutions and journals, and more discussion of the therapeutic regimen with the patient.
8. Instituting a system of monitoring prescribing and periodic peer review of drug utilization.

#### REFERENCES

- (1) Brodie, D. C.: Drug utilization and drug utilization review and control. National Center for Health Services Research and Development. NCHS-RD-70-8. Rockville, Md., April 1970, p. 1; (a) p. 3; (b) p. 2; (c) p. 26. Processed.
- (2) Donabedian, A.: Promoting quality through evaluating the process of patient care. *Med Care* 6: 196-197 (1968).
- (3) Lasagna, L.: The diseases drugs cause. *Perspect Biol Med* 7: 457-470, summer 1964.
- (4) Moser, R. H., editor: Diseases of medical progress: A study of iatrogenic disease. Ed. 3. Charles C Thomas, Springfield, Ill., 1969.
- (5) Cluff, L. E.: Problems with drugs. *In* Proceedings, Conference on Continuing Education for Physicians in the Use of Drugs. Sponsors: Committee on Continuing Education, Drug Research Board, National Academy of Sciences-National Research Council; Food and Drug Administration; and Health Services and Mental Health Administration; Public Health Service, Washington, D.C., 1969, p. 9. Processed.
- (6) Seidl, L. G., Thornton, G. F., Smith, J. W., and Cluff, L. E.: Studies on the epidemiology of adverse drug reactions. III. Reactions in patients on a general medical service. *Bull Johns Hopkins Hosp* 119: 299-315, November 1966.
- (7) Smick, K. M., Condit, P., Proctor, R., and SUTcher, V.: Fatal aplastic anemia: An epidemiological study of its relationship to the drug chloramphenicol. *J Chronic Dis* 17: 899-914 (1964).
- (8) National Disease and Therapeutic Index: Drug reference file, July 1967-June 1968. Lea Associates, Inc., Ambler, Pa., 1968.
- (9) Wallerstein, R. O., et al.: Statewide study of chloramphenicol therapy and fatal aplastic anemia. *JAMA* 208: 2045-2050, June 16, 1969.
- (10) Best, W. R.: Chloramphenicol-associated blood dyscrasias: A review of cases submitted to the American Medical Association Registry. *JAMA* 201: 181-188 (1967).
- (11) Physician's desk reference to pharmaceutical specialties and biologicals. Litton Publications, Inc., Oradell, N.J., 1970, pp. 993-999.
- (12) Meade, T. W.: Prescribing of chloramphenicol in general practice. *Br Med J* No. 5541: 671-674, Mar. 18, 1967.
- (13) Lee, J. A.: Prescribing and other aspects of general practice in three towns. *Proc R Soc Med* 57: 1041-1047, November 1964.
- (14) Lee, J. A., Draper, P. A., and Weatherall, M.: Primary medical care: Prescribing in three English towns. *Milbank Mem Fund Q* 43: 285-290, April 1965, pt. 2.
- (15) Wilson, C. W., Banks, J. A., Mapes, R. E., and Korte, S. M.: The assessment of prescribing: A study in operational research. *In* Problems and progress in medical care; essays on current research, edited by G. McLachlan. Oxford University Press, London, 1964, pp. 173-201.
- (16) Wilson, C. W., Banks, J. A., Mapes, R. E., and Korte, S. M.: The influence of different sources of therapeutic information on prescribing by general practitioners. *Br Med J* No. 5357: 599-604, Sept. 7, 1963.
- (17) Joyce, C. R. B., Last, J. M., and Weatherall, M.: Personal factors as a cause of difference in prescribing by general practitioners. *Br J Prev Soc Med* 22: 170-177, July 1968.
- (18) Martin, J. P.: Social aspects of prescribing. Heine-mann, Ltd., London, 1957, pp. 73-84.
- (19) Great Britain, Ministry of Health: Recent National Health Service prescribing trends, mainly based on prescribing during 1961 and 1962. Reports on Public Health Medical Subjects No. 110. Her Majesty's Stationery Office, London, 1964.
- (20) Coleman, J. S., Katz, E., and Menzel, H.: Medical innovation: A diffusion study. Bobbs-Merrill Company, Inc., Indianapolis, 1966.
- (21) Darsky, B. J., Sinai, N., and Axelrod, S. J.: Comprehensive medical services under voluntary health insurance: A study of Windsor Medical Services. Harvard University Press, Cambridge, Mass., 1958.
- (22) McEvilla, J. D.: A computerized prescription recording system. *J Am Pharm Assoc* NS7: 636-638, December 1967.
- (23) Somers, A. R., and Somers, H. M.: Doctors, patients, and health insurance. Brookings Institution, Washington, D.C., 1961, pp. 122-123.
- (24) Rogers, E. M.: Diffusion of innovations. Free Press, New York, 1962.
- (25) U.S. Public Health Service: Promoting the group practice of medicine. Report of the National Conference on Group Practice. PHS Publication No. 1750. U.S. Government Printing Office, Washington, D.C., 1967.
- (26) Saward, E. W.: The relevance of prepaid group

- practices to the effective delivery of health services. Presented at the 18th Annual Group Health Institute, Sault Sainte Marie, Ontario, Canada, June 18, 1969, pp. 15-16.
- (27) Hawley, P. R.: Quality as well as quantity of medical care. *In* Proceedings, Group Health Institute of 1959. Group Health Association of America, Washington, D.C., 1959, pp. 115-121.
- (28) May, C. D.: Selling drugs by "educating" physicians. *J Med Educ* 36: 1-23, January 1961.
- (29) U.S. Public Health Service: Challenge to pharmacy in the 70's. PHS Publication No. 2146. U.S. Government Printing Office, Washington, D.C., 1971.
- (30) Kunin, C. M., and Dierks, J. S.: A physician-pharmacist voluntary program to improve prescription practices. *N Engl J Med* 280: 1442-1446 (1969).
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**BECKER, MARSHALL H. (School of Medicine, Johns Hopkins University), STOLLEY, PAUL D., LASAGNA, LOUIS, McEVILLA, JOSEPH D., and SLOANE, LOIS M.: *Characteristics and attitudes of physicians associated with the prescribing of chloramphenicol. HSMHA Health Reports, Vol. 86, November 1971, pp. 993-1003.***

Despite the clear relevance of drug therapy decisions to overall quality of medical care, little sociological research has been conducted relative to the prescribing behavior of physicians. This study examined associations between personal and professional characteristics of physicians and the extent to which they prescribed a controversial antibiotic (chloramphenicol).

Interviews and self-administered questionnaires were obtained from 37 of the 44 actively practicing primary care physicians in a county with approximately 112,000 persons. The number of prescriptions for chloramphenicol written by each physician was obtained from an

ongoing audit of pharmacies in the county.

Physicians who prescribed chloramphenicol relatively less frequently were younger, more recent graduates, with fewer years of practice. They gave higher ratings to the adequacy of their medical education, and had taken more postgraduate training; they maintained larger, more hurried practices with a greater number of ancillary staff, yet wrote fewer prescriptions per visit, and did less prescribing by telephone.

More frequent prescribers of chloramphenicol less often seek consultation concerning drug therapy and tend not to be con-

sulted themselves; they are also more willing to accept detail men and retail pharmacists as sources of information about drugs.

Finally, relative avoidance of prescribing chloramphenicol was associated with a more cosmopolitan and modern approach to medicine. These less frequent prescribers were more concerned with general level of quality, contraindications and side effects, and psychosocial aspects of care. They were also more critical of their communities, patients, and the image and activities of the pharmaceutical industry.

On the basis of these findings, possible approaches to affecting prescribing behavior are offered.