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AN EXAMINATION OF EXTERNAL SOURCES OF INFORMATION USED BY PRIMARY CARE PHYSICIANS IN THE SELECTION OF A REFERRAL SPECIALIST

by

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A DISSERTATION

Submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy in the
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ABSTRACT OF DISSERTATION
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Title An Examination of External Sources of Information Used by Primary Care Physicians in the Selection of a Referral Specialist

This study examined relationships between attributes ascribed to a source of information and the use of the source by primary care physicians in making decisions on patient referrals. A cost-benefit model was used in which the attributes of availability and ease of use were demarcated as costs of using the source while the attributes of informativeness, credibility and relevance were demarcated as benefits derived from the source.

Support was found for a basic assumption of the study that primary care physicians use external sources of information for selecting specialists for referrals. It was found that some sources are preferred over others, and that the most used sources were: a fellow physician, the specialist, the patient, and (to a lesser extent) hospital referral directories. The remaining sources in order of likely use were: the patient's health care payer, a hospital call referral service, a hospital representative, hospital sponsored material sent to the referring physician, and material sent by the specialist.

The attributes studied had a clear impact on the use of a source of information. It was found that decreasing the cost of using a source (e.g., increasing its availability and ease of use) increased use of the source. Further, increasing the benefits derived from using a source (e.g., increasing its credibility, informativeness and relevance) increased use of the source.

Results of the study indicate that benefit attributes were more closely related to source usage than were cost attributes. A finding with major implications for hospitals was the low use of hospital sponsored sources of information. Finally, the least used source of information was material sent to the referring physician by the specialist.

Abstract Approved by: Committee Chairman John E. Swan, DBA

Acting Program Director Gail W. McGee, Ph.D.

Date 6/9/92 Dean of Graduate School

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CHAPTER I

INTRODUCTION

Providing patients with the best possible medical care is a major concern of the American medical system. A major component of this process is providing this care with continuity (Cummins, Smith, & Inui 1980; Glenn, Hofmeister, Neikirk, & Wright, 1983). Continuity of care can be defined as the extent to which a patient receives medical care as part of a coordinated sequence of events consistent with the needs of the patient (adapted from Shortell & Vahovich, 1975). This sequence of events, which is determined by an interaction between the patient and the physician, includes the decision of the physician to treat the patient directly, admit the patient to a hospital, or refer the patient to another physician or provider of care. The focus of this study is the latter, namely, the referral of the patient by one physician to another physician.

Physicians do not practice in isolation; they frequently need help from colleagues in providing quality care for their patients, and in turn these colleagues may require help for their patients (Schaffer & Holloman, 1985). The importance of referrals was concisely stated by Shortell and Anderson (1971)

when they said

> It is admittedly no longer possible, in terms of either knowledge or costs, for a single physician to deliver a total medical product. The practice of specialized medicine evolves into an organizational process, and central to this process are the referral relations among individual medical practitioners. (p. 39)

Significance of Physician Referrals

Physician referrals are an important ingredient in providing optimal medical care, and are important to the survival and growth of physician practices and health care institutions. Further, these referrals have system wide implications, affecting patients, referring physicians, specialists, community hospitals, teaching hospitals, and third-party payers (Lee, Pappius & Goldman, 1983; Ludke & Levitz, 1983; McIlwain, 1987; Williams, White, Fleming, & Greenberg, 1961).

The decision to refer a patient is inevitably followed by other events--office visits to the specialist, hospitalization, medical and surgical procedures and even other referrals. Each of these consequential events has an economic impact on the patient and the larger medical system. To the patient it represents a cost; to the referring physician it represents a loss of present and future income; to the physician receiving the referral and the hospital it represents income; and to the third-party payer it represents an added cost for additional tests and more expensive diagnosis and treatment.

It is estimated that a single referral from a referring physician in a rural community to a specialist in a tertiary-care facility will yield, within a six month period, 3.45 outpatient visits to the specialist, .47 hospital admissions, 2.8 hospital inpatient days, .07 ambulatory surgeries and 1.28 inpatient procedures, producing a cumulative economic effect of $3,000 on the total medical system (Glenn, Lawler, & Hoerl, 1987). A recent nationwide survey of more than 800 hospitals found that the average hospital admission generated $5,392 in revenue. Admissions by primary care physicians generated $3,709 while admissions by specialists generated $6,129 in revenue (Koska, 1991). Finally, Gombeski, Carroll and Lester (1990) state that a physician-referred new patient to The Cleveland Clinic Foundation generated three times more revenue per year than a self-referred new patient and about twice the revenue of a previous patient.

Referrals have long been recognized as an important part of the primary care physician's treatment options. The rapid growth of knowledge and highly technical diagnostic and treatment procedures make referrals particularly important in current medical practice (Curry, Crandall, & Coggins, 1980). Thirty years ago Williams et al. (1961) stated that

> The rapid extension of knowledge and the accompanying, necessary growth of specialization must inevitably mean more frequent consultations between family physicians and specialists and greater use of referrals to medical centers, universities and others.... (p. 899)

A few years later, Bates and Torkelson (1967) stated that referring patients to consulting physicians or medical centers

is essential for optimal medical care, and that with increasing specialization and regionalization of services such referrals are likely to increase.

Increasing competition among physicians and hospitals, a more sophisticated consuming public, shorter hospital stays, and more active third party payers have resulted in the need for better understanding and management of the referral process. As a result, many physicians and hospitals are developing proactive programs designed to strengthen their referral base (Bender, Geoghean, Lundquist, Cantone, & Krasnick, 1990; Gombeski et al., 1990; Schneeweiss, Ellsbury, Hart, & Geyman, 1989). The importance physicians place on referrals is evidenced by the findings of a study conducted by National Research Corporation, a firm specializing in health care marketing research. When asked what kind of assistance they needed from hospitals, 28 percent of the 500 physicians surveyed indicated that they could use marketing support, which includes referral services (Jensen, 1987).

Statement of the Problem

Despite the recognized importance of the referral process, a recent review of the literature by Ludke and Levitz (1983) confirmed that little was actually known about the physician referral process, especially with regard to the decision of where (to whom) to refer a patient (Shortell & Anderson, 1971; Simendinger & Lekas, 1984; Williams et al., 1961).

An important part of this decision is the referring physician's knowledge of specific specialists to whom they can

refer a patient. In general, such knowledge is available to the referring physician through various external sources of information. However, as is the case with the overall referral process, little is known about the process of information source selection in the decision of whom to refer a patient (Curley, Connelly, & Rich, 1990).

The purpose of this study was to help close this gap by examining the relationship between attributes ascribed to an external source of information and the use of the source by referring physicians in making the decision of to whom to refer a patient. This was accomplished by applying a cost-benefit model proposed by Curley, Connelly, & Rich (1990) to information source use. The attributes ascribed to a source were used, among other things, to predict the use of an information source by referring physicians. The cost-benefit model used in this study is discussed in detail in the Theory of Physician Information Seeking and Decision Making section of Chapter II.

Research Questions

As will be discussed in detail in the review of the literature chapter, a basic premise of decision making theory is that a decision is preceded by an information search. This search can involve internal sources of information (memory) and external sources of information (sources other than memory). It is further assumed that information gathered during the search will be used in making the decision.

An assumption of this study is that, in some instances, referring physicians use external sources of information in

deciding to whom to refer a patient and that specific source of information can be identified (Gombeski et al., 1990; Rudisill, Painter, Rodenhauser, & Gillen, 1989). The principal motivation for the information search is the identification of a specialist to whom to refer a patient.

The major research question to be answered by this study was: How do costs versus benefits of external sources of information determine which source a referring physician will tend to use in deciding to whom to refer a patient?

From this question, several sub-questions were developed, each of which was addressed through a review of the relevant literature and answered by testing of the hypotheses. These sub-questions are:

1. Are there attributes that can be ascribed to external sources of information that will influence the use of the source by referring physicians?

2. If there are attributes which can be ascribed to sources of information, can these attributes be used to predict the use of a source by referring physicians?

3. What sources of information are used most by referring physicians to obtain information on specialist?

4. Can a cost-benefit model be used to predict the use of an information source by a referring physician in deciding to whom to refer a patient?

Hypotheses

The literature suggests a common theme with respect to a physician's decision of to whom to refer a patient. Specifically, given a lack of sufficient information in memory

(internal source) a referring physician may use external sources to obtain information to be used in the decision of to whom to refer a patient. If external sources are used, a source will tend to be selected based on the sources' perceived net benefit to the referring physician. This net benefit will result from a comparison of the costs and benefits attributed to the attributes ascribed to the source.

The study hypotheses are presented here for convenience. Each will be presented again as it is developed from the applicable theory and literature.

H_1: For each external source of information, use of the source increases as costs decrease and benefits increase.

H_2: Costs are more important in predicting the use of a source of information than are benefits.

H_3: Use across different types of information sources increases as costs decrease and benefits increase.

Intention Objects and Setting

The intention objects of this study are the external sources of information used by referring physicians in the decision of to whom to refer a patient. To measure the likelihood of a referring physician using a source of information, the questionnaire instructs the respondent to place themselves in the position of needing to make a referral but of not knowing a specialist to whom to refer the patient. The respondent was then asked to rate the likelihood of using the various sources, the priority in which the sources would

be used, and to rate each source on the five identified attributes.

A referring physician could find themselves in such a situation for any number of reasons, including: (1) the physician is new to the community and is not acquainted with the local specialists, (2) the medical problem is one for which the referring physician has not made a previous referral or the last such referral was some time ago, (3) the referring physician has little or no information about the specialist, or (4) for whatever reason the referring physician was dissatisfied with the last referral to the specialist and as a result is looking for a new specialist to refer patients.

Thus, the referring physician will be using an external source of information to identify and obtain information on a referral specialist. By posturing the situation in this context, it should be possible to capture the use of the various sources, as well as the importance of each source attribute, in selecting and using the source.

Definition of Terms

Implicit in the term "referral" is the fact that today's physician cannot be all things to all patients. In the past, a physician, depending on his skills, knowledge and isolation, may have been able, and in some cases required, to fill this all inclusive role. However, in today's complex medical setting and the availability of efficient communication and transportation, such a role is generally not necessary or advisable. In fact, referrals are major vehicles for

integrating and coordinating various links and levels in the medical care system (Bosanac, 1981; Saunders, 1978).

In understanding physician referrals, it is necessary to distinguish between two somewhat similar terms: consultation and referral. The term "consultation" usually denotes the practice whereby one physician seeks advice, an opinion or special studies from another physician on a particular situation while responsibility for the care of the patient, both during and after the consultation, remains with the first physician. "Referral" usually denotes the practice whereby one physician, either temporarily or permanently, transfers total or partial responsibility for the care of the patient to another physician. The second physician is used because of his particular expertise, knowledge or access to special equipment or facilities (Bosanac, 1981; Brock, 1977; Curry et al., 1980; Ludke, 1982; Morgan, Folse, & D'Elia, 1979; Penchansky & Fox, 1970; Saunders, 1978; Schaffer & Holloman, 1985; Shortell & Anderson, 1971). The two modes differ primarily in their duration and permanence. However, the underlying purpose of both is the pooling of medical knowledge for the patient's benefit (Schaffer & Holloman, 1985).

A referral usually involves two categories of physicians, a primary care physician and a specialist. Physicians generally considered primary care physicians include general practitioners, family practitioners, pediatricians, internists, and obstetricians/gynecologists (Glenn, 1989; Gombeski et al., 1990; Simendinger & Lekas, 1984). These physicians are often referred to as "gatekeepers" in that they

are major feeders into the health care system influencing both the amount and location of a patient's care (Glenn, 1989; Simendinger & Lekas, 1984). One key role of the primary care physician is to help guide patients through the complex health care system and to orchestrate the delivery system on their patient's behalf (Bosanac, 1981). The other physician in the process is the physician to whom the patient is referred (transferred) and is usually a specialist.

As will be discussed in detail in the review of the literature chapter, numerous factors have been identified as being important to referring physicians in their decision of to whom to refer a patient. In general, a factor can be input or output related, related to the referring physician or his practice, the specialist or his practice, or the patient. Further, these factors can be communicated to the referring physician through various information sources (Gombeski et al., 1990).

For the purpose of this study, the following terms will be defined and used as follows:

Referral: The transfer of the patient to another physician as opposed to simply seeking advice (consultation) from another physician.

Referring Physician: The physician making the referral, that is, the physician transferring care of the patient to another physician.

Specialist: The physician to whom the patient is transferred (referred) for care.

Information Source: A vehicle from which a referring physician could receive information used in the referral decision.

Factor: Information, either objective or subjective, about a specialist or his practice that a referring physician may consider in making the decision of whom to refer a patient.

Attribute: A characteristic or quality ascribed to an information source.

Significance and Contribution

The aim of this study was to present a theoretical, empirical, and managerial perspective on the external sources of information used by physicians in the decision of to whom to refer a patient. In particular, the study examined information source usage in light of a cost-benefit model where source attributes are used to predict usage of a source.

This study contributes to the health care, marketing, and information acquisition literature by specifically addressing the information needs and source usage of referring physicians. Knowledge of information acquisition strategies is vital because information search is an influential stage in the decision making process (Murray, 1991).

An understanding of the selection of a source of information used by a physician in making the decision of whom to refer a patient can have major implications for specialists and hospitals wanting to increase their referrals (Gombeski et al., 1990). The sources used influence the amount and type of information acquired because different sources likely provide different kinds of information (Lenz, 1984). Further,

different sources can guide the decision maker down different paths, and the source consulted at the beginning of the external search may be the major determinate of the ultimate decision (Engel, Blackwell, & Miniard, 1990; Peay & Peay, 1984). The assumption is that the most valued information will be collected first, followed by less valued information, and so on (Simonson, Huber, & Payne, 1988). Such an understanding allows for, among other things, the channeling of resources to those sources determined to be the most effective in influencing the referral decision.

A review of the literature on physician referrals reveals three significant findings. First, theory driven research on physician referrals is somewhat unique and much of what is currently known comes from clinical studies and interviews with practitioners (Schaffer & Holloman, 1985). Very few studies have their base in theory (McIlwain, 1987; Shortell, 1974; Shortell & Anderson, 1971). The lack of theory based research limits the ability for a critical review of the referral process and does not provide a base for answering specific questions, testing specific hypotheses, or suggesting further research.

Second, only a few of the many aspects of physician referrals have been studied in depth, and even fewer have been examined in the marketing literature. Ludke (1982) stated that "little is actually known about the referral process in terms of how it operates; the relationships between referring physicians...; the decision making process of each of the key

participants and the environmental context which influences the operation of the process" (p. 793).

Finally, as will be discussed in the review of the literature, the majority of the research on the external search for information by physician has focused on continuing medical education and clinical decisions. Few studies have examined information sources used in the referral decision.

This study addressed these issues by, first, setting out several hypotheses which were theory tested. Second, it examined an aspect of physician referrals that has received only limited attention, namely, the sources used by referring physicians to obtain information to be used in deciding to whom to refer a patient. Finally, attributes identified as being important to referring physicians in selecting an information source were examined as predictors of source usage.

In summary, questions related to the sources of information used by referring physicians in deciding to whom to refer a patient are of interest not only theoretically, but also in terms of designing improved marketing communication programs. As an example, a hospital wanting to help increase referrals to its associated specialists should direct its resources to those information sources most likely to be used by referring physicians. Further, those attributes identified as important in influencing use of a source should be incorporated in the development of an information source.

Delimitations

The scope of this study was limited to actual referrals where responsibility for a patient's care is transferred to another physician and did not address the issue of consultations. With respect to theory, the literature was restricted to information seeking and decision making. More specifically, the literature reviewed focused on external sources of information used in the decision making process. An external source of information is any source of information potentially available to the information seeker other than memory (internal source). This internal source was not part of this study due to the fact that memory provides information based on past experiences and previously gathered information. The focus of this study was on those sources (external) which are used whenever the internal source proves inadequate, a concept discussed in detail in Chapter II. The use of an external source represents a deliberate effort on part of the referring physician to obtain information needed to select a specialist to whom to refer the patient.

It is important to point out that in order to have an adequate understanding of physician referrals, the literature on the decision of whether or not to refer a patient is reviewed. However, this part of the referral process was not part of the actual study. For the purpose of the study, it was assumed that the referring physician had already made the decision to refer the patient. The focus of this study was on the second part of the referral decision, namely the question

of to whom the patient will be referred. That is, to which specialist will the referring physician transfer the patient for care?

CHAPTER II

REVIEW OF THE LITERATURE: RESEARCH AND THEORY

This chapter presents a review of the literature on physician referrals and the theory of information search and decision making. It begins by reviewing physician referrals, which will be divided into three distinct but interrelated parts: the referral process, referral rates, and referral patterns. It then proceeds to a review of the literature on the theory of information seeking and decision making. This section presents a general review of the theory, including its foundation and major concepts. The primary focus of this review is on external sources of information used in decision making by physicians. The chapter concludes by discussing the specific source attributes used in this study.

Physician Referrals

The Referral Process

Of the approximate 636 million annual office encounters between physicians and patients, the five specialties of general practice, family practice, internal medicine, pediatrics, and obstetrics/gynecology account for more than 60 percent of these encounters. These physicians are generally considered primary care physicians and are the primary source of referrals to specialists and hospitals (Glenn, 1989;

Gombeski et al., 1990; Simendinger & Lekas, 1984). Much of the information on the actual referral process comes from clinical studies and interviews with practitioners (Schaffer & Holloman, 1985). These studies depict the basic referral process as consisting of two parts: (1) the decision of the primary care physician to refer or not to refer the patient, and (2) if the decision is made to refer the patient, to whom should the patient be referred (Mackesy & Mulligan, 1990; Schaffer & Holloman, 1985; Shortell & Anderson, 1971).

When a patient makes a visit to a primary care physician three outcomes are possible: (1) the physician can treat the patient in the office, (2) admit the patient to the hospital under the physician's care, or (3) refer the patient to another physician, generally a specialist (Glenn, 1989). If the patient is referred, the specialist will then either (1) treat the patient in the office, or (2) admit the patient to the hospital under the specialist's care.

The decision to refer. In making the decision of whether to refer, a primary care physician has options other than outright referral (Morgan et al., 1979). These include consulting his personal library, consulting a medical/hospital library, consulting another physician in his own specialty and consulting another physician in other specialties. In their study of physicians in central and southern Illinois, Morgan et al. (1979) found that 97 percent of the physicians studied preferred to use other means of solving a difficult problem before referring to another physician.

It has been suggested that the referral process proceeds through a sequence of steps, each of which is important in the provision of good medical care. An early model of these steps was proposed by Williams et al. (1961) which, they suggested, would allow for a systematic evaluation of the performance of the process. These steps are described as follows (see also Cummins, et al., 1980):

1. Definition of need for and purpose of the referral There must be a mutual understanding between the physician and the patient.

2. Communication of the need and purpose of the referral and of the problem for which the referral is needed.

3. The attention given to the problem by the consultant.

4. Communication of the consultant's findings and recommendations to the referring physician.

5. Clear understanding by the patient, referring physician, and consultant of who will have responsibility for the patient's continuing care.

Curry et al. (1980) posit that four factors are involved in the referral process: (1) the primary care physician's awareness of the need for assistance, (2) the specialist's awareness of the problem and his ability to help, (3) adequate communication between the physicians about the nature of the problem and the degree to which each will assume responsibility for the patient's care, and (4) adequate communication with the patient.

Various studies have found that the initial decision of whether to refer is based on many factors, including the primary care physician's education, skills and past experience (Mackesy & Mulligan, 1990), personal clinical knowledge, skills, clinical judgement, prevailing local standards of medical practice, and sometimes by a request from the patient for a second medical opinion (Schaffer & Holloman, 1985).

Ludke (1982) states that the decision to refer may occur at any point during the care process: during diagnosis, after diagnosis but before treatment, or during treatment. Further, the reason for a referral may have its base in one or more of the following: diagnosis, confirmation of diagnosis, treatment, confirmation of treatment, the scope of the primary care physician's practice, diagnostic and treatment equipment and procedures available to the physician, time constraints, as well as nonclinical factors such as a request from the patient. In general, when a patient's illness is outside the scope of the physician's practice, the patient will be referred.

In an attempt to identify the factors that influence the referral process, Ludke (Ludke, 1982; Ludke & Levitz, 1983) interviewed 38 physicians in active practice in Wisconsin, the majority of whom were primary care physicians. The interviews were content analyzed to identify factors which influenced the physician's referral decision. Twelve factors were identified as being important in the decision of whether to refer a patient. These factors fell into three broad categories: (1)

technical/care related factors, (2) patient related factors, and (3) physician related factors.

Once these factors were identified, they were further analyzed by having 11 general surgeons and 14 general practitioners in active practice in Wisconsin rank order their relative importance in the decision of whether to refer. The most important factors in the decision were quality of patient management, patient results, and individualized patient management and care, all of which are technical/care related. The least important factors were physician related: referring physician's degree of belief referring is admitting failure, physician's loss of patient/family income, and attitude of physician's colleagues/local medical community towards referring.

Shortell and Anderson (1971) posit that the referral process is a function of several clusters of variables. Specifically:

R = f(P,M,C)

where:

R = the referral decision

P = vector of patient variables

M = vector of physician variables

C = vector of community variables

This model is inclusive in that it reflects the entire referral process, including both the decision of whether to refer and to whom to refer. Implicit in the vector of physician variables are those related to both the referring physician and the specialist. The authors state that these

variables vary in importance, and that the most important variables in the decision of whether to refer are the patient's illness (type and severity), the physician's skill, his training and equipment, his sources for referrals, and the patient preference.

To whom to refer. Once the decision to refer has been made, the physician must then decide to whom to refer. This part of the decision process may be more difficult and complex than the initial decision of whether to refer (Schaffer & Hollomon, 1985). Ludke and Levitz (1983) report that a review of the literature reveals that little is known about the referral process, especially with regard to the decision of where (to whom) to refer. Shortell and Anderson (1971) state that the decision of to whom to refer depends principally on whom the referring physician knows in the specialty, the referring physician's perception of the competence and other characteristics of these specialists, and his past experience in referring patients to these specialists. Schaffer and Holloman (1985) state that, traditionally, once the decision to refer is made, the referring physician selects a specialist from a close circle of colleagues with whom he is comfortable and is a respected peer. The referring physician and the specialist tend to share similar backgrounds, interest and perhaps education or postdoctoral training.

Studies have identified numerous factors which influence the referring physician's decision of to whom to refer a patient. A recapitulation of these factors is presented in

Table 1. Of these factors, several have consistently been identified as being important to the referral decision.

In one of his early studies on physician referrals, Ludke (Ludke & Levitz, 1983) developed a model to predict physician referrals. The model identified five factors that best predicted referral behavior: (1) degree patient's preferences are met, (2) reciprocations physician received, (3) communication physician receives, (4) previous use of and satisfaction with specialist by patient and their family, and (5) physician's personal knowledge of specialist.

In a subsequent study, Ludke (1982) (Ludke & Levitz, 1983) identified 15 factors which influence the decision of to whom to refer. These factors fell into the three major categories: technical/care related, patient related, and physician related. The 15 factors were subdivided into outcome and environmental factors. Outcome factors are those which result in direct outcomes to the referring physician and environmental factors are those which, from the referring physician's perspective, define the context in which the decision is made.

As with the decision of whether or not to refer, the most important factors in the decision of whom to refer were those related to the technical/care of the patient. The least important factors in the decision were: (1) physician's loss of patient/family income, (2) attitude of physician's colleague/local medical community towards consultant, (3) reciprocations physician receives, (4) cost to patient, and (5) respect/courtesy physician receives.

Table 1

Factors Influencing the Referral Decision

Specialist Skill Related

- High quality of treatment for the patient
- Proper match of the specialist's technical ability to the patient's problem
- Patient results
- Previous experience with the specialist
- Treatment plan involving the referring physician
- Academic credentials
- Board certification
- Reputation/ Status of the specialist
- Hospital affiliation
- Medical technology available to the specialist

Specialist Accessibility

- Good, detailed reports on a timely basis
- Patient can be seen promptly
- Patient will be returned to referring physician
- Location of specialist

Patient Related

- Patient satisfaction
- Patient/family preference for specialist
- Patient/family preference for hospital
- Patient's insurance, HMO or PPO coverage
- Cost to patient
- Previous use of and satisfaction with specialist or facility by patient/family

Facility Related

- Referring physician's perception of facilities' strengths and weaknesses
- Access to facility staff and management
- Knowledge of services facility provides
- Technology and range of services available
- Competent nursing

Specialist's Personal Factors

- Respectful to patient
- Questioning of referring physician's work-up or diagnosis
- Personal relationship with referring physician
- Re-referring patient without referring physicians' knowledge

Table 1 (Continued)

Other

Providing education to referring physician
Referrals to referring physician
Specialist's reputation and status in the local medical community
Referring physician's loss of income from referring the patient
Referring physician's attitude towards referrals in general
Over-extensive work-up of patient by specialist

Source: Bender et al., 1990; Brock, 1977; Glenn et al., 1983; Gombeski et al., 1990; Ludke, 1982; Ludke & Levitz, 1983; Mackesy & Mulligan, 1990; McIlwain, 1987; Rudisill et al., 1989.

Mackesy and Mulligan (1990) state that the decision of to whom to refer typically involves the following: (1) an awareness of various specialists, (2) an assessment of those specialists (skills, reputation, available technological resources, hospital affiliation, board certification, etc.), and (3) past referral experience, if any, with those specialists.

In an effort to investigate the expectations of referring physicians for the continuing care of patients, Glenn et al. (1983) analyzed 497 referrals over a three year period--1977 to 1979. Referrals were made by residents in a family medicine training program at a satellite clinic operated by the Department of Family and Community Medicine of the University of Missouri-Columbia. Resident physicians had the option of referring to several specialists in both private and university based practices. Results showed that the majority of the referrals were for the management of the referred problem only, that is, the referring physician intended to remain the patient's primary care physician. Factors identified as being important in the decision of whom to refer included the consultant's reputation, ability to see the referred patient promptly, and willingness to provide a timely report to the referring physician.

In his study of outcome factors that referring physicians expect from a referral, McIlwain (1987) examined thirteen factors he identified from the literature as being potentially important. Of these, four were found to be significant. The four were: (1) high quality of treatment for the patient,

(2) good, detailed reports on a timely basis, (3) treatment of the patient at the proper monetary cost, and (4) the proper match of a specialist's technical ability to the patient's problem. Education about new treatment methods was also found important, but to a lesser extent.

In their study of the primary care physician-psychotherapist referral system, Rudisill et al (1987) examined, among other things, factors that determine to which psychotherapist a primary care physician referred patients. The most important factor was the psychotherapist's ability, followed, in rank order, by availability, appreciation for persons as a whole, interpersonal skills, and experience. Several other factors, were identified as being less important.

Finally, based on research at The Cleveland Clinic Foundation, Gombeski et al. (1990) found three major categories of information used by physicians to refer a patient to another physician or a health care facility: physician skill related factors (e.g., medical skill of physician), physician accessibility (e.g., patient can be seen quickly), and patient related factors (e.g., patient preference).

This literature answers the question "What factors have been identified as being important to referring physicians in deciding to whom to refer a patient?" This review reveals that there are identifiable factors that are important to the decision. While many such factors have been identified, some appear to be more important than others. Finally, the

literature indicates that an awareness of these factors by the referring physician with respect to a specialist tends to affect the likelihood of the physician referring patients to the specialist.

Referral Rate

The referral rate of primary care physicians has been a major focus of much of the literature on the referral process. Studies have shown that primary care physicians refer from 0.6 percent to 8.8 percent of their patients' visits (Cummins et al., 1980; Ludke, 1982; Ruane, 1979). As early as 1955, it was reported that 5.7 percent of patients seen over a one year period in a general practice located in rural North Carolina were referred to a consultant or a medical center (Williams et al., 1961).

Table 2 presents a summary of the referral rates found in several studies discussed below. It is significant to note that these studies were conducted during the 1970s. It is possible that changes which have occurred since that time, such as DRGs, prospective payment, increased competition among physicians, increases in managed care, and alternative delivery systems, may have affected referral rates. Current studies would be of value in updating our knowledge in this area.

In their study of 83 general practitioners in North Carolina, Williams et al. (1961) found that these physicians referred approximately 2.5 percent of their patient visits. The results of this study are somewhat limited in that the

Table 2

Average Referral Rates in Selected Studies

Study	Date of actual study	Sample size	Referral rate as %
Taubenhaus (1955)	*	N/A	5.7
Williams (1961)	*	N/A	2.5
Shortell (1971)	Summary data	N/A	2.0
Metcalfe (1973)	1971	4,604	2.2
Geyman (1976)	1974	6,409	1.6
Brock (1977)	1975	8,616	4.4
Moscovice (1979)	1978	N/A	2.4
Morgan (1979)	*	3,733	2.3
Raune (1979)	*	7,220	1.5
Cummins (1980)	1974-75	4,367	5.3
Mayer (1982)	1978	12,228	3.8
Glenn (1983)	1977-79	30,131	1.6

*Actual date for data collection was not given.

N/A: Sample size not given.

participating physicians only reported their referrals for a two week period and data on the total number of patient visits was not available.

Shortell and Anderson (1971) report that based on summary data from studies in the United States and Britain, of every 250 individuals who consult a physician, five, or 2.0 percent, will be referred to another physician. Metcalfe and Sischy (1973) studied the referrals of four family physicians practicing in Rochester, New York. Based on logs kept by these physicians for a two month period during 1971, it was determined that the four physicians had a combined referral rate of 2.2 percent of their patients.

After a review of the literature, Geyman, Brown, and Rivers (1976) cite a 1971 study of 7,514 patient office visits to general and family practitioners. That study showed a 2.7 percent referral rate to another physician for consultation, diagnosis or treatment. In their study, Geyman et al. examined referrals of eight family practices in northern California during two 30 day periods in 1974. Of the 6,409 hospital and office visits during the two periods, 1.6 percent of the patients were referred to another physician. They suggest that, when compared to the 2.2 percent referral rate found by Metcalfe and Sischy (1973) in Rochester, New York, referral rates may differ between family practices located in the eastern and western parts of the country. They caution that if a longer time period were covered, referral rates might be higher or lower.

Brock (1977) studied the referrals of 31 physicians and residents of the University of Western Ontario (Canada) Department of Family Medicine and eight physicians in private practice over a four week period in 1975. Of the 8,616 office visits during the period, 4.4 percent resulted in referrals to a medical or surgical specialist with another 1.0 percent to other community resources.

As part of a larger three-year study examining the impact of several innovations in the organization and delivery of medical care in Washington State, Moscovice, Schwartz, and Shortell (1979) examined the referral rates and patterns of family physicians. While the study included only four physicians, it is somewhat unique in that the four comprised the total population of family physicians in the rural area under consideration. It was found that during a three-month period, April through June 1978, the four physicians combined referred 2.4 percent of all office visits, a rate comparable, they say, with those previously reported.

As part of a major manpower study, researchers at Southern Illinois University School of Medicine studied family physicians and surgeons (Morgan et al., 1979). A stratified sample of 34 general or family physicians and surgeons practicing in central and southern Illinois was used for the major study. However, not all 34 physicians were involved in all aspects of the study. The portion of the study focusing on referral rates used 16 general or family physicians and 12 surgeons. It was found that general and family physicians referred 2.5 percent of their patients while general surgeons

referred 1.8 percent, producing a combined rate for the group of 2.3 percent.

In 1979, Ruane stated that in the three quantitative studies on referrals he could identify in the literature for the preceding 20 years, referrals ranged from 0.6 to 3.8 percent of all office visits. In an effort to extend the base of knowledge, one purpose of Ruane's study was to define the rate of consultation and referral. The study was conducted over a period of approximately seven months at a freestanding family practice unit of a university based family practice residency program. Of the 7,220 office visits to the practice during the study period, 1.5 percent resulted in a referral.

In an effort to investigate the frequency with which consulting physicians supply follow-up information to referring physicians, Cummins et al. (1980) conducted a study of their own practice located in a rural county in a southeastern state. As part of the overall study, the referral rate for all patients was measured. Their practice was located within 50 miles of two university medical centers, each surrounded by numerous specialists in private practice. Referrals were measured over a six month period during 1974 and 1975, and were made to either university affiliated emergency rooms, university specialty clinics, or private practice specialists. During the six months of the study, 233 of the 4,367 patient visits resulted in a referral, reflecting a referral rate of 5.3 percent.

Mayer (1982) examined referrals over a one-year period in a single practice location providing both fee-for-service and

prepaid (HMO) medical care to a similar population. The practice was a satellite clinic of a large multispecialty group practice and was staffed by three full-time family physicians, a half-time pediatrician, and a quarter-time obstetrician-gynecologist. A total of 12,228 patient visits were made during the year, 47.7 percent by fee-for-service patients and 52.3 percent by HMO patients, resulting in 471 referrals. The overall referral rate was 3.85 percent; consisting of 3.19 percent for fee-for-service patients and 4.46 percent for HMO patients. Mayer offered no conclusive explanation for the difference in the fee-for-service and HMO referral rates, (which he determined to be significant at the 0.01 level by t test) or why the HMO rate was higher than the average reported referral rate across the country.

In 1977, a three-year study was initiated at a family practice residency training site associated with the Department of Family and Community Medicine at the University of Missouri-Columbia (Glenn et al., 1983). Referrals could be made to specialists in either private or university-based practice. During the 36-month period, 30,131 patient visits were made, of which 497, or 1.65 percent, resulted in a referral. The authors suggest that this slightly lower referral rate may be due, at least in part, to the fact that the study was conducted at a residency training site rather than a private practice. The resident physicians may have been less willing to transfer care of their patients, preferring to maintain patient management themselves in an effort to further their own educational goals.

Referral Pattern

In addition to considering the referral process and referral rates, it is also important to examine referral patterns. As used here, referral pattern refers to the type of specialist the referring physician is most likely to refer a patient. This is a broader concept than the decision of to whom to refer. Referral pattern deals with the question of what specialty a primary care physician is most likely to turn for help in managing his patients' care.

This concept takes on primary importance when it is considered from the prospective of the specialist. The question of interest is "are some specialties and subspecialties more dependent on referrals than are others?" If the answer is yes, and if these specialties can be identified, this will have clear implications for those considering entering a specialty, physicians already practicing the specialty, as well as hospitals recruiting specialists.

Using a previously suggested classification system, Shortell and Vahovich (1975) investigated referrals among different specialties. According to this classification, physicians can be arranged on a continuum from client-dependent to colleague-dependent based on the way they attract patients. Client-dependent physicians are primary care physicians, such as family or general practitioners, and internists who depend heavily on patient self-referral. Colleague-dependent physicians are those who depend heavily on primary care physicians for patients.

Shortell and Vahovich (1975) emphasize that this classification should be viewed as a continuum in that the terms client and colleague-dependent represent extremes. They use as examples the general practitioner in solo practice in an isolated rural area as the closest to the client-dependent type and a hospital-based radiologist or pathologist as the closest to the colleague-dependent type.

Table 3 presents a summary of the results of several studies which attempted to identify the specialty to which patients were referred. Each of these studies are briefly discussed below.

In his examination of the source of specialists' patients, Glenn (1989) found that based on data collected during a major study conducted in the mid-1970s, referral dependency ranged from 2% for general practitioners to 86% for neurosurgeons and medical oncologists.

In their study of the referrals of four family physicians over a three month period during 1971, Metcalfe and Sischy (1973) found that the five specialties of general surgery, obstetrics/gynecology, orthopedics, otolaryngology, and urology accounted for 64% of referral destinations.

In a similar study of eight family practices in central and northern California over a 30-day period, Geyman et al. (1976) found similar results. In their study, the five specialties of general surgery, orthopedics, obstetrics/gynecology, ophthalmology, and urology accounted for 67% of referral destinations. In the study by Brock (1977) previously discussed, she found that the five

Table 3

Specialty to Which Patients Were Referred

Referral destination	Study and % of referral to specialty A	B	C	D	E	F	G
General surgery	25.5	20.6	13	21.5	19.2	15.7	19.0
Orthopedics	9.8	15.9	--	13.7	21.1	9.7	14.4
OB/GYN	10.8	11.9	18	----	4.9	9.9	10.6
Otolaryn-gology	9.8	11.1	8	12.7	10.5	13.3	10.5
Ophthalmology	----	----	13	8.8	----	----	7.2
Urology	7.8	7.9	--	----	4.9	----	5.9
Internal medicine	----	----	11	----	----	----	1.4
Dermatology	----	----	--	6.8	----	9.9	4.2
Neurology	----	----	--	----	7.4	----	5.4
Total	64%	67%	63%	64%	68%	58%	79%

A =Metcalf and Sischy (1973)
B =Geyman et al. (1976)
C =Brock (1977)
D =Ruane (1979)
E =Moscovice et al. (1979)
F =Mayer (1982)
G =Glenn (1989): Reflects the unweighted average of seven studies totaling 1,367 referred patients.

NOTE: Except for E (Moscovice et al.) the five specialties receiving the greatest number of referrals are shown. In the Moscovice et al. study, two specialties (OB/GYN and urology) received the same number of referrals.

specialties of obstetrics/gynecology, general surgery, ophthalmology, internal medicine, and otolaryngology received 63% of all referrals.

In Ruane's (1979) study of 102 referrals from a university based freestanding family practice unit, it was found that the five specialties of general surgery, orthopedic surgery, otolaryngology, ophthalmology, and dermatology accounted for 64% of referral destinations.

During a three month study in 1978, Moscovice et al. (1979) studied the referrals of four family physicians in Washington State. Of the 161 referrals made during the three months, the six specialties of orthopedics, surgery, otolaryngology, neurology, obstetrics, and urology received 68% of all referrals.

Mayer (1982) studied the referral rate of a family practice clinic serving both fee-for-service and HMO patients. During 1978, a total of 471 referrals were made to specialists. While there were some differences in the referral destination of the two patient groups, overall they were fairly consistent. The five specialties receiving the most referrals from the combined groups were general surgery, otolaryngology, orthopedics, obstetrics/gynecology, and dermatology. These specialties accounted for approximately 58% of all referrals.

Glenn (1989) identified seven studies dealing with the specialty destination of physicians' referrals. An interesting comment by Glenn is that while it would be useful to know the referral rate of every specialty to every other

specialty, such data does not exist. The only comprehensive data available focuses on family practitioners, and this is largely due to the need to design curricula for this new specialty. These seven studies identified 12 specialties which accounted for 87% of the 1,367 referrals in the combined studies. The five specialties of general surgery, orthopedics, obstetrics/gynecology, otolaryngology, and ophthalmology accounted for about 62% of all specialty destinations.

An equally important question that should be asked is "who makes referrals?" That is, are some specialties more likely to make referrals than others? Again, if there are and they can be identified, there would be implications for all involved. For example, physicians in more colleague-dependent specialties would want to build strong referral networks with those physicians most likely to refer patients. Table 4 summarizes the findings of the two studies on sources of referrals discussed below.

In a 12-month study of 1,188 patients referred to a gastroenterologist in North Carolina, 95% of the patients were referred by four specialties: internists (62.2%), general surgeons (16.0%), general practitioners (10.3%), and pediatricians (2.7%) (Manning, Long, & Tyor, 1980).

In an effort to determine his source of patients, Bohan (1981) analyzed the source of the first 1,000 patients to his newly established consultative rheumatology practice located in southern California. The data showed that 71% of the patients were referred by other physicians, with the remainder

Table 4

Source of Referred Patients

Referring physician specialty	Manning		Bohan	
	%	Sample size	%	Sample size
Internal medicine	66.2		26.5	
General surgeons	16.0		N/A	
General practitioners	10.3		22.4	
Pediatricians	2.7		N/A	
Orthopedic surgeons	N/A		9.5	
Total	95.2%	1,188	58.4%	1,000

Source: Bohan, 1981; Manning, Long, & Tyor, 1980.

N/A = Not Applicable.

being referred from sources, such as the Arthritis Foundation and friends. The three specialties of internists (26.5%), general practitioners (22.4%), and orthopedic surgeons (9.5%), accounted for 58% of all patients. An interesting finding is that 17% of new patients were either self-referred or referred by a friend or relative of the patient.

Theory of Physician Information Seeking and Decision Making

Theoretical Base

The theoretical base for this study comes from three bodies of literature: health care, marketing, and information seeking. The majority of the currently available information on the decision of whom to refer a patient comes from the health care literature. While this material is the most directly applicable to the immediate topic, there is utility in considering ancillary disciplines.

One such area comes from the marketing literature, specifically that dealing with consumer behavior. Although this body of literature deals primarily with consumer purchases, it is believed that it is generalizable to and can provide useful insight into the physician referral decision, especially with respect to information seeking. The consumer behavior literature may be generalizable because it is grounded in basic psychological processes and models of individual behavior. This combination is not new and has been utilized in prior research on information seeking and decision making in health care (Lenz, 1984).

The other area of contribution is the literature on information seeking. As will be seen from the literature review, this area has been used extensively in the study of information seeking by physicians.

The Referral Decision

Once the decision to refer a patient has been made, the physician must then proceed to the second part of the referral process, namely the decision of to whom to refer the patient (Schaffer & Holloman, 1985). As stated previously, despite its recognized importance, little is known about the actual referral process, especially with regard to the decision of where to refer the patient (Ludke & Levitz, 1983; Shortell & Anderson, 1971; Simendinger & Lekas, 1984; Williams et al., 1961).

This, like other decisions, presupposes that certain information is available to, or will be acquired by, the decision maker prior to making the decision (Gombeski et al., 1990; Moore & Lehmann, 1980; Punj & Staelin, 1983; Schwartz & Griffin, 1986; Simonson et al., 1988). Such information is generally situation specific, that is, it is within the framework of the decision to be made, gathered for a specific purpose, or to satisfy an immediate need (Connelly, Rich, Curley & Kelly, 1990). Consider the following examples. Punj and Staelin (1983) stated that consumers seek information in order to make better, more satisfying purchase decisions. An individual diagnosed as having cancer will likely focus their search for information on the nature of the disease, the

comparative advantages of different treatments, and specific coping strategies (Johnson & Meischke, 1991).

Physicians typically seek information for clinical problem solving and patient-care decisions (Connelly et al., 1990; Curley et al., 1990; Deber, Barnsley, & Blidner, 1982; Gruppen, 1990; Gruppen, Wolf, Van Voorhees, & Stross, 1988; Northup, Moore-West, Skipper, & Teaf, 1983; Peay & Peay, 1984). In the case of a physician referral, the decision to be made, and thus the information needed, involves an awareness of various specialists, an assessment of those specialists, including their skills, reputation, availability, hospital affiliation, available technological resources, board certification, and so forth, and any past referral experience with the specialist (Mackesy & Mulligan, 1990).

A Physician Decision Making Model

Most decision making models depict the decision process as proceeding through a series of stages, beginning, for example, with need recognition and continuing through a post-decision evaluation (Beach & Mitchell, 1978; Engel et al., 1990).

While each stage is subject to evaluation and study, the present research is limited to the search for information on potential need satisfiers. More specifically, the focus is on the active search for information from external sources where the information will be used in a referral decision as distinct from gathering information to be stored in memory to be recalled later when needed.

Information Search

The importance of information search has long been recognized as being part of the overall decision making process and is basic to most decision making models (Beatty & Smith, 1987; Lenz, 1984; Midgley, 1983; Newman & Staelin, 1971; Schwartz & Griffin, 1986). In general terms, a search is undertaken to obtain information on various options available and to enable the decision maker to reduce uncertainty and thus make better, more satisfying decisions (Lenz, 1984; Osiobe, 1985; Punj & Staelin, 1983; Schwartz & Griffin, 1986).

Information search can be conceptualized as being a subpart of the physician's overall decision process. Further, information search precedes the actual decision of to whom to refer a patient. Information is available from various sources, and the selection from among these sources is a recurring decision for practicing physicians (Curley et al., 1990; Gombeski et al., 1990).

As a result of the varied nature of their tasks, physicians require various forms of information (Osiobe, 1985). Search can be viewed as the acquisition of this needed information, and should be considered at its most general level. The search for information by physicians involves the use of various information resources, including both formal and informal sources (Osiobe). Further, the information can be patient specific or generalizable beyond the patient under investigation (Curley et al., 1990). Information can be acquired by actively seeking it during the decision making

process (active search) or by being confronted with it while engaged in some other activity (passive receipt) (Bettman, 1978; Lenz, 1984). It has been suggested that active search is related to the specific decision and is influenced by involvement in the decision, while passive search is independent of the specific decision and is influenced by involvement with the object of the decision (Beatty & Smith, 1987).

One of the major difficulties in information seeking research is the lack of a consistent definition of what behavior constitutes information seeking (Kiel & Layton, 1981). Krikelas (1983) defines information seeking as any activity undertaken to identify a message that satisfies a perceived need. Beatty and Smith (1987) define external information search as the degree of attention, perception, and effort directed toward obtaining environmental data or information related to the specific decision under consideration.

Connelly et al. (1990) define information seeking behavior as "any activity undertaken to obtain information that satisfies a perceived need" (p. 354). Finally, Engel et al. (1990) define information search as "the motivated activation of knowledge stored in memory or acquisition of information from the environment" (p. 494). This definition indicates that the search can be either internal or external in nature. Internal search involves the retrieval of knowledge or information from memory, whereas external search is the acquisition of information from external sources, that

is, a source other than memory (Engel et al., 1990; Krikelas, 1983). Further, internal and external searches are not mutually exclusive and are often sequential. An internal search is usually performed initially and is followed by an external search if there is insufficient information in memory to make a decision (Bettman, 1978; Moore & Lehmann, 1980).

Internal Search

It has been hypothesized that when faced with a decision, an individual will, in general, engage first in an internal search, examining memory for available information (Bettman, 1978; Murray, 1991). Further, various degrees of internal search are possible. It can range from an almost automatic response in a habitual choice to an extensive search of memory. The degree of internal search is generally determined by three factors: (1) the amount of information in memory, (2) the suitability of that information to the current decision, and (3) the level of decision conflict (Bettman, 1978).

Often the internal search is not exhaustive but rather conducted to determine what is not known, thus providing a guide for an external search (Bettman, 1978). One could hypothesize that the more information available from an internal search, the less the need for an external search. In fact, if the internal search provides sufficient information to make a satisfactory decision, an external search may not be undertaken at all (Lenz, 1984).

External Search

If, for whatever reason, the internal search proves inadequate, the decision maker may decide to gather additional information from an external source. For example, Engel, Warshaw, and Kinnear (1991) suggest that an internal search will prove inadequate when:

1. The decision maker has little or no previous experience to draw on.

2. Previous choices have resulted in dissatisfaction.

3. A lengthy time period has passed since the last decision.

4. The benefits offered by available alternatives have changed.

5. The decision maker has little confidence in their ability to make the right choice in a given situation.

The process by which a physician decides whether and where to seek additional (external) information is conceived as a special instance in the general decision procedure (Curley et al., 1990), and this area has proven to be a fertile area of research in health care (Connelly et al., 1990; Curley et al., 1990; DaRosa, Mast, Dawson-Saunders, Mazur, Ramsey, & Folse, 1983; Gruppen, 1990; Gruppen et al., 1988; Lockyer, Parboosingh, McDouglas, & Church, 1985; Northup et al., 1983; Peay & Peay, 1984; Stross, 1987).

An external search for information is goal directed and situation specific. That is, information deemed to be most relevant to the current decision will be sought (Bettman, 1978; Connelly et al., 1990). Information gathered during an

external search will likely be placed in memory for retrieval during a future internal search. Physicians regularly gather and store information to be recalled when the need arises (Connelly et al., 1990; Curley et al., 1990).

Numerous attempts have been made to identify the salient dimensions of external search. According to Beatty and Smith (1987), measures of external search can be classified into four general dimensions:

1. Information sources used.
2. Type of information sought.
3. Alternatives considered.
4. Time spent in the search.

Engel et al. (1990) suggest three dimensions of search behavior: degree, direction, and sequence. Degree represents the total amount of search, which they suggest is directly related to the type of decision making process. Direction represents the specific content of search. Marketers are interested in the specific factors considered during search and those factors deemed important should be emphasized in promotional activities, unless, of course, they are weaknesses. Finally, sequence represents the order of search activities. In general, individuals access the most preferred source first, then secondary sources if the problem remains unsolved. There is evidence to suggest that the first source consulted by a physician in an external search may be the most influential in the final decision (Gruppen, 1990; Lockyer et al., 1985).

In summary, external information search represents a motivated and conscious decision by the decision maker to seek new information from the environment (Moore & Lehman, 1980; Murray, 1991).

Information Sources

The question posed here is: What external sources of information are used by physicians in their search for information in deciding to whom to refer a patient? Integral to this question is the issue of factors and attributes that influence the use of an information source. Factors identified as being important were discussed previously (see Table 1), and source attributes will be discussed later.

An understanding of the sources of information used by physicians in making the decision of whom to refer a patient will have major implications for specialists and hospitals wanting to increase their referrals (Gombeski et al., 1990). The sources used by a referring physician will influence the amount and type of information acquired, as different sources likely provide different kinds of information (Lenz, 1984). Such an understanding allows for the channeling of resources to those sources determined to be the most effective in influencing the referral decision.

Much of what we know about the sources of information used by physicians comes from studies dealing with patient specific situations such as diagnosis, clinical decision making, and patient care (Connelly et al., 1990; Curley et al., 1990; DaRosa et al., 1983; Gruppen, Wolf, & Stross, 1990; Gruppen et al., 1988; Northup et al., 1983; Osiobe, 1985;

Weinberg, Ullman, Richards, & Cooper, 1981), or from more general areas such as continuing medical education (CME) and the adoption of new drugs (Gruppen, 1990; Peay & Peay, 1984; Stinson & Mueller, 1980; Stross, 1987). Only two studies dealing specifically with the sources of information used by physicians in the decision of whom to refer a patient have been identified (Gombeski et al., 1990; Rudisill et al., 1989).

In general, information can be classified in terms of its source (personal versus impersonal), type (commercial versus noncommercial) (Engel et al., 1990), or whether it is formal or informal (Gruppen, 1990). In addition, whether the decision relates to a professional decision (e.g., diagnosis or treatment) or a purchase decision, the decision maker generally has a choice of information sources, and studies have shown that individuals display wide differences in the sources they use (Bettman, 1978; Connelly et al., 1990; Gerstberger & Allen, 1968; Gombeski et al, 1990, Gruppen, 1990; Osiobe, 1985; Peay & Peay, 1984, Stross, 1987). It has been demonstrated that physicians access and use multiple sources of information in arriving at a decision (Gombeski et al., 1990; Gruppen, 1990; Lockyer et al., 1985; Manning & Denson, 1980; Osiobe, 1985; Peay & Peay, 1984; Stross, 1987). Further, physicians place different importance on various sources depending on the type of information desired (Gruppen, 1990; Lenz, 1984). Finally, the source of information directly influences the acceptance and interpretation of the information (Assael, 1987).

A large body of health care literature deals with the sources of information used by physicians in making day-to-day patient related decisions. Information seeking is a critical part of the physician's ability to keep abreast of current medical knowledge and for proper patient treatment (Northrup et al., 1983). As stated previously, the source used in the acquisition of information will impact the acceptance and interpretation of the information (Assael, 1987).

Studies have used various subject areas to examine sources of information used by physicians. For example, Peay and Peay (1984) studied the information sources used in the adaption of new drugs, and Lockyer and colleagues (1985) examined family physicians' perceptions of the sources of information in the adoption of an innovation. In 1984, Gruppen, Wolf, Voorhees, and Stross (1987) asked physicians attending a CME course to respond to, among others, the following question: "When faced with a difficult medical problem for which you are uncertain of the answer, which of the following information sources would you use first?" Ferguson and Caplan (1987) studied both informal (self-study) and formal (CME) sources of information used by physicians. And, in the only such study identified, DaRosa et al. (1983) studied the information seeking skills of medical students. Curley et al. (1990) investigated the knowledge seeking behavior of physicians involved in clinical problem solving, and Connelly et al. (1990) studied the use, value, and costs of various information sources used by family physicians in their clinical practice.

These studies identified numerous sources of information used in clinical and patient treatment decisions by physicians. The major sources are presented in Table 5.

Two studies have been identified which deal specifically with the sources of information used in the decision of whom to refer a patient. In their study of family physician referrals for psychotherapy, Rudisill et al. (1989) found the most important source used in selecting a psychotherapist was personal knowledge of or acquaintance with the therapist. Other important sources were (in rank order) opinions of other physicians, recommendations of other therapists, and patient recommendations. It is interesting to note that registers, listing, and advertisements were not considered important sources of information.

A recent study by Gombeski et al. (1990) focussed directly on information sources used by physicians in the referral decision. Testing their previously developed model, these authors found that physicians referring to The Cleveland Clinic Foundation for the first-time used four basic sources of information: influentials (peers, patients, and payers), mass media (e.g., TV, radio, newspapers, magazines), special media (e.g., brochures and direct mail), and interpersonal media (e.g., personal contact with the specialist). Table 6 shows the sources of information used by physicians in their decision to refer to the Foundation.

A significant finding of this study was the importance of patients as a source of information. The authors suggest that

Table 5

Sources Of Information Used by Physicians in Clinical and Patient Treatment Decisions

Formal continuing education courses

Formal consultation with a specialist

Informal consultation with a colleague

Medical journals

Pharmaceutical representative (detailman)

Professional meetings

Text or reference books

Audiovisual programs

Mass media

Computerized data bases

Patients

Physicians Desk References

Source: Connelly et al., 1990; Curley et al., 1990; Ferguson & Caplan, 1987; Gruppen, 1990; Gruppen et al., 1990; Gruppen et al., 1987; Gruppen et al., 1988; Lockyer et al., 1985; Murray, 1981; Northup et al., 1983; Rudisill et al., 1989; Stross, 1987.

Table 6

Sources of Information Used by Referring Physicians in Deciding to Refer to the Cleveland Clinic Foundation

Source	Number	Percent
Patient	44	49.5
Interpersonal media	28	31.5
Peers	12	13.5
Mass media	2	2.2
Special media	2	2.2
Payer	1	1.1
Total respondents	89	100

Source: Gombeski et al. 1990.

this may be due, at least in part, to the Foundation's high brand name awareness in its market area. Accordingly, patients may not be a significant source in other settings. The next most important source, both in terms of influence and of sources mentioned, was interpersonal media (e.g., personal contact with the specialist). This media was cited as the primary reason for referring to the Foundation by 31.5% of the physicians. This stresses the importance of specialists communicating and developing relationships with referring physicians.

The study also showed that physicians obtain information from several sources. Approximately 23% of the physicians used two sources and all sources were noted at least once as having been the most influential. The finding of multiple source usage is consistent with other studies of information source usage by physicians (Gombeski et al., 1990; Gruppen, 1990; Lockyer et al., 1985; Manning & Denson, 1980; Osiobe, 1985; Peay & Peay, 1984; Stross, 1987).

Table 7 presents the major sources of information potentially available to a referring physician in making the decision of whom to refer a patient.

Information Source Attributes

Having identified potential sources of information available to physicians in deciding to whom to refer a patient, a more specific question is: "Why do physicians select certain sources of information over others?" A simple and rather general answer suggested by Krikelas (1983) is that people select a source that is convenient (easy to access) and

Table 7

Sources of Information Potentially Available to Referring Physicians in Making the Decision to Whom to Refer

Source	Description
Personal contact with specialist	Attended medical school/residency with specialist; met at CME, medical seminar/symposium, social event, medical society meeting; talked with specialist by phone.
Patient	Request or information from patient or patient's family.
Peers	Partners in practice, physician friends, other physicians in the community.
Hospital	Hospital sponsored material including directory of physicians, facilities, services, etc. of hospital; brochures, newsletters or direct mail to referring physician or patients.
Physician liaison	Hospital salesperson making personal calls and visits to referring physicians.
Professional publications	Medical journals or books.
Mass media	TV, radio, newspaper, magazines.
Payer	Patient's employer, insurance carrier, HMO or PPO.
Non-personal contact with specialist	Newsletters, brochures or other direct mail from specialist.

Source: Gombeski et al., 1990; Rudisill et al., 1987.

that is perceived to contain pertinent information. Further, the choice may not always be the best source and a weighing for judgment seems to take place. Osiobe (1985) states that studies on the use of information sources by, among others, health care professionals have shown that accessibility, ease of use, and technical quality are important predictors of a source's use. He concluded that health care professionals show distinct preferences for specific sources depending on the task at hand. As an example, for patient care management the preferred source is a medical journal, and for research scientific/technical journals are preferred.

According to Gruppen et al. (1987), information-seeking strategies can be conceptualized as the underlying priorities physicians place on the attributes of information sources. As used in this study, an attribute is defined as a characteristic or quality ascribed from using a particular source. Benefits would include the value of the information obtained, quicker decisions, satisfaction with the decision reached, or psychological to an information source. Attributes are, at least as perceived by the individual physician, specific to the source (Curley et al., 1990) and can be used to distinguish one source from another. Further, an attribute can be conceptualized as reflecting either a cost or benefit of using the source. This concept will be developed more fully in a subsequent section, but at this point it is useful to define cost and benefits as used in this study.

Costs in the context of information search is a rather complex concept with several dimensions--economic,

psychological, and physical (Gerstberger & Allen, 1968). Costs of using a source are frequently specific to the user and unique to the source (Curley et al., 1990). Costs would include direct monetary expenses, time, energy, delay in making the decision, physical effort, frustration, and other psychological costs that the information seeker resists expending in order to use the source (Bettman, 1978; Christensen-Szalanski, 1978; Connelly et al., 1990; Curley et al., 1990; Smith, Mitchell, & Beach, 1982). In general, costs are incurred before information can be obtained from the source (Christensen-Szalanski, 1978).

Benefits, like costs, may be specific to the user and source. A benefit can be considered as the utility derived from using a particular source. Benefits would include the value of the information obtained, quicker decisions, satisfaction with the decision reached, or psychological benefits such as a feeling one did a thorough job (Bettman, 1978; Christensen-Szalanski, 1978; Curley et al., 1990). Benefits occur during and after source usage.

The importance of source attributes in the physician decision making process is well documented. For example, in their study of clinical information-searching, Northup et al. (1983) found that physicians based their selection of an information source on attributes of the source. Attributes deemed to be important are instrumental in determining the source's ability to effectively and efficiently provide the needed information and appear to directly affect the tendency of a physician to select one source over another.

Attributes identified as being important to physicians in their use of a source include availability of the source, ease of use, educational value, informativeness, relevance and accuracy (Gruppen et al., 1987), convenience of access, physician proximity, familiarity with the source, currency, comprehensiveness, and authoritativeness (Northup et al., 1983).

The cost-benefit model to be used in this study will now be developed. Following this, the specific source attributes to be used in the model will be discussed. The specific study hypotheses will be presented as each is developed from the literature and theory.

Cost-Benefit Model for Source Selection

Information seeking and selection among information sources is a recurring decision for practicing physicians (Curley et al., 1990). Source selection can be conceptualized as involving costs and benefits to the physician, with a given source having both costs and benefits associated with its use. The concept of a cost-benefit base to information seeking is not new and is drawn from economic theory (Stigler, 1961). The basic premise is that a person will seek information as long as the benefits derived from the information outweighs the costs of acquiring the information (Moore & Lehmann, 1980).

The decision of whether and where to seek information can be viewed as a balancing between the costs of obtaining the information and the potential benefits to be derived from the information. This process represents a compromise between

two conflicting goals--obtaining information that will reduce uncertainty and a resistance to expenditures of time, effort, or money needed to obtain the information.

According to Mooer's law (Culnan, 1985) an information source will tend not to be used whenever it is more painful (costly) and troublesome for the individual to have the information than it is not to have it. Culnan summarizes this concept by stating that an individual's information search behavior is a function of the availability of the information, the ability to use the information based on effort, and the usefulness of the information.

A source selection model using costs and benefits to predict information source usage by physicians has been developed by Curley and colleagues (Connelly et al., 1990; Curley et al., 1990). Their model is based on a more general strategy selection model developed by Beach and Mitchell (1978); (Christensen-Szalanski, 1978). The Beach and Mitchell model posits that the process of selecting a strategy from among a repertoire of strategies is viewed as a cost-benefit analysis in which the decision maker selects a strategy expected to provide the maximum net benefit. Beach and Mitchell summarize by stating that strategy selection is contingent upon a cost-benefit compromise between the decision maker's desire to make a correct decision and the negative feelings about investing time and effort in the decision making process. Empirical support for the Beach and Mitchell model has been consistent (Christensen-Szalanski, 1978; Curley et al., 1990; Smith et al., 1982).

According to the model suggested by Curley and colleagues (1990), the expected value of an information source results from a tradeoff between the perceived benefits of obtaining information from the source and the perceived costs of obtaining the information. Costs and benefits of a particular source are reflected through the attributes ascribed to the source, where a given attribute is postulated to reflect either a cost or a benefit of using the source.

The global representation of the selection of a source is the comparison of costs and benefits. If the perceived costs of using a source are greater than the perceived benefits of the source, the source will tend not to be used. If more than one source is perceived as having greater benefits than costs, the source with the greatest net benefit (benefits minus costs) will tend to be used. If all sources are perceived as having greater costs than perceived benefits, no information will tend to be sought (Connell et al., 1990; Curley et al., 1990). It has been found that, in general, as the cost of information increases, less information will be sought and acquired (Bettman, 1978; Murray, 1991).

From their study of information source usage by engineers, Gerstberger & Allen (1968) concluded that engineers act in a manner intended not to maximize gain, but rather to minimize cost in terms of effort, either physical or psychological, which must be expended in order to access the source. This behavior, they suggest, appears to follow a "law of least effort" where individuals, when choosing among

several paths to a goal, will base their decision upon the single criterion of "'least average rate of probable work'."

In his study of information source usage for services, Murray (1991) suggests that information search activities can be analyzed in terms of costs and benefits. Due largely to the nature of services, accessing information sources may not be feasible or accomplished without considerable effort (cost).

Curley and associates (Connelly et al., 1990; Curley et al., 1990) used the cost-benefit model to structure a set of attributes that influence the selection of clinical information sources used by physicians. As applied in this context, it is not assumed that physicians actually calculate and combine numbers associated with these costs and benefits in evaluating a source. Rather, physicians are presumed to evaluate a potential source as if they were weighing costs and benefits (Curley et al., 1990).

Curley and others (Connelly et al., 1990; Curley et al., 1990) studied two independent groups of physicians. One objective of their study was to answer two primary questions: "How does a physician decide whether, and where, to seek additional information?" and "What knowledge resources are used by different physicians, and why?" To answer these questions the authors identified several attributes (they called these factors) which they postulated influenced the costs and/or benefits of a source and thereby influence source selection. The authors caution that while it is useful to demarcate source attributes as either cost or benefit based on

their presumed primary influence, some characteristics span the boundary between costs and benefits.

Four attributes believed to reflect costs (availability, searchability, understandability, and applicability) and two believed to reflect benefits (extensiveness and credibility) were used by Curley and others (Connelly et al., 1990; Curley et al., 1990) in their analysis. The mean frequences of reported use and ratings for each source and source attribute were calculated. Rank correlations and regression analysis were performed probing the attributes' relationships with reported use.

The analysis revealed two findings of note. First, individually the four cost attributes were positively associated with reported frequency of use, while neither of the two benefit attributes were related to reported use. Second, the final regression model, in which source attributes were regressed against use, included only the cost attributes of availability and applicability, and neither of the benefit attributes.

The authors conclude by noting the impact of cost attributes and not of benefit attributes, a finding which, they state, is similar to that observed in nonmedical professional settings. One suggested explanation for this finding is that there is potentially a greater certainty about the costs of gaining information compared with a greater uncertainty about the benefits.

From the review of the literature, it can be concluded that source attributes can be demarcated as either a cost or

benefit. In this context, a cost can be defined as that which the information seeker resists expending in order to use the source. Costs are incurred before information can be obtained from the source. A benefit can be defined as the utility derived from using the source and occurs during and after source usage. Further, the evidence indicates that costs are more significant in determining the use of a source than are benefits.

The significance of costs in the decision to use a source is postulated to exist based on the premise that individuals are more certain about the costs of using a source as compared to the potential benefits to be derived from its use. Further, individuals tend to place great emphasis on avoiding expenditures necessary to use the source.

From this the following hypotheses are presented:

H_1: For each external source of information, use of the source increases as costs decrease and benefits increase.

H_2: Costs are more important in predicting the use of a source of information than are benefits.

The specific attributes used in this study will now be discussed.

Source Attributes

Accessibility (Availability)

Accessibility refers to the ready physical availability of the source to the potential user (Curley et al., 1990). For a source to be used, the information seeker must first find the source and have it in hand and ready to use. This

source attribute has often been the focus of source use studies (Culnan, 1985).

Inaccessibility of a source acts as a constraint. If a source that would have otherwise been considered is physically unavailable, the source will be eliminated from the set of possible sources regardless of its benefits (Curley et al., 1990). Curley et al. conclude that not all sources are equally available and that physical availability is an important attribute of an information source. In their study, Northup et al. (1983) found that when asked the reason for their first choice of an information source, 51 percent of the responding physicians said they made their choice based on physical proximity of the source.

Accessibility can be conceptualized as inconvenience (Murray, 1991). Inconvenience can be represented by the time or effort needed to reach the source before information can be obtained from it (Curley et al., 1990; Culnan, 1985).

While a number of sources may provide the needed information, the perceived accessibility of a particular information source will influence an individual's selection of the source over alternative sources (Culnan, 1985). Accessibility is basic not only to the use of the source, but also to the frequency with which it is used (Gerstberger & Allen, 1968; Krikelas, 1983).

The importance of accessibility in source selection has been demonstrated in a number of settings and with various occupational groups. In their classic study of the selection of an information channel (source) by engineers, Gerstberger

and Allen (1968) examined the relative costs associated with the use of various sources. Costs were measured in terms of the source's accessibility and ease of use. Their finding was that accessibility was the dominant criterion upon which source selection was based.

An interesting conclusion drawn by Gerstberger and Allen (1968) was that in the selection of an information source, engineers act in a manner intended not to maximize gain, but rather to minimize cost in terms of effort, either physical or psychological, which must be expended in order to access the source. This behavior, they suggest, appears to follow a "law of least effort" where individuals, when choosing among several paths to a goal, will base their decision upon the single criterion of "'least average rate of probable work'."

In his study of information-seeking in the context of librarianship, Krikelas (1983) states that one source is chosen over another based on the perceived convenience (ease of access) of the source.

Applying the attribute of accessibility to health care professionals is not new and has been a measure of source usage in several studies. As early as 1955, it was demonstrated that physicians often learned about innovations in drugs not from the most qualified sources such as medical journals, but from accessible sources such as drug salesmen (O'Reilly, 1982).

In his review of the literature, Osiobe (1985) concluded that accessibility and ease of use were important predictors of a health professional's choice of an information source.

In fact, Osiobe reported that sources are used in proportion to their accessibility and ease of use. In their study of the information needs of dentists, Strother, Lancaster and Gardner (1986) found the most common reason for use of a source was convenience.

In their study of information needs of physicians, Northup et al. (1983) found that convenience of access was a basis of the physician's first choice of a source of information. Connelly et al. (1990) concluded from their study of family physician's use, value, and cost of information sources that costs related to accessibility appear to be much more influential in the decision to use a source than are other source characteristics.

Finally, O'Reilly (1982) concluded that accessibility, not quality, of the source is frequently the critical factor in determining its use. When questioned, the decision maker may be able to identify the source which provides the best information. However in practice, a less quality, more accessible source may be used more frequently.

From the review of the literature, accessibility can be defined as the ready availability of the source when needed and requiring a minimal expenditure of time on part of the user to reach the source. Accessibility is considered a cost of using a source and has been determined to be a dominant attribute in determining a source's use. Finally, the evidence indicates that the greater the accessibility of a source, the greater the likelihood of the source being used.

The positive relationship between accessibility and use of the source is postulated to exist based on the premise that information seeking represents a compromise between two conflicting goals--obtaining the information and a resistance to the expenditure of time needed to obtain the information. A source will tend to be used if it is less painful (costly) to have the information than it is not to have the information (Culnan, 1985). Thus, the more available a source, the more likely the source will be used.

Ease of Use

Ease of use refers to the ease with which information can be found in or obtained from a source once the source is in hand (Curley et al., 1990). Accordingly, ease of use comes into consideration only after the attribute of accessibility (availability) has been satisfied.

Ease of use is a somewhat difficult construct to conceptualize in that it is closely related to the attribute of accessibility. In fact, these two attributes may share common measures and it is not always clear whether the author is referring to accessing the source or obtaining information from the source. (See for example Salasin & Cedar, 1985). However, according to Culnan (1985) physical access to the source and access to the actual information in the source are independent dimensions.

In their study of information seeking, Northup et al. (1983) found many of the physicians they interviewed based their choice of an information source on the ease of its use. Gruppen and colleagues (1987) found that both availability and

ease of use were important to family physicians and internists in their choice of a source of information.

As stated previously, Osiobe (1985) concluded that accessibility and ease of use were important predictors of a health care professional's choice of an information source. Further, sources are used in proportion to their accessibility and ease of use. From their study of individuals working in rural medical health services, Salasin and Cedar (1985) concluded that an individual's preference for a specific information source is more likely to correspond to their estimate of the ease of using the source than to their estimate of the amount of information expected from the source. Finally, from his study of employers of scientific organizations, Rosenberg (1967) concluded that ease of use was a significant determinant of a source's use.

In addition to being easy to obtain from the source, the information must also be easy to understand (Gruppen et al., 1990). Information sources differ in the organization and clarity of their information. Difficulty in understanding the information contained in the source places heavy time and energy costs on the physician and decreases the likelihood of the source being used (Curley et al., 1990).

From the review of the literature, ease of use can be defined as the ease with which information can be found in or obtained from a source once the source is in hand (i.e., has been accessed). Ease of use is considered a cost of using a source and has been found to be important in determining a source's use. Finally, the evidence indicates that the

greater the ease of use of a source the greater the likelihood of the source being used.

The positive relationship between ease of use and use of the source is postulated to exist based largely on the same premise as the positive relationship between accessibility and use. That is, once the source has been accessed, the user will balance the benefits of obtaining the information and a resistance to expending time and effort needed to obtain the information from the source. The less time and effort required to obtain information from a source, the greater the likelihood of using the source (Culnan, 1985).

Informativeness

This attribute refers to the breadth, extensiveness, and quality of the information contained in, or provided by, the source. In general, the more information a source contains the more the physician can benefit from the source, and thus the greater the likelihood of its use (Connelly et al., 1990; Curley et al., 1990; Lenz, 1984).

The information sought by a physician can relate to any number of issues, including disease processes, diagnoses and treatment (Gruppen, 1990), adoption of an innovation (Lockyer et al., 1985), treatment and patient management (Gruppen et al., 1988; Gruppen et al., 1990), for continuing medical education (Stross, 1987), about new drugs (Peay & Peay, 1984), or for information on whom to refer a patient (Gombeski, 1990; Rudisill et al., 1989).

It is noteworthy that while specific information may be critical to the decision to be made, studies have found this

to be a less important criterion in source selection than other attributes. For example, Salasin and Cedar (1985) conclude from their study of rural mental health services employees that an individual's preference for a specific information source is more likely to correspond to their estimate of the ease of using the source than to their estimate of the amount of information expected from the source.

In his study of professional personnel employed by scientific organizations, Rosenberg (1967) concluded that preference for a given source reflects the estimated ease of use of the source rather than the amount of information expected from the source.

A review of studies on the use of information sources by scientists, technologists and health professionals lead Osiobe (1985) to conclude that information sources are used in proportion to accessibility and ease of use but ideas (information) are accepted from sources in proportion to their technical quality. Finally, Connelly et al. (1990) concluded from their study of the use, value, and costs ascribed to information sources by physicians that factors related to accessibility and applicability appeared to be much more influential in the decision to use a source than are characteristics of the source's information quality.

From the review of the literature, informativeness can be defined as a source providing a breadth of information on factors important to the decision maker in making a specific decision. Informativeness is considered a "benefit" of using

a source. While there is evidence, suggestions that, in general, informativeness may be of less importance in determining a source's use than are other attributes, it is never the less hypothesized here that the greater the informativeness of a source the greater the likelihood of the source being used in the decision of whom to refer a patient.

The positive relationship between informativeness and use of the source is postulated to exist based on the premise that decision makers want a breadth of information important to the decision to be made. As applied in the present research, studies have identified numerous factors which influence the referring physician's decision of to whom to refer a patient. A factor can be defined broadly as any information about a specialist or his practice that a referring physician may consider in making the decision of whom to refer a physician. Studies have consistently found certain factors to be important in the decision of to whom to refer a patient and that referring physicians frequently use multiple factors in making the decision. Table 1 shows factors identified as influencing the decision of to whom to refer a patient.

Credibility

A long-standing principle of persuasion is that a credible source will facilitate persuasion (Engel et al., 1990). Further, the perceived credibility of a source will affects its selection and use, as well as the acceptance of the information it provides (Assael, 1987). Studies of source credibility have shown that individuals often choose

information because of the trustworthiness of the source rather than its expertise (O'Reilly, 1982).

It is well established that a consumer's use of an information source is related to confidence in the source (Murray, 1991). Though virtually any source can provide some degree of utility to the decision maker, particular types of sources are known to be sought for specific utilities (Murray, 1991).

Credibility is associated with believability, trustworthiness, and confidence in the source. These factors are frequently influenced by the sponsor of the source (Assael, 1987). Credibility is derived from the source's cognitive authority, defined as that influence on one's thoughts that is recognized as proper (Curley et al., 1990). For example, Strother et al. (1986) concluded from their study of the information needs of dentists that the reliability (credibility) of a source was an important determinate of the source's use.

From the review of the literature, credibility can be defined as believability, trustworthiness, or confidence in the source. Credibility is considered a benefit of using a source and will tend to influence a source's usage. Further, the evidence indicates that the greater the credibility of a source the greater the likelihood of the source being used. The positive relationship between credibility and use of the source is postulated to exist based on the premise that individuals tend to use sources in which they believe and find trustworthy.

Relevance

An information source is considered relevant if one or more of its domains of information has a close and logical relationship to the decision under consideration (Curley et al., 1990). The domain of information is situation specific, that is, while a source might contain a vast amount of information, only a portion of the information may be relevant to the decision at hand (Connelly et al., 1990).

The importance of relevance is shown in recent research on management information systems usage (Culnan, 1985). The basic conclusion drawn from the study was that a system that does not meet the user's need for timely, accurate, and relevant information is unlikely to be used. In their study of information source usage by cardiovascular nurses, Corcoran-Perry and Graves (1990) found that a frequently encountered problem was too much information that was in the wrong place. Krikelas (1983) concluded from his study of information seeking behavior that individuals select a source that is perceived to contain pertinent information.

In studying medical libraries as a source of information, Gruppen (1990) found that primary care physicians often avoided libraries due largely to the lack of relevant and easy to access information. Rather, these physicians sought out other physicians because they could provide timely and relevant information, thus enabling the primary care physician to obtain the needed information without having to search out and synthesize a mass of information from the various sources.

According to O'Reilly (1982), in an ideal situation a decision maker would select a source perceived to offer the highest quality information. Quality would typically be reflected in information that is, among other things, relevant or specific to the problem being addressed. Northup et al. (1983) found that the physicians in their study sought factual, subject-specific information.

From the review of the literature, relevance can be defined as a source providing information pertinent to the problem or question being addressed without containing an excess of unrelated information which must be sifted through before that which is needed can be found. Relevance differs from the attributes of ease of use and informativeness in that relevance limits the information provided by the source to the specific issue at hand. As an example, while a medical textbook may contain information important to a physician in making a specific clinical decision (informativeness) and information in the book (source) may be easy to find (easy to use), it likely contains much irrelevant information which must be sifted through before that which is needed can be found.

Relevance is considered a benefit of using a source and has been found to influence the use of a source. Finally, the evidence indicates that the greater the relevance of a source the greater the likelihood of the source being used.

The positive relationship between relevance of a source and use of the source is based on the premise that when an individual needs an answer to a specific question (e.g., to

who to refer a patient) searching through a large volume of information carries with it the high cost of managing a great deal of information that is irrelevant to the problem at hand (Gruppen, 1990) thus reducing the likelihood of the source being used.

In summary, the ideal source of information would be one that is readily available, easy to use and understand, credible and provides a wide range of information relevant to the decision to be made (Gruppen et al., 1987). However, information sources vary widely on these attributes and choices must be made. In fact, the selected source may not always be the best source, and an apparent weighing for judgement takes place (Krikelas, 1983). Peay and Peay (1984) concluded from their study of the adoption of new drugs that what a physician thinks of a source may not be reflected in the extent to which the source is used. For example, drug company detailmen were not evaluated very highly, yet they were the most frequent single source for first information.

From the above review of source attributes, the following hypothesis is presented.

H_3: Use across different types of information sources increases as costs decrease and benefits increase.

CHAPTER III

RESEARCH DESIGN

The model on which this study was based is a cost-benefit model developed by Curley and colleagues (Connelly et al., 1990; Curley et al., 1990). Their model is based on a more general strategy selection model developed by Beach and Mitchell (1978) and refined by Christensen-Szalanaski (1978). The Curley model was developed and used to predict information source usage by physicians based on costs and benefits attributed to attributes of an information source. Both the Beach and the Curley models were discussed in detail in the previous chapter.

As applied to the present study, the Curley et al. (1990) model was used to predict the likely use of external information sources by referring physicians in making the decision of to whom to refer a patient. Specifically, the model uses source attributes as predictor variables where each attribute is a priori designated as either a cost or benefit of using a particular source.

Operationalization

Operationalization of the model begins with the external sources of information potentially available to referring physicians in making the decision of to whom to refer a

patient. The sources of information potentially available to referring physicians are shown in Table 7. These sources were derived from a review of the relevant health care literature (Gombeski et al., 1990; Rudisill et al., 1989) and discussion with health care specialists.

Source attributes were defined as a characteristic or quality ascribed to an information source and are designated as reflecting either a cost or benefit of using a particular source. This cost-benefit demarcation is based on the attribute's presumed primary influence and is consistent with that used by Curley et al. (1990).

As used in this study, costs are that which the information seeker resists expending in order to use the source. Costs are incurred before information can be obtained from the source. Benefits are the utility derived from using the source and occur during and after using the source. The source attributes, their definition, and their cost-benefit designation are shown in Table 8.

For consistency, the definitions in Table 8 are in affirmative terms, that is, in terms of the presence of the attribute. As an example, the greater the availability (a cost) of a source, the less the cost of using the source; and, the greater the informativeness (a benefit) of a source, the greater the benefits derived from using the source. Thus, in this study, costs decrease and benefits increase as the amount of the attribute increases.

Table 8

SOURCE ATTRIBUTES

Attribute	Definition	Cost-benefit designation
Accessibility (availability)	Ready availability of the source when needed and requiring a minimal expenditure of time on part of the user to reach the source.	Cost
Ease of use	Ease with which information can be found in or obtained from a source once the source is in hand (accessed).	Cost
Informativeness	Providing a breadth of information on factors important to the decision maker in making a specific decision.	Benefit
Credibility	Believability, trustworthiness, or confidence in the source.	Benefit
Relevance	Providing information pertinent to the problem or question being addressed without containing an excess of unrelated information which must be sifted through before that which is needed can be found.	Benefit

Research Population and Response Rate

The study population consists of primary care physicians who are members of the Medical Association of the State of Alabama. Primary care physicians are defined as physicians who specialize in general practice, family practice, internal medicine, pediatrics, or obstetrics/gynecology. The definition of, and focus on, this group of physicians is consistent with previous studies on physicians who make referrals (Glenn, 1989; Gombeski et al., 1990; McIlwain, 1987; Simendinger & Lekas, 1984).

A list of member physicians was obtained from the Association. Membership in the Association is open to physicians licensed to practice in Alabama and the Association estimates that approximately 75% of the State's physicians are members. Because of an anticipated low response rate, the entire population was surveyed rather than using a sample. This was done to help ensure a sufficient response for statistical analysis and for the results to be generalizable. This procedure is consistent with that used by McIlwain (1987).

The list consisted of 2,880 usable names, that is, those with the physician's full name and complete mailing address. There were 144 questionnaires returned for reasons such as the physician being retired, in a nursing home, deceased or otherwise unable to complete the questionnaire. Thus, the final population for the study was 2,736. The initial mailing produced 469 usable responses with the second mailing

producing an additional 337. Thus, there were a total of 806 usable responses for a final response rate of 29.50%.

Questionnaire Design and Mailing Procedures

Due to the specific subject matter of this study no complete instrument was identified. Accordingly, it was necessary to develop a questionnaire to measure the constructs under investigation. The questionnaire was based on the following: (1) the literature dealing with decision making, specifically the external search for information, (2) the health care literature dealing with physician referrals, information sources, referral factors, and source attributes, (3) discussions with experts, including hospital marketing personnel, physicians, and marketing and health care academicians, and (4) existing instruments. The final questionnaire followed that used by McIlwain (1987) in his study of physician referrals, the format and wording used by Curley and associates (Connelly et al., 1990; Curley et al., 1990) in their study of information sources used by physicians, and of O'Reilly (1982) in his study of information sources used by county welfare agency employees.

In addition to the above, development of the questionnaire included the following. The initial version of the instrument was pretested with a group of twelve primary care physicians at a large not for profit hospital. Results of that test, including comments from the respondents, were incorporated in a second version of the instrument.

The second version of the instrument was reviewed by a different group of primary care physicians at the hospital.

In addition, the instrument was reviewed by the Director of Marketing at the hospital, a marketing professor with considerable experience in health care marketing and physician referrals, a professor of sociology (Ph.D.) for coding ability, and the director of the Masters program in Allied Health Sciences at the University of Alabama at Birmingham. Results from this step was incorporated in a third version.

The third version was reviewed by the Director of Marketing at the hospital, the above mentioned director of the M.A. Ed. program, the chair of the researcher's committee, and a third group of primary care physicians. Comments on the third version were incorporated in the final version of the instrument.

The questionnaire instructed the respondent to place themselves in a position of needing to make a referral but not knowing a specialist to whom to refer the patient. Based on this frame of reference, the first question asks the respondent "how likely would it be that you would use each of the sources listed below to obtain information on a specialist to whom you could refer a patient?" Each of nine sources are rated on a seven point Likert-scale. The scale is anchored at very unlikely (1), very likely (7), and not applicable. Thus, the higher the score, the more likely the source would be used.

The second question asked the respondent to "...rank the sources from 1 to 9 in the priority in which you would use each source to obtain information on a specialist." One would

be the first source used and 9 the last. Thus, the lower the rank the higher the priority of use.

The third set of questions (questions C - G) asked the respondent to rate the potential sources of information on the five source attributes of availability, ease of use, informativeness, credibility, and relevance (see Table 8). For each of these questions the respondent was given a brief description of the attribute and was again instructed to imagine themselves in the previously described situation. A seven point Likert-scale was used where the higher the rating, the more of the attribute the source possessed. This format is consistent with that used by Curley and colleagues (Connelly et al., 1990; Curley et al., 1990). It was believed that by posturing the questions in this context both the self-reported use of a source and the amount of each attribute the source possessed would be captured.

A final question asked the respondent to indicate how important each of the attributes are in their use of a source from which to obtain information on a specialist. Again a seven point Likert-scale was used where the higher the score the more important the attribute.

The last section asked for descriptive information on the respondent and their practice. Included were questions on years in practice, type of office practice, and primary area of practice. A copy of the self-administered questionnaire is in Appendix A.

The questionnaire was mailed to the entire subject population. To help ensure an adequate response rate, several

steps were taken. First, a cover letter accompanied the questionnaire. Each envelope and letter was personally addressed to the recipient. The letter was on the letterhead of the Southern Medical Association and was over the signature of the Association's Executive Vice-President. Each letter was hand-signed.

To help induce the interest of the respondent, the letter stressed the benefits of the study to the respondent, why their response was important, how the information would be used, and ensured the confidentiality of their response. An offer was made to share the results of the study with the respondent. A self-addressed postage paid envelope was provided.

A follow-up mailing was made four weeks after the initial mailing. Each questionnaire in the initial mailing was numbered and a follow-up questionnaire was mailed only to those who had not responded at the time of the follow-up mailing. As with the initial mailing, each questionnaire package contained a hand-signed follow-up cover letter and a self-addressed postage paid return envelope. In addition, each follow-up package contained a questionnaire in the event the original had been lost or misplaced.

These procedures are consistent with those suggested by Dillman (1978). Copies of both cover letters are included in Appendix B.

Reliability and Bias

Consistent with the procedure suggested by Churchill (1979), reliability of the instrument was assessed by

calculating alpha coefficients. According to Nunnally (1967), an alpha of .50 or greater suggests acceptable reliability. Cronbach's alphas were calculated for each measure and these values are shown in Table 9. All alphas are .50 and above which, according to Nunnally, is suggestive of reliability. This finding is important in that it increases confidence in the results of the study. As will be discussed more fully in the next chapter, while there may be some nonresponse bias, it does not appear to be a major factor in the primary survey results.

Delimitations

Acknowledging the inherent limitations of a mail questionnaire, including a traditionally low response rate from physicians (Maheux, Legault, & Lambert, 1989), it was nevertheless believed that this approach was appropriate for the present study. By taking the steps outlined above, a response rate of approximately 20% was anticipated, a rate consistent with similar studies and one considered acceptable for a physician survey (Gruppen et al., 1990; McIlwain, 1987).

Another limitation of the study is the possibility nonresponse bias. Again, the procedures outlined above were used to help increase the response rate and thus reduce the possibility of nonresponse bias.

An additional limitation is that this is not a study of the actual information source selection decision but a study of the referring physician's stated intention or stated belief with respect to the particular source. The use of surrogate

Table 9

Cronbach's Alphas

INFORMATION source	USE index[1]	COST index[2]	BENEFIT index[3]
Patient	.82	.80	.85
Physician	.76	.80	.83
Directory	.61	.76	.85
Other material	.50	.73	.84
Specialist	.73	.74	.83
Representative	.61	.74	.89
Payer	.82	.85	.87
Newsletters	.57	.73	.88
Call service	.74	.85	.92

1. Two measures: likely use and priority of use.
2. Two measures: availability and ease of use.
3. Three measures: informative, credibility and relevant.

Note: This table shows the Cronbach alpha between the USE index, COST index and BENEFIT index and the individual information sources.

measures for the actual decision is not uncommon and is consistent with prior research on the referral process (McIlwain, 1987) and on information source usage (Connelly et al., 1990; Curley et al., 1990).

CHAPTER IV

METHODOLOGY

This chapter presents the methodology used in the study and proceeds as follows. First, the response rate for the study will be discussed. Next, a descriptive profile of the respondents will be presented. After describing the responding physicians, the data is examined for response bias. Finally, the methods used to test each hypothesis will be discussed. The actual results of the testing will be presented in the next chapter. The statistical package used to analyze the data was SPSS/PC+. The specific procedures used in each step in the analysis are identified.

Response Rate

As stated previously, the population for the study consisted of 2,736 primary care physicians in the State of Alabama. A total of 806 usable questionnaires were returned for a final response rate of 29.50%. This is considered an acceptable response rate from physicians and is consistent with previous studies. For example, in his study of physician referrals, McIlwain (1987) received a 27% response rate, and in their study of physician decision making, Gruppen et al. (1990) received a 21% response rate. Other researchers have received higher rates. In their study, Curley and colleagues

(Connelly et al., 1990; Curley et al., 1990) received a response rate of 46%. The higher response rate experienced by Curley may be due, at least in part, to the fact that their study population consisted of a somewhat "captive" group, i.e., residents and members of the medical faculty of a medical school, rather than physicians in private practice.

Description of Respondents

Table 10 describes the respondents and is suggestive of several implications about physician referrals. First, the mean time for the physician practicing in their current community is 13.2 years. This suggests that the physicians are well settled in their community, and thus would likely be familiar with and have a set pattern of specialists to whom they could refer a patient. This could, then, reduce the need for and use of an external source of information on specialists. If this is the case, those wanting to influence referrals through information sources would want to focus on primary care physicians relatively new to their community.

The fact that 35% of the respondents are in solo practice is significant in that practicing alone might result in a limitation of knowledge on the part of the physicians about specialists to whom they could refer patients. This could result in an increased need for the referring physician to use external sources of information to obtain information on specialists.

The data in Table 10 raises several interesting and significant questions, all of which are beyond the scope of the present study. These areas could be ripe for further

Table 10

Description of Respondents

Descriptive characteristic	Mean	Range
Years as a licensed physician	18.10	1 to 54
Years practicing in current community	13.19	1 to 54
Age	46.80	28 to 87

Primary area of practice	N	%
Solo	282	35
Partnership	154	19
Single specialty group	144	18
Multi-specialty group	99	12
Other	125	16
Total	804*	100

* Two responses with missing data.

research, the results of which could be very informative. These issues will be discussed in the final chapter.

Table 11 shows comparisons of the respondents based on several variables and will be used to test for response bias. An important point needs to be made about Table 11A. First, with respect to primary area of practice, the areas of practice shown for the study population reflects the physician's primary area of practice as shown on the records of the Medical Association of the State of Alabama (the source of the population for the study). The designation shown in Table 11A for the respondent is that reported by the physician on the questionnaire. It is, therefore, possible that for any given physician the two designations may differ. As an example, the Association's records may have shown the physician's primary area of practice as general practice while the physician indicated internal medicine on the questionnaire as their primary area of practice. The self-reported designation on the questionnaire would more likely reflect the physician's current primary area of practice and this was the designation used in the study.

Table 11A shows that the respondent's primary area of practice differed from the population in that a higher proportion of family practice physicians and fewer general practice and internal medicine physicians were in the respondent group. Because of the possibility that the respondent's area of practice may have changed as discussed above, it is difficult to reach a firm conclusion concerning

Table 11

Comparison of Respondents by Primary Area of Practice and Mailing

A. Response by primary area of practice

Practice area	Respondent N	Respondent %[1]	Study population N	Study population %	% Diff.	X^2	Sig.
Family practice	253	32	668	25	+7		
General practice	60	7	295	11	- 4		
Internal medicine	249	31	994	36	- 5		
OB/GYN	112	14	357	13	+1		
Pediatrics	132	16	422	15	+1		
Total	806	100	2,736	100		30.16	.01

B. Responses by mailing

Mailing	N	%[1]	X^2	Sig.
Initial mailing	469	58		
Follow-up mailing	337	42		
Total	806	100	21.62	.000

C. Responses by primary area of practice and mailing

Practice area	Initial mailing N	Initial mailing %[1]	Follow-up mailing N	Follow-up mailing %	X^2	Sig.
Family practice	168	36	85	25		
General practice	30	7	30	9		
Internal medicine	133	28	116	34		
OB/GYN	62	13	50	15		
Pediatrics	76	16	56	17		
Total	469	100	337	100	11.40	.022

1 = % of total responses

the possibility of practice differences between the respondents and the population.

While it would have been beneficial to have made further demographic comparisons between the population and the respondents, primary area of practice was the only descriptive characteristic available on the population. Budgetary constraints would not allow further contact with nonresponders to obtain additional information on that group.

An examination of Table 11B reveals results consistent with what would generally be expected. Specifically, it is generally expected that the initial mailing will yield a larger response than the follow-up mailing (Bowers & Powers, 1991; Maheux et al., 1989). Unless the responses are dramatically disproportionate, this would not likely cause a problem or affect the results of the study.

An analysis was conducted to determine if there was a difference by primary area of practice for those responding to the initial versus follow-up mailings (see Table 11C). The follow-up mailing is often used as a rough measure of nonresponders in the assessment of response bias (Churchill, 1987) and several additional comparisons will be made using the two mailings. With the exception of general practice, where the number of responses were equal, there was a slightly higher percentage of responses to the initial mailing from all areas of practice. The largest difference was for family practice where there were almost twice as many responses to the initial versus follow-up mailing (168 and 85, respectively).

The second check for response bias was to test for differences in the scores of each source by the initial versus follow-up mailings. Table 12 shows the mean scores for each source for the two use measures and five cost-benefit attributes. A .05 level of significance was used to test the difference. Using the .05 level, twelve significant differences were found.

There are no significant differences between means for the likely use measure. For the priority of use measure there are three: patient, representative and payer. Each of the cost-benefit attributes have at least one source where the mean difference is significant. The attributes of ease of use and informative both have three: patient, representative, call service, and specialist, representative, newsletters, respectively. The attributes of availability, credibility and relevance each had one: payer, specialist, and directory, respectively. There does not appear to be a consistent pattern in mean differences among the variables.

As a final check for nonresponse bias, regressions were run for the initial and follow-up mailings. Table 13 shows the results of these regressions. With the exception of one follow-up mailing for priority of use, all regressions were significant (F at $p<.05$). While there are some differences in the significance of the t for the initial versus follow-up mailings, as well as between the combined mailing versus the initial and/or follow-up mailings, there does not appear to be a major pattern to these differences. Thus, these results

Table 12

Comparison of Means Scores for Each Source by Initial vs. Follow-Up Mailing

Source	Likely use Init.[1] (F-up)	t (p)[2]	Priority of use Init.[1] (F-up)	t (p)[2]	Available Init.[1] (F-up)	t (p)[2]	Ease of use Init.[1] (F-up)	t (p)[2]	Informative Init.[1] (F-up)	t (p)[2]	Credible Init.[1] (F-up)	t (p)[2]	Relevant Init.[1] (F-up)	t (p)[2]
Patient	5.31	1.8	6.67	2.11	5.57	1.66	5.57	2.86	3.76	.40	3.94	.93	4.07	.11
	(5.08)	(.072)	(6.31)	(.036)	(5.37)	(.098)	(5.21)	(.004)	(3.72)	(.692)	(3.84)	(.354)	(4.05)	(.915)
Physician	6.13	1.5	7.94	.06	6.02	-.02	6.13	-.28	5.97	-.28	6.34	1.34	6.25	1.21
	(5.99)	(.135)	(7.94)	(.949)	(6.02)	(.985)	(6.15)	(.780)	(5.99)	(.777)	(6.25)	(.181)	(6.17)	(.228)
Directory	3.63	1.27	4.98	.69	4.79	1.31	5.10	1.80	4.32	1.17	4.15	1.21	4.38	2.35
	(3.48)	(.204)	(4.89)	(.490)	(4.63)	(.190)	(4.89)	(.073)	(4.19)	(.242)	(4.01)	(.227)	(4.13)	(.019)
Other material	2.93	.26	3.42	- .82	3.62	.05	3.97	.10	3.62	.51	3.60	.19	3.69	.64
	(2.90)	(.797)	(3.51)	(.413)	(3.61)	(.962)	(3.96)	(.923)	(3.57)	(.609)	(3.58)	(.849)	(3.62)	(.522)
Specialist	6.02	.23	7.60	- .21	5.25	-.90	5.61	-.59	6.09	2.37	6.22	2.40	6.24	.71
	(5.99)	(.820)	(6.63)	(.831)	(5.36)	(.370)	(5.67)	(.557)	(5.87)	(.018)	(6.02)	(.017)	(6.19)	(.475)
Representative	3.10	-.46	3.73	-2.40	3.33	1.29	3.94	3.08	3.71	2.78	3.68	1.94	3.77	1.51
	(3.16)	(.648)	(4.07)	(.017)	(3.17)	(.198)	(3.54)	(.002)	(3.39)	(.006)	(3.46)	(.052)	(3.60)	(.131)
Payer	3.58	.94	4.02	2.35	3.89	2.19	3.89	1.33	3.23	1.60	3.07	1.78	3.32	1.46
	(3.44)	(.348)	(3.60)	(.019)	(3.58)	(.029)	(3.71)	(.184)	(3.03)	(.110)	(2.87)	(.076)	(3.14)	(.146)
Newsletter	2.88	.93	2.97	-1.87	3.30	-.26	3.48	1.24	3.46	1.98	3.39	1.77	3.55	1.47
	(2.78)	(.354)	(3.22)	(.061)	(3.02)	(.794)	(3.32)	(.215)	(3.23)	(.048)	(3.19)	(.077)	(3.38)	(.142)
Call service	3.51	.44	3.92	- .65	4.80	1.87	4.96	2.93	3.92	.31	3.91	.21	3.98	.55
	(3.45)	(.661)	(4.03)	(.517)	(4.54)	(.061)	(4.56)	(.004)	(3.88)	(.757)	(3.89)	(.835)	(3.90)	(.583)

1 = Mean score for the initial and the follow-up mailings 2 = 2-tail probability

Table 13

Comparison of Combined, Initial and Follow-Up Mailings

Likely use

Source	Combined* mailing		Initial* mailing		Follow-up* mailing	
	$\bar{R}^2$	t	$\bar{R}^2$	t	$\bar{R}^2$	t
Payer	.370	1	.319	1	.443	1
Call service	.370	1	.333	1	.418	1
Patient	.302	1	.276	1	.340	1
Newsletters	.256	1	.233	2	.283	1
Representative	.240	1	.209	2	.288	1
Physician	.230	1	.203	1	.256	1
Directory	.216	1	.205	1	.223	1
Specialist	.205	1	.168	1	.260	1
Other material	.180	2	.170	2	.190	2

*All F values significant at .05.

1 All t values significant at .05.
2 Cost t not significant at .05.

Priority of use

Source	Combined* mailing		Initial* mailing		Follow-up* mailing	
	$\bar{R}^2$	t	$\bar{R}^2$	t	$\bar{R}^2$	t
Payer	.231	1	.281	1	.163	1
Call service	.183	1	.176	2	.189	2
Patient	.212	1	.206	1	.215	1
Newsletters	.021	2	.035	2	.006*	4
Representative	.088	2	.090	2	.090	2
Physician	.115	1	.116	1	.111	1
Directory	.057	1	.035	3	.086	1
Specialist	.120	1	.135	1	.096	3
Other material	.018	2	.017	2	.014	2

*All F values significant at .05 except follow-up mailing for newsletters.

1 All t values significant at .05.
2 Cost t not significant at .05.
3 Benefit t not significant at .05.
4 No t significant at .05.

suggest that, while not strong, some nonresponse bias may exist.

The data in Table 11, 12 and 13 suggest that while nonresponse bias is possible, it is some assurance that it is not strong. While some bias may exist, it is not likely that it will affect the main results of the study. Thus, the results of the study should be generalizable to at least the Alabama population of primary care physicians.

Finally, Table 14 provides current information on the number of referrals made by primary care physicians. As discussed in Chapter II, the existing research on outbound referrals was conducted during the 1970s. Thus, current information in this area is of value.

With respect to this study, Table 14 presents several important findings. First, since the respondents were active in making referrals, the sample was appropriate as a set of physicians used to study the referral process. Further, the number of referrals is generally consistent with the findings of previous studies (see Table 2 and related discussion for details) indicating that referrals have been and continue to be an important part of the primary care physician's treatment options.

Data from the present study show that a primary care physician will make in excess of 400 referrals per year. Glenn and colleagues (Glenn et al., 1987) estimated that a single referral produces a cumulative economic effect of $3,000 on the total medical system. Based on the current

Table 14

Average Number of Referrals Per Week

Primary area of practice	Mean
Family practice	10.4
General practice	9.0
Internal medicine	8.0
OB/GYN	6.8
Pediatrics	6.6
For total population	8.7

findings of over 400 referrals per year, the referrals of a single primary care physician will have an economic impact in excess of one million dollars on the total medical system. These findings not only support the importance of studying the referral process but also the relevance and timeliness of this study.

Hypothesis Testing

This section presents some preliminary information and describes how each of the hypotheses were tested.

Variable Description

For convenience, the variables used in the study are referred to by short descriptive phrases. As an example, "likely use patient" is used for the likelihood of using the patient or the patient's family as a source of information, and "available patient" is used for the availability of the patient or the patient's family as a source of information. See Appendix C for a complete list of the variables and their descriptive phrase.

Indexes

Testing of the hypotheses was conducted in part with the use of indexes. Indexes are useful tools for combining several variables into a single variable. Use of indexes is not new and has been used in prior research on information source usage by physicians (Connelly et al., 1990; Curley et al., 1990), as well as in other source usage studies (O'Reilly, 1982).

Three indexes were used in testing the hypotheses. The first index was formed by combining questions A and B of the

questionnaire, namely "likely use" and "priority of use" of the sources. This index is an overall measure of the reported use of a source based on these two measures. For convenience, this index is referred to as "USE" index. Thus, there are three separate measures of source usage, "likely use," "priority of use" and the "USE" index. These measures are the dependent variables in the study.

The other two indexes were formed by combining source attributes. The attributes of availability and ease of use were combined to form a "COST" index, and the attributes of informative, credible and relevant were combined to form a "BENEFIT" index. These two indexes were the independent variables in the study.

As discussed previously, the designation of an attribute as either a cost or a benefit is based on the attribute's presumed primary influence. As used in this study, costs are that which the information seeker resists expending in order to use the source. Benefits are the utility derived from using the source. Costs are incurred before the information can be obtained from the source and benefits occur during and after using the source.

In an effort to assess the demarcation of the five attributes as either cost or a benefit, a factor analysis was performed across each of the nine information sources. Results of this analysis are shown in Table 15. While factor analysis is useful in testing a theory about the hypothesized nature of underlying processes, it may have limited utility

Table 15

Factor Loading[1] for Source Attributes by Information Source

Source/attribute		Factor 1 loading	Factor 2 loading
Patient			
Credible	(B)*	.864	
Relevant	(B)	.859	
Informative	(B)	.831	
Available	(C)		.904
Ease of use	(C)		.865
Physician			
Relevant	(B)	.827	
Credible	(B)	.812	
Ease of use	(C)	.778	
Informative	(B)	.753	
Available	(C)	.726	
Directory			
Relevant	(B)	.839	
Informative	(B)	.827	
Credible	(B)	.794	
Ease of use	(C)	.751	
Available	(C)	.680	
Other Material			
Relevant	(B)	.840	
Informative	(B)	.816	
Credible	(B)	.788	
Ease of use	(C)	.732	
Available	(C)	.653	
Specialist			
Credible	(B)	.811	
Relevant	(B)	.807	
Informative	(B)	.805	
Ease of use	(C)	.731	
Available	(C)	.677	
Representative			
Credible	(B)	.865	
Informative	(B)	.858	
Relevant	(B)	.854	
Ease of use	(C)	.787	
Available	(C)	.690	

Table 15 (Continued)

Source/attribute		Factor 1 loading	Factor 2 loading
Payer			
Informative	(B)	.861	
Relevant	(B)	.844	
Credible	(B)	.821	
Ease of use	(C)	.821	
Available	(C)	.773	
Newsletters			
Informative	(B)	.849	
Credible	(B)	.843	
Relevant	(B)	.835	
Ease of use	(C)	.762	
Available	(C)	.597	
Call Service			
Credible	(B)	.880	
Relevant	(B)	.874	
Informative	(B)	.872	
Ease of use	(C)	.814	
Available	(C)	.787	

1 Principal - components extraction with varimax rotation
* Cost-Benefit designation

when the number of variables is small, as is the case in the present study (Tabachnick & Findell, 1989).

The results of the factor analysis were clear and strong for the patient as a source of information. For this source, the two cost and the three benefit attributes loaded as hypothesized, that is, forming two distinct factors. Results across the other eight sources were less strong. For each of these sources, all five attributes loaded on a single factor. However, these results provide some encouraging findings. Specifically, for the sources of directory, other material specialist, representative, newsletters, and call service, the loadings for the three hypothesized benefit attributes are larger than for those of the two cost attributes. For the sources of physician and payer the demarcation is less distinct.

With the exception of patient as a source of information, the results of the factor analysis suggests that the attributes form a unidimensional construct with bipolar extremes as opposed to two distinct factors. These findings suggest that the distinction between the attributes may not be precise and that some overlap between the attributes may exist. This limitation was acknowledged in the discussion of the source attributes in the Review Of The Literature chapter and is consistent with the findings of Curley and colleagues (1990).

Reliability of the indexes was assessed by calculating alpha coefficients. These were presented in Table 9 and were discussed in the Reliability and Bias section of Chapter III.

As stated in that section, the indexes were found to have acceptable reliability.

Hypotheses One and Two

Multiple linear regression was used to test both H_1 and H_2. This procedure was chosen as it allows for an examination of the relationship among variables, specifically the dependent variable and several independent (predictor) variables. In this study, questions A and B provided the dependent variables and questions C through G provided the independent variables. As an example, the dependent variables from question A are the likely use of each of the nine information sources and the predictor variables are the source attributes associated with each of the information sources.

Dependent variable. Three sets of regressions were performed. Each regression set used one of the three measures of source usage, likely use (question A), priority of use (question B), and the USE index, as the dependent variable. Question A asked "...how likely would it be that you would use each of the sources listed below to obtain information on a specialist to whom you could refer the patient?" The respondent indicated the likelihood of using each source on a seven point Likert-scale where the higher the score the greater the reported likelihood of using the source. Question B asked the respondent to "... rank the sources from 1 to 9 in the priority in which you would use each source to obtain information on a specialist" where the lower the score the higher the priority of use. For consistency of analysis,

"priority of use" was reverse coded by use of the SPSS/PC+ (Norusis, 1988) RECODE command so that the higher the score the higher the priority of use. The USE index was formed by combining questions A and B.

Independent variables. Each of the three regression sets described above were further divided into two subsets; an index and a full model. As an example, when "likely use patient" was used as the dependent variable, one subset of regressions used the COST and BENEFIT indexes as the independent variables (index model), and the second subset of regressions used the five individual attributes (available, ease of use, informative, credible, and relevant) as the independent variables (the full model). The full models were used to confirm the use and finding of the index models.

Finally, as will be discussed more fully in the Results chapter, the index models were used to test H_1 and H_2. The specific testing of H_1 used the regression coefficients. Testing of H_2 utilized the indexes' beta weights and correlation coefficients.

Hypothesis Three

A comparison of the ranking of the nine information sources was the basis for testing H_3. Specifically, the hypothesis was tested by calculating rank order correlation coefficients for the ranking by the usage measures and attributes.

CHAPTER V

RESULTS

This chapter presents the results of the analysis of the data and proceeds as follows. First, the use of the index models is discussed. Next, the results of the testing of each hypothesis is presented. The Chapter concludes with a summary of the results.

The regressions used in testing H_1 and H_2 were the index models, details of which are presented in Tables 16, 17 and 18. As an example from Table 16, the first regression used patient as the dependent variable and the COST and BENEFIT indexes as the independent variables. The regression produced a constant of 2.078, and coefficients of .102 and .178 for the COST and BENEFIT variables, respectively.

The first values of importance in assessing the regressions are the F statistics. An examination of these values shows that all of the regression models are statistically significant at the .000 level. Based on the F values, the null hypothesis of no linear relationship between the variables is rejected for each of the regressions.

The next values to be examined were the adjusted R squares. These values are informative in that, after adjusting for the degrees of freedom, they measure the

Table 16

Regression Analysis-Cost and Benefit Index/Likely Use

Dependent variable (sources)	Const. (SE)	Cost B (SE)	Cost Beta	Benefit B (SE)	Benefit Beta	Adj.R^2	F (Sig)
Patient	2.078 (.206)	.102 (.020)	.178	.178 (.014)	.444	.302	163.83 (.000)
Physician	1.446 (.313)	.163 (.023)	.269	.143 (.019)	.277	.230	117.75 (.000)
Directory	.806 (.203)	.113 (.022)	.203	.135 (.016)	.323	.220	104.82 (.000)
Other material	1.106 (.163)	.024* (.020)	.047	.153 (.015)	.400	.180	80.95 (.000)
Specialist	2.357 (2.88)	.140 (.019)	.275	.116 (.019)	.245	.205	98.75 (000)
Representative	1.050 (.153)	.056 (.022)	.106	.160 (.016)	.418	.239	113.32 (.000)
Payer	.740 (.150)	.183 (.021)	.331	.153 (.017)	.343	.370	212.46 (.000)
Newsletters	.888 (.137)	.048 (.020)	.091	.162 (.013)	.454	.369	127.31 (.000)
Call service	.621 (.161)	.067 (.020)	.128	.191 (.014)	.517	.369	218.12 (.000)

* t not significant at .05.

Table 17

Regression Analysis-Cost and Benefit Index/Priority of Use

Dependent variable (sources)	Const. (SE)	Cost B (SE)	Cost Beta	Benefit B (SE)	Benefit Beta	Adj.R^2	F (Sig)
Patient	2.900 (.292)	.153 (.028)	.205	.171 (.019)	.329	.212	98.25 (.000)
Physician	4.364 (.371)	.129 (.027)	.196	.109 (.023)	.194	.115	50.31 (.000)
Directory	3.318 (.251)	.104 (.027)	.169	.049 (.020)	.106	.057	22.83 (.000)
Other material	2.775 (.192)	.010* (.024)	.019	.053 (.017)	.133	.018	7.32 (.000)
Specialist	4.774 (.354)	.156 (.023)	.272	.065 (.022)	.119	.120	51.18 (.000)
Representative	2.276 (.203)	.056* (.029)	.099	.107 (.021)	.238	.088	34.27 (.000)
Payer	1.140 (.211)	.228 (.030)	.331	.110 (.024)	.200	.231	104.89 (.000)
Newsletters	2.441 (.193)	.074* (.028)	-.012	.068 (.018)	.160	.021	8.54 (.000)
Call service	1.473 (.228)	.067 (.028)	.106	.158 (.020)	.354	.183	80.90 (.000)

* t not significant at .05.

Table 18

Regression Analysis-Cost and Benefit Index/Use Index

Dependent variable (sources)	Const. (SE)	Cost B (SE)	Cost Beta	Benefit B (SE)	Benefit Beta	Adj.R^2	F (Sig)
Patient	4.970 (.450)	.257 (.043)	.213	.347 (.030)	.410	.293	151.31 (.000)
Physician	6.142 (.600)	.301 (.043)	.271	.229 (.037)	.240	.200	95.57 (.000)
Directory	4.149 (.386)	.209 (.041)	.209	.188 (.031)	.252	.165	71.41 (.000)
Other material	3.872 (.296)	.046* (.037)	.053	.202 (.028)	.311	.114	45.22 (.000)
Specialist	7.173 (.545)	.250 (.037)	.269	.209 (.035)	.239	.197	90.51 (.000)
Representative	3.311 (.299)	.117 (.043)	.120	.266 (.031)	.377	.211	91.43 (.000)
Payer	1.875 (.331)	.423 (.047)	.366	.254 (.037)	.274	.335	173.73 (.000)
Newsletters	3.370 (.280)	.037* (.041)	.037	.231 (.027)	.352	.137	56.38 (.000)
Call service	2.111 (.344)	.131 (.043)	.125	.353 (.030)	.481	.324	169.62 (.000)

* t not significant at .05.

proportion of the variation in the dependent variable explained by the independent variables (Aczel, 1989), thus providing a measure of the predictive ability of the regression. Adjusted R^2s for the three usage sets are shown in Table 19. The adjusted R^2s indicate that the models are best able to predict likely use and USE index of the source and have only limited predictive ability for priority of use.

As an aid in confirming the results of, and conclusions drawn from, the index regressions, regressions were run using the individual attributes as predictor variables. These "full" models used the same three dependent variables (likely use, priority of use, and USE index) for each of the nine sources, as did the index models. As with the index models, the adjusted R^2s for the full priority of use regressions were lower than for the likely use and USE index regressions and the analysis was again limited to the likely use and USE index measures of source usage. Since the full regressions were used for confirmation of the index models, the discussion which follows is limited to the most salient findings. Results of the full regressions are presented in Appendix D.

An examination of Appendix D reveals that all F values are statistically significant at the $p<.000$. Based on these values, the null hypothesis that there is no linear relationship between the variables is, again, rejected for all of the full models.

Comparing the individual adjusted R^2s in Table 19 for the full models reveals that these values are consistent with

Table 19

Adjusted R Squares for the Index and Full Regressions

	Likely use[1]		Priority of use[1]		Use index[2]	
Source	Index[3]	Full[3]	Index[3]	Full[3]	Index[3]	Full[3]
Payer	.370	.379	.231	.240	.335	.347
Call service	.369	.376	.183	.185	.324	.330
Patient	.302	.301	.212	.209	.293	.291
Newsletters	.256	.269	.021	.028	.137	.154
Representative	.239	.245	.088	.088	.211	.215
Physician	.230	.226	.115	.122	.200	.200
Directory	.216	.216	.057	.059	.165	.165
Specialist	.205	.204	.120	.122	.197	.197
Other material	.180	.180	.018	.022	.114	.114

Note: This table shows the adjusted R squares for the index and full models (independent variables) for each of the three source use measures (dependent variable).

1 = Dependent variable - single measure
2 = Dependent variable - index/two measures
3 = Independent variables

those produced by the corresponding index regressions, both in size and in rank order. Thus, overall, the predictive ability of the respective index and full models are comparable.

Finally, with a limited number of exceptions, the regression coefficients are positive, standard errors are small and their respective t values are statistically significant ($p<.05$).

Based on the above analysis of the full models, support is found for both the use of and the conclusions drawn from the analysis of the index models.

Based on the finding that the priority of use regressions for both the index and full models have lower adjusted R^2 values across all nine information sources than either the likely use or USE index regressions, it was decided that it was more informative to use only the latter two regression sets for the analysis. Accordingly, testing of the hypotheses was based on the index models and was further limited to the likely use and USE index regressions.

The likely use and USE index regressions were examined for the possibility of multicollinearity. Table 20 shows the correlation coefficients used for this analysis. The presence of multicollinearity distorts the standard error of estimate and may lead to incorrect conclusions regarding which variables are significant and which are not. A common rule of thumb is that a correlation among the predictor variables of less than .70 does not cause problems (Mason & Lind, 1990). All correlations (r) between the COST and BENEFIT indexes are

Table 20

Correlation Coefficients Between Indexes and Information Sources

	Likely use			Use index		
Source	Cost	Benefit	Cost/ benefit[3]	Cost	Benefit	Cost/ benefit[3]
Patient	.39	.53[1]	.47	.41	.51[1]	.47
Physician	.42	.43[2]	.55	.40	.39[2]	.55
Directory	.38	.44[1]	.56	.35	.37[1]	.56
Other material	.26	.43[1]	.53	.22	.34[1]	.53
Specialist	40	.39[2]	.52	.40	.39[2]	.54
Representative	.37	.48[1]	.62	.36	.45[1]	.62
Payer	.55	.55[2]	.63	.54	.51[1]	.64
Newsletters	.33	.50[1]	.53	.23	.37[1]	.54
Call service	.47	.60[1]	.66	.44	.56[1]	.66

1 = Difference between correlation for COST and BENEFIT indexes significant at at $p<.05$.

2 = Difference between correlation for COST and BENEFIT indexes not significant at .05.

3 = Correlation between COST and BENEFIT $p<.001$.

below .70, thus suggesting little likelihood of multicollinearity and that the two indexes are independent. The absence of multicollinearity allows for appropriate interpretation of the significance of the variables in the regression.

Results of the tests of the individual hypotheses are now presented.

Hypothesis One

H_1: For each external source of information, use of the source increases as costs decrease and benefits increase.

The regression coefficients in Tables 16 and 18 were used as the specific test of H_1. The first finding of note with respect to the COST index for both source use measures is that all coefficients are positive. As stated previously, an increase in a cost attribute decreases the cost of using the source. Thus, these positive COST coefficients indicate that an increase in the COST index results in an increase in the use of the source. As an example, an increase in the availability and ease of use (cost attributes) of the patient as a source of information decreases the costs associated with using the source and increases the use of the patient as a source of information.

A second finding of importance are the small standard errors. These small values, along with their statistically significant t values ($p<.05$), indicate that the variables are individually significant.

An examination of the regression coefficients for the BENEFIT index reveals results consistent with those for the COST index. First, all coefficients are positive, indicating that an increase in the BENEFIT index results in an increase in the use of the source. Again, this is the case for both source use measures. Further, all standard errors are small and all associated t values are significant ($p<.05$), again indicating the significance of the individual variable.

The finding of positive and statistically significant coefficients support H_1 and suggest that the use of each information source increases as the costs of using the source decrease and the benefits increase.

Hypothesis Two

H_2: Costs are more important in predicting the use of a source of information than are benefits.

The initial test of H_2 used the index's beta weights. Beta weights allow for an examination of the contribution of the individual predictor variables (Huck, Cormier, & Bonds, 1974; Kachigan, 1986). Beta weights are useful in at least two types of evaluations. First, the absolute value of the beta weights tell the rank order of importance (contribution) of the predictor variables in the equation. The predictor variable with the largest absolute beta weight is the best predictor. Second, the relative importance (contribution) of any two predictor variables can be obtained by taking the ratio of the squares of their respective beta weights (Huck et al., 1974; Kachigan, 1986). The beta weight and relative

importance for the independent variables in each regression are shown in Table 21.

An examination of Table 21 reveals that for the likely use measure of source usage the BENEFIT indexes in eight of the nine regressions have larger absolute beta weights than their associated COST index. Consistent with the larger absolute values, the BENEFIT index in each of these eight regressions is of greater relative importance than their associated COST index. As an example, for likely use of the patient as a source of information the COST beta is .178 and the BENEFIT beta is .444. Not only does the larger absolute value of the BENEFIT's beta indicate it is the best predictor, its relative importance of 6.22 indicates that BENEFIT accounts for over six times as much of the variance in the dependent variable as does the COST variable. Thus, with the exception of specialist the BENEFIT index is of greater relative importance in predicting the likely use of a source than is the COST index.

For the USE index measure of source usage, in six of the nine regressions the BENEFIT indexes have a larger absolute beta weight than their respective COST index. Again, in each of these cases the BENEFIT index is of greater relative importance than their associated COST index. Thus, with the exception of physician, specialist and payer, the BENEFIT index is the better predictor and is also of greater relative importance in predicting USE of a source than is the COST index.

Table 21

Regression Beta Weights For Both Source Use Measures

Source (D.V.)	Likely Use: Cost (I.V.) Beta	Likely Use: Cost (I.V.) Rel.[1] Imp.	Likely Use: Benefit (I.V.) Beta	Likely Use: Benefit (I.V.) Rel.[1] Imp.	Use Index: Cost (I.V.) Beta	Use Index: Cost (I.V.) Rel.[1] Imp.	Use Index: Benefit (I.V.) Beta	Use Index: Benefit (I.V.) Rel.[1] Imp.
Patient	.178		.444	6.22[2]	.213		.410	3.71[2]
Physician	.269		.277	1.06	.271	1.28	.240	
Directory	.203		.323	2.53	.209		.252	1.45
Other material	.047		.400	72.43	.053		.114	4.63
Specialist	.275	1.26	.245		.269	1.27	.239	
Representative	.106		.418	15.55	.120		.377	9.87
Payer	.331		.343	1.07	.366	1.78	.274	
Newsletters	.091		.454	24.89	.037		.137	13.71
Call service	.128		.517	16.31	.125		.481	14.81

1 Relative importance of beta.

2 As an example, BENEFIT accounts for 6.22 times as much of the variance in the likely use of the patient as a source of information as does COST. Likewise, BENEFIT accounts for 3.71 times as much of the variance in the USE index of patient as does COST.

D.V. = Dependent variable I.V. = Independent variable

The larger absolute value and greater relative importance of the BENEFIT's beta for eight of the nine likely use regressions and six of the nine USE index regressions suggests that the BENEFIT indexes are more important in predicting the use of a source of information than are the COST indexes. This finding does not support H_2.

The next tests of H_2 used the correlations shown in Table 20. That table shows the simple correlation, r, between: 1) the COST index and each source, 2) the BENEFIT index and each source, and 3) the COST and BENEFIT indexes. Correlations are shown for both the likely use and USE index measures of source usage. These correlations are a measure of the strength of the relationship between variables. While there is no established rule that specifies what constitutes a weak, moderate, or strong relationship, one general rule is that an r of .01 to .30 is a weak relationship; .31 to .70 a moderate relationship; and .71 to .99 a strong relationship. Where $r = 0$, there is a no relationship, and where $r = 1.00$, there is a perfect relationship (Elifson, Runyon, & Haber, 1990).

The first analysis was of the correlations between the use of an information source and the predictor variables (indexes). As an example from Table 20, the correlation between the BENEFIT index and the likely use of the patient as a source of information is .53, and the correlation between the COST index and USE index of the patient as a source of information is .41. Applying the general rule stated above,

the correlations in Table 20 fall largely in the moderate range.

A further analysis of the correlation coefficients shows that for the likely use measure of source usage, the coefficient for the BENEFIT index and the information source is greater than the coefficient for the COST index and the information source for seven of the nine sources. With the exception of physician, the difference between the COST and BENEFIT coefficients are significant at $p<.05$. For the only source where the COST coefficient is larger than the BENEFIT index (specialist), the difference between the coefficient is not significant at .05.

For the USE index measure of source usage, the correlation coefficients for the BENEFIT index and the source is greater than the coefficient of the COST index and the source for six of the nine sources. The difference between the coefficients are significant at $p<.05$. For the two sources where the COST coefficient is larger (physician and specialist) the difference between the coefficients are not significant at .05.

Based on the higher correlations between the BENEFIT indexes and the source than between the COST indexes and the source, it can be concluded that the BENEFIT indexes are more important in predicting the use of an information source than are the COST indexes. This finding does not support H_2.

The analysis of the beta weights and of the correlation coefficients suggest that benefits are more important in

predicting source usage than are costs. This finding does not support H_2, and thus, the null hypothesis can not be rejected.

Hypothesis Three

H_3: Use across different types of information sources increases as costs decrease and benefits increase.

The primary test of H_3 was to compare the attributes (availability, ease of use, informative, credible, and relevance) for the nine information sources to the use of the source. As with the regressions, "priority of use" was reverse coded so that the higher the score the higher the priority of use. Mean sources were used as a summary measure of the characteristic being measured.

The first analysis was of the rank order of the mean scores for the information sources. Mean scores were ranked in descending order as an indication of the relative importance of the attribute and use of the source. Four sets of rank order comparisons were performed: 1) likely use of the sources with source attributes, 2) priority of use of the sources with source attributes, 3) USE index of the sources with source attributes, and 4) likely use with the USE index. Rank order analysis is an informative technique and has been used in prior research on information source usage by physicians (Williams & Hensel, 1991) and in other source usage situations (Gerstberger & Allen, 1968).

The rank order of the variables was tested with the Spearman rank-order correlation coefficient, r_s. This test allows for a measure of correlation of ranked data and

measures the degree of relationship (agreement) between two sets of ranked observations (Mason & Lind, 1990). As with other correlation measures, the coefficient can range from -1.00 to +1.00 where the higher the absolute value the greater the agreement in the ranking of the two groups (Rosenberg, 1967). The rank-order correlation coefficients are shown in Table 22. This Table shows the correlation coefficients for: 1) source attributes and likely use of the sources, 2) source attributes and priority of use of the sources, 3) source attributes and the USE index of the sources, and 4) likely use and the USE index of the sources. Details of the rank order analysis for each pairing are shown in Appendix E.

The first rank-order coefficient of note is for the two source use measures: likely use and priority of use. The .95 ($p<.005$) coefficient indicates a high positive correlation between the rank order of using the sources as ranked by both the likely use and priority of use measures. The high coefficient gives support to the consistency between the two measures of source usage and provides support for the use of the USE index, which was formed by combining the two measures.

The second set of rank-order coefficients is for the attribute and the source use measures. These coefficients range from .73 to .97, indicating a strong and positive correlation between the rankings of sources by the attributes and the ranking of the sources by the use measures. Thus, the more of the attribute the source was presumed to have, the

Table 22

Rank Order Correlation Coefficients

Source use measure	Likely use	Costs: Available	Costs: Ease of use	Benefits: Informative	Benefits: Credible	Benefits: Relevant
Likely use	-	.95[1]	.92[1]	.73[2]	.75[2]	.80[2]
Priority of use	.95[1]	.93[1]	.93[1]	.85[1]	.87[1]	.92[1]
USE index	-	.97[1]	.95[1]	.82[2]	.83[1]	.87[1]

Note: This Table shows the Spearman rank order correlation coefficients for the rank order of the source attributes and the three source use measures, and for the like use measure and priority of use measure of source usage.

1 = $p<.005$
2 = $p<.05$

greater the use of the source. As an example, greater availability of a source has a strong positive correlation with all three use measures: likely use (.95), priority of use (.93), and USE index (.97).

Another informative finding from Table 22 is that for all three source use measures the cost attributes (availability and ease of use) have larger ccefficients than the benefit attributes (informative, credible, and relevance). This suggests a stronger relationship between the cost attributes and source usage than between the benefit attributes and source usage. This finding is consistent with prior research (Connelly et al., 1990; Curley et al., 1990).

Perhaps a more interesting finding comes from the detailed data presented in Appendix E. This data shows the consistency of the ranking of the top four sources: physician, specialist, patient, and directory. These four sources were ranked in this order by all three use measures. Further, with the exception of the attributes of informative and credible where patient was ranked fifth, these sources were in the top four when ranked by attribute. A fuller discussion of these findings will be presented in the Conclusion and Implications chapter.

The strong, positive, rank order correlation coefficients suggest that use across different sources increases as costs decrease and as benefits increase. Thus, results of the rank order analysis supports H_3 and the null hypothesis is rejected.

Summary of Results

Referrals of patients have been, and continue to be, an important part of the primary care physician's treatment options. The present study found that a primary care physician will make in excess of 400 referrals per year. With a single referral having an estimated cumulative economic effect of $3,000 on the total medical system (Glenn et al., 1987), the impact of the referral process is important to health care marketers.

Support was found for a fundamental assumption of the study, namely that when confronted with the need to refer a patient to a specialist but not knowing of a specialist to whom to refer a patient, the primary care physician will likely use external sources of information to obtain the needed information. Further, not only do primary care physicians use external sources of information but certain sources are preferred over others. Specifically, a fellow physician, the specialist, the patient or the patient's family, and to a lesser extent, a hospital referral directory, are the sources most used by primary care physicians to obtain information on a specialist. These sources were also rated high in the attributes studied. Conversely, other hospital sponsored material and newsletters, brochures, and other material sent by the specialist were consistently ranked as the sources least used. These findings are consistent with those of Gombeski et al. (1990) and Rudisill et al. (1989).

The evidence indicates that source attributes are related to source usage. Specifically, as the cost of using a source

decreases and benefits increase, source usage increases. The evidence further suggests that costs are lowest and benefits greatest for using a fellow physician, the specialist, the patient and a hospital referral directory as sources of information, thus their higher reported use. Conversely, costs are greater and benefits least for other hospital sponsored material and newsletters, brochures and other material sent by the specialist, thus their low reported use.

There is a strong positive correlation between the rank order of source usage and the source attributes across all sources. An interesting finding is that the rank order correlations between the cost attributes (availability and ease of use) and the three use measures are stronger than between the benefit attributes (informative, credible, and reliable) and the three use measures. The consistency of the rank order of the sources suggests that some sources are preferred over and are perceived as possessing more of the attributes than other sources.

Finally, benefit attributes appear to be better predictors of source usage than cost attributes. While perhaps weak in predictive ability, the data suggest that cost attributes are nevertheless important factors in source usage.

In summary, the study found that not only do primary care physicians use external sources of information to obtain information on specialists to whom to refer patients, but that they also use some sources more than others. Further, use of a source is influenced by the five cost and benefit attributes studied.

CHAPTER VI

CONCLUSIONS AND IMPLICATIONS

This chapter presents the conclusions and implications that stem from the testing of the study hypotheses and proceeds as follows. First, a review of the basic assumption and research questions of the study is presented. Second, the results of the tests of the hypotheses will be summarized and implications of the findings will be presented. The focus will be on the theoretical and marketing implications for specialists, hospitals, and others interested in increasing referrals. Next, areas for further research will be suggested. The Chapter concludes with a brief summary of the study.

Research Questions

A fundamental assumption of the study was that, in some instances, referring physicians use external sources of information in deciding to whom to refer a patient and that specific sources of information could be identified. It was found that referring physicians are likely to use some external sources of information and that the five cost and benefit source attributes affected source usage. Thus, support was found for the basic assumption.

The above assumption allowed for the formulation of several research questions. The major research question to be answered by the study was: "How do costs versus benefits of external sources of information determine which source a referring physician will tend to use in deciding to whom to refer a patient?"

From this question, four sub-questions were developed:

1. Are there attributes that can be ascribed to external sources of information that will influence the use of the source by referring physicians?

2. If there are attributes which can be ascribed to sources of information, can these attributes be used to predict the use of a source by referring physicians?

3. What sources of information are used most by referring physicians to obtain information on specialists?

4. Can a cost-benefit model be used to predict the use of an information source by a referring physician in deciding to whom to refer a patient?

Each of the above questions were answered through the testing of the individual hypotheses. Five attributes were identified and each was found to be related to source usage. Although not extremely strong, the attributes were useful in predicting source usage. Sources found to be the most used were, in order, a fellow physician, personal contact with the specialist, the patient or the patient's family, and hospital referral directories. Finally, the cost-benefit model was found to be useful in analyzing source usage.

Theoretical Implications

This study contributes to the health care, marketing and information acquisition literature by specifically addressing the information needs and source usage of referring physicians. It does so by presenting a theoretical, empirical, and managerial perspective on the external sources of information used by primary care physicians in the decision of to whom to refer a patient.

The study adds to these areas by empirically testing theory driven hypotheses. It is unique in that, as discussed in the Significance and Contribution section of Chapter I, it used theory to address an aspect of the referral process that has received only limited attention, especially in the marketing literature.

As discussed in the Theory of Physician Information Seeking And Decision Making section of Chapter II, two studies were identified which dealt specifically with the sources of information used by primary care physicians in the decision of to whom to refer a patient. Rudisill et al. (1989) took a very narrow focus and studied only referrals for psychotherapy. Further, only a part of their total study addressed the issue of sources of information used in the decision of to whom to refer the patient.

The second study was by Gombeski et al. (1990), in which they studied the information sources used by physicians in the referral decision. However, they too took a narrow focus. Namely, they studied only referrals to a single and specified referral center--the Cleveland Clinic. Further, they

interviewed only physicians who had actually made a referral to the Clinic during a two-month period.

The present study extends the Rudisill et al. (1989) and Gombeski et al. (1990) studies in several ways. First, unlike the Rudisill study, no specific area of referral "need" (psychotherapy) was specified. Second, unlike the Gombeski study, the present study did not limit the referral decision to a single and specified referral center (or specialist). While such narrow focuses could provide useful information to the specific practice area or referral center, the generalizability of the results would be limited. Not limiting the referral need or the destination of the referral allows for greater generalizability and projections of the study's findings.

The basic theoretical model upon which this study was based is a cost-benefit model developed by Curley and colleagues (Connelly et al., 1990; Curley et al., 1990) used to predict information source usage for clinical decision making. According to the theory, the expected value of an information source results from a tradeoff between the perceived benefits of obtaining information from the source and the perceived costs of obtaining the information. Thus, source usage is a function of the costs of and benefits derived from using the source.

A fundamental contribution of this study was the attempt to empirically test the usefulness of the cost-benefit model as it relates to source usage in the referral process. As stated above, Curley et al. (1990) used the model to predict

information source usage for clinical problem solving. The present study differs from that study in that it used the model to study sources of information used in the decision of to whom to refer a patient. To the author's knowledge, the present study is the only study to use a cost-benefit model to study information source usage in the referral decision. At a minimum, this advances the understanding of the information source usage of referring physicians and should help improve the understanding of the referral process.

The present study both provides support for (at least in part) and extends the work of Curley and colleagues (Connelly et al., 1990; Curley et al., 1990) in several ways. First, empirical support was found for the cost-benefit model in predicting information source usage by referring physicians. Further, limited support was found for the classification of attributes as either a cost or benefit. Consistent with the cautions of Curley and others (Connelly et al., 1990; Curley et al., 1990) the demarcation of an attribute as either a cost or benefit is useful, but some attributes may span the boundary between costs and benefits and the distinction may not be clear. With the exception of availability, factor analysis of the attributes did not support a clear and strong demarcation of the attributes. However, other tests provided support for the independence of the cost and benefit indexes (i.e., tests for multicollinearity). No factor analysis information was reported by Curley and others so the strength of the demarcation of attributes used in their study can not be assessed.

The present study found that benefit attributes were better predictors of source usage than were cost benefits, a finding opposite to those of Curley and colleagues (Connelly et al., 1990; Curley et al., 1990). One possible explanation for this difference is the use of the information. In the present study, the use of the source was to obtain information on a specialist to whom to refer a patient. In the Curley study, the purpose of the information was clinical problem solving. It is possible that physicians perceive the need for information to solve clinical problems as being more immediate than that needed in a referral decision. Thus, in the clinical problem solving situation, the cost attributes of availability and ease of use may take on greater importance in that the information must be obtained as quickly and easily as possible. Conversely, in a less time sensitive situation, the benefits derived from the source may be perceived as outweighing the costs of obtaining the information. This explanation is consistent with the concept suggested by Curley and colleagues (1990) where the expected value of an information source results from a tradeoff between the perceived benefits of obtaining information from the source and the perceived costs of obtaining the information.

Another possible explanation for the difference in findings comes from the setting in which the studies were conducted. The study conducted by Curley and colleagues (Connelly et al., 1990; Curley et al. 1990) used two groups of physicians. The first group consisted of 102 internal medicine physicians who were either residents (75) or members

of a medical faculty (27). Of the 75 residents, 68% were in either their first or second postgraduate year. The second group consisted of 126 family practice physicians who were listed on the clinical faculty roster of a medical school. This total group of respondents may not be representative of physicians in private practice, and their status (resident or medical faculty) could influence their information source usage.

With respect to the residents, this group of respondents were still in training and would likely need clinical information to be both readily available and easy to use. Further, not being "full practicing physicians," they may be perceived as having a "lower status" than practicing physicians, a factor which could influence source usage. Finally, residents would be more limited in their clinical problem solving knowledge than more experienced physicians, again a factor likely to affect source usage.

With respect to the other respondents, all were either members of a medical faculty or listed on the clinical faculty of a medical school. Again, this group may not be representative of physicians in private practice and their medical school affiliation would likely influence their information source usage.

Finally, the Curley (1990) study included only two areas of practice, internal medicine and family practice. The present study included these areas of practice plus three additional areas: general practice, pediatrics and OB/GYN. In addition, 85% of the respondents in the present study were

in private practice. Based on the above differences, it is suggested that the present study may be more representative of primary care physicians in private practice and may more accurately reflect their use of information sources.

The present study further adds to the literature by identifying specific sources of information most likely to be used by referring physicians in the referral process. Previous studies have found that physicians prefer some sources over others (Curley et al., 1990; Gombeski et al., 1990; Rudisell et al., 1989). The present study supports these findings and found the most used sources (as rated by all use measures) were a fellow physician, the specialist, the patient or the patient's family, and to a lesser extent, hospital referral directories. This finding also extends the theory that, at least in certain settings, personal sources are preferred over impersonal sources (Murray, 1991).

Support was also found for the theory predicting the importance of attributes in determining source usage. Across all five attributes, the more of the attribute the source was rated as having, the greater the reported use of the source.

Finally, there is some evidence suggesting that referring physicians may not view source attributes as totally independent constructs to be considered and weighed objectively and independently. Rather, they may take a more hedonic approach, using more subjective and symbolic criteria and concentrating on a source for its own sake apart from more objective considerations of the source's attributes. Further,

research will be needed to determine if this is in fact the case.

Marketing Implications

The results of this study suggest several important marketing implications for specialists, hospitals and others interested in increasing their referrals. As an example, hospitals are interested in increasing revenue through utilization of their facilities, specifically through admissions. A majority of these admissions come from specialists. The number of admissions by a specialist is related to the number of patients the specialist sees. And, as was pointed out previously, the number of patients a specialist sees is dependent to a great degree on referrals from primary care physicians.

A major finding of the study was that primary care physicians use external sources of information to obtain information on a specialist to whom to refer a patient. This being the case, the question then becomes "which sources will they use?" It was found that the sources most used are, in order: a fellow physician, personal contact with the specialist, the patient or the patient's family, and to a lesser extent, hospital referral directories. It is noteworthy that the top three sources involve some form of personal interaction as opposed to an impersonal source, such as a referral directory or referral call service. This finding is consistent with that of Murray (1991) in his study of information acquisition activities. His data showed that, for services, personal sources of information were preferred

over impersonal sources. It may be that by using personal sources the physician not only receives the necessary information, but also receives some form of social or psychological gratification or reward. While the answer to this question is beyond the scope of this study, further study should be undertaken to determine if this is the case.

An interesting finding of the study was the importance of a fellow physician as a source of information. In fact, this source was ranked first by all three source use measures, and was rated high on all five attributes. This finding has major implications for the specialist. Namely, it is vital that the specialist develop and maintain a good referral relationship with primary care physicians. In doing so, the specialist will increase the likelihood of being recommended to other physicians by those who have referred to him in the past.

Ways by which a specialist can improve their relationship with referring physicians would include the following: 1) seeing the referred patient as quickly as possible, 2) providing the referring physician with timely information on the patient, and 3) returning the patient to the referring physician. The hospital can help strengthen the relationship by assisting the specialist in their communications with the referring physician and by helping coordinate other activities between the referring physician and the specialist.

A significant finding was the importance of the patient and the patient's family as a source of information. Anecdotal information gathered by the researcher during the course of the study supports this finding. Virtually all of

the physicians with whom the author discussed the study stated that they routinely asked the patient or the patient's family if they have a preference for a specialist to whom to be referred. If they do, and if the referring physician does not have a specific reason for not using the named specialist, the request is honored. If the physician has an objection, an alternative specialist is suggested. Such preferences would likely stem from prior use of the specialist by the patient, the patient's family, a friend or an acquaintance. The importance of the patient in the referral decision is consistent with the findings of Gombeski et al. (1990) in their study of referrals to the Cleveland Clinic.

An important finding for specialists is that they ranked second on source usage, only slightly behind a fellow physician. Equally important is the finding that specialist ranked first on the attributes of informative and relevance, second on ease of use and credibility, and third on availability. While the specialist is considered the most informative and relevant source of information, they are considered less easy to use, less credible (possibly due to a perceived self-interest on the specialist's part) and even less available than a fellow physician. The implication for specialists is that they must make themselves easy to use, increase their credibility and, clearly, make themselves more available as a source of information. This could be done by making themselves available for consultations, making personal visits to the primary care physician's office, present or participate in seminars/CME courses or otherwise make

themselves available to the primary care physician both on a professional and a personal basis.

Another implication for specialists applies to the use of newsletters, brochures and other material from the specialist. This source ranked last on all three source use measures and last or next to last on all five attributes. Accordingly, the specialist would be better off spending their resources on developing relationships with primary care physicians.

An important implication for hospitals is the relatively low reported use of hospital referral directories, and even lower use of referral call services, hospital representatives and other hospital sponsored material. The present study suggests that hospitals would benefit more by allocating their resources to the development of relations between specialists and primary care physicians than on these areas. The hospital could help develop these relationships by encouraging the specialists to visit the primary care physician's office, sponsoring CME courses or seminars in which the specialists participate, sponsoring social events for interactions between the specialists and primary care physicians, facilitating communications between the specialists and primary care physician, and otherwise encouraging and aiding the specialists to make themselves more available to the primary care physicians.

An interesting and somewhat problematic finding was the low reported use of hospital representatives. This finding is especially significant in light of a recent study by Bowers and Powers (1991). Their findings suggest that while the

health care industry has not yet made significant progress in adopting personal selling, this activity is in the process of being adopted by the industry. It is likely that the low reported use of hospital representatives as a source of information on specialists is due, at least in part, to the newness of this activity in the industry. Bowers and Powers found that approximately 50% of respondents reported little or no activity in developing this area. As health care marketers increase their activities in this area and as primary care physicians become accustomed to and recognize the benefits of using a hospital representative, it is possible that their use as a source of information will increase.

Marketer would also want to be aware of the demographic characteristics of primary care physicians. As an example, it was found that the mean time of the respondent physicians practicing in their community was 13.2 years. This suggests that these physicians are well settled in their community, and thus would likely be familiar with and have a set pattern of referral specialists. This could, then, reduce the need for and use of an external source of information on specialists. If this is the case, those wanting to influence referrals through information sources would want to focus on primary care physicians relatively new to their community.

A final marketing implication is that regardless of which source is being considered, the sponsor of the source must be aware of the impact that the attributes considered in this study have on the use of the source. Specifically, the cost of using the source should be reduced by making it readily

available and easy to use, and the benefits derived from the source should be increased by making it more informative, credible and reliable.

Areas for Future Research

While this study has provided additional empirical information on physician referrals, several opportunities remain for further research.

Testing of the study hypotheses was conducted on an aggregate basis. That is, the respondents were considered as a homogeneous group with no distinction being made for specific demographic or descriptive characteristics. Accordingly, the results of the study are generalizable to "primary care" physicians as a group.

A fruitful area for future research would be to analyze source usage based on various descriptive characteristics of the respondents, such as primary area of practice or type of office practice. Such an analysis would reveal any differences in source usage based on specific characteristics of the respondents.

By design, the research instrument captured considerable descriptive information on the respondents not used in the present study. The nine questions in section I of the questionnaire captured this descriptive information and that which was not presently used is available for use in future analysis.

Two potentially beneficial areas for future analysis are "primary area of practice" (e.g., internal medicine and pediatrics) and type of "private office practice" (e.g. solo

and multi-specialty group). The following are examples of the types of research questions that could be developed and tested using the descriptive characteristics of the respondents:

1. Do physicians in different primary areas of practice use different information sources?

2. Do physicians in different types of private office practice use different information sources?

As an example, it may be that internist are more likely to use source A than are pediatricians, or perhaps pediatricians view different attributes as more important than do OB/GYNs. It was suggested previously that primary care physicians in solo practice may have limited knowledge about specialists to whom to refer a patient and as such would use different sources than physicians in other types of practices.

Similar questions could be asked for years the physician has been licensed to practice (it is suggested that less experienced physicians may use different sources than more experienced physicians), length of time practicing in the local community (it is suggested that those with longer tenure in the community are more likely to have a set pattern of referral specialists and would use different sources than physicians new to the community), Zip Code (use as a surrogate for rural/urban practice, do these settings affect source usage), and degree of severity of illness treated (those treating the more seriously ill would likely have different referral needs than those treating the less seriously ill, and thus their source usage could differ).

The utility of such an approach is clear. If differences in source usage exists and these differences can be identified, it would then be possible to direct specific sources to those primary care physicians most likely to use the source. As an example, internists may use the specialists as their primary source of information and not use hospital referral directories. Those wanting to increase referrals from internists would focus on developing relations between the physician and the specialist as opposed to developing and using directories. This type of approach is common in industry and its potential for use in health care is promising.

Another productive area for research would be to investigate the linkage of source usage and information content of the source. For example, specifically what information should the source provide the primary care physician?

As discussed previously, interest in personal selling (hospital representatives) is increasing in the health care industry. Further research is needed in this area to determine if this is a viable source of information and to provide guidance to health care organizations as to the direction they should take.

It would also be beneficial to learn more about what hospitals can do to help their specialists develop stronger personal relationships with primary care physicians. As indicated from the present study, this should increase

referrals to the specialist and in turn admissions to the hospital.

Finally, further research should be undertaken to verify the findings of this study with respect to hypothesis two. Specifically, why were benefits found to be more important in predicting source usage than were costs?

Summary

This study examined the relationship between attributes ascribed to an external source of information and the use of the source by primary care physicians in making the decision of to whom to refer a patient. A cost-benefit model was used where source attributes were demarcated as either a cost or a benefit of using the source.

The findings of the study support a basic assumption of the study, namely, that referring physicians use external sources of information to obtain information on specialists to whom they could refer patients. Further, the most used sources were a fellow physician, the specialist, the patient or the patient's family, and to a lesser extent, hospital referral directories.

The attributes studied have a clear impact on source usage. It was found that decreasing the cost of using a source (i.e., increasing its availability and ease of use) increases the use of the source. Further, increasing the benefits derived from using the source (i.e., increasing its informativeness, credibility and relevance) increases use of the source.

The results indicate that benefit attributes were better predictors of source usage than were cost attributes. Finally, the rank order of source attributes and source usage are highly correlated. Thus, usage across all sources increases as costs decrease and benefits increase.

This study examined only one aspect of physician referrals. There are many other areas that need to be studied. Further, while providing new and additional information on physician referrals, many questions remain unanswered. The findings from the study have both theoretical and managerial applications, and are of importance to those interested in physician referrals. The study should provide the basis for future research.

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APPENDIX A

QUESTIONNAIRE

PHYSICIAN REFERRAL SURVEY

This survey deals with physician referrals. You will be asked to respond to questions about sources of information from which you could potentially obtain information on specialists to whom you could refer a patient.

For the purpose of this survey, assume that you need to refer a patient to a specialist, but, for whatever reason, you do not know of a specialist to whom you could refer the patient.

A. If you found yourself needing to refer a patient but did not know of a specialist to whom to refer, how likely would it be that you would use each of the sources listed below to obtain information on a specialist to whom you could refer the patient? (Please circle the appropriate number on the right of the sources below that best represents your response.)

Priority of Use			Very Unlikely						Very Likely	Not Applicable
_____	1.	The patient or the patient's family (e.g. preference of patient or family)	1	2	3	4	5	6	7	NA
_____	2.	A fellow physician (other than the specialist).	1	2	3	4	5	6	7	NA
_____	3.	Hospital referral directory describing its physicians, facilities, services, etc.	1	2	3	4	5	6	7	NA
_____	4.	Other hospital sponsored material such as brochures or newsletters from the hospital.	1	2	3	4	5	6	7	NA
_____	5.	Personal contact with the specialist.	1	2	3	4	5	6	7	NA
_____	6.	Hospital representative (e.g. a representative of the hospital who calls or visits you to provide information on the hospital, its physicians, facilities, services, etc.)	1	2	3	4	5	6	7	NA
_____	7.	Patient's health care payer (e.g. patient's insurance carrier, HMO or PPO).	1	2	3	4	5	6	7	NA
_____	8.	Newsletters, brochures or other material sent to you by the specialist.	1	2	3	4	5	6	7	NA
_____	9.	Medical center or hospital referral call service.	1	2	3	4	5	6	7	NA

B. In the space provided on the left of each of the above information sources, please rank the sources from 1 to 9 in the priority in which you would use each source to obtain information on a specialist. For example, 1 would be the first source you would use, 2 the second source you would use, etc., and 9 the last source you would use.

C. An information source is considered **AVAILABLE** if it is readily available and accessible when you need it and it does not require you to spend much time to reach or get access to it.

How readily **AVAILABLE** are each of the following sources to you when you need information on a specialist to whom you could refer a patient? (Circle the appropriate number.)

		Not Available						Very Available	Not Applicable
1.	The patient or the patient's family (e.g. preference of patient or family)	1	2	3	4	5	6	7	NA
2.	A fellow physician (other than the specialist).	1	2	3	4	5	6	7	NA
3.	Hospital referral directory describing its physicians, facilities, services, etc.	1	2	3	4	5	6	7	NA
4.	Other hospital sponsored material such as brochures or newsletters from the hospital.	1	2	3	4	5	6	7	NA
5.	Personal contact with the specialist.	1	2	3	4	5	6	7	NA
6.	Hospital representative (e.g. a representative of the hospital who calls or visits you to provide information on the hospital, its physicians, facilities, services, etc.)	1	2	3	4	5	6	7	NA
7.	Patient's health care payer (e.g. patient's insurance carrier, HMO or PPO).	1	2	3	4	5	6	7	NA
8.	Newsletters, brochures or other material sent to you by the specialist.	1	2	3	4	5	6	7	NA
9.	Medical center or hospital referral call service.	1	2	3	4	5	6	7	NA

D. An information source is considered **EASY TO USE** if it is easy to obtain the needed information from the source once the source is available (accessible) to you.

If each of the following sources could potentially provide information on specialists to whom you could refer a patient, how **EASY** is it to obtain this information from the source? (Circle the appropriate number.)

		Not Easy						Very Easy	Not Applicable
1.	The patient or the patient's family (e.g. preference of patient or family)	1	2	3	4	5	6	7	NA
2.	A fellow physician (other than the specialist).	1	2	3	4	5	6	7	NA
3.	Hospital referral directory describing its physicians, facilities, services, etc.	1	2	3	4	5	6	7	NA
4.	Other hospital sponsored material such as brochures or newsletters from the hospital.	1	2	3	4	5	6	7	NA
5.	Personal contact with the specialist.	1	2	3	4	5	6	7	NA
6.	Hospital representative (e.g. a representative of the hospital who calls or visits you to provide information on the hospital, its physicians, facilities, services, etc.)	1	2	3	4	5	6	7	NA
7.	Patient's health care payer (e.g. patient's insurance carrier, HMO or PPO).	1	2	3	4	5	6	7	NA
8.	Newsletters, brochures or other material sent to you by the specialist.	1	2	3	4	5	6	7	NA
9.	Medical center or hospital referral call service.	1	2	3	4	5	6	7	NA

E. An information source is considered INFORMATIVE if it provides information that you need to select a specialist.

How much of the INFORMATION that you feel is important to you and that you need to choose a specialist to whom you could refer a patient does each of the following sources typically provide? (Circle the appropriate number.)

		None of the Info.						All of the Info.	Not Applicable
1.	The patient or the patient's family (e.g. preference of patient or family)	1	2	3	4	5	6	7	NA
2.	A fellow physician (other than the specialist).	1	2	3	4	5	6	7	NA
3.	Hospital referral directory describing its physicians, facilities, services, etc.	1	2	3	4	5	6	7	NA
4.	Other hospital sponsored material such as brochures or newsletters from the hospital.	1	2	3	4	5	6	7	NA
5.	Personal contact with the specialist.	1	2	3	4	5	6	7	NA
6.	Hospital representative (e.g. a representative of the hospital who calls or visits you to provide information on the hospital, its physicians, facilities, services, etc.)	1	2	3	4	5	6	7	NA
7.	Patient's health care payer (e.g. patient's insurance carrier, HMO or PPO).	1	2	3	4	5	6	7	NA
8.	Newsletters, brochures or other material sent to you by the specialist.	1	2	3	4	5	6	7	NA
9.	Medical center or hospital referral call service.	1	2	3	4	5	6	7	NA

F. An information source is considered CREDIBLE if it is believable, trustworthy, and you have confidence in it.

How CREDIBLE are each of the following sources in providing information on specialists to whom you could refer a patient? (Circle the appropriate number.)

		Not Cred-ible						Very Cred-ible	Not Applicable
1.	The patient or the patient's family (e.g. preference of patient or family)	1	2	3	4	5	6	7	NA
2.	A fellow physician (other than the specialist).	1	2	3	4	5	6	7	NA
3.	Hospital referral directory describing its physicians, facilities, services, etc.	1	2	3	4	5	6	7	NA
4.	Other hospital sponsored material such as brochures or newsletters from the hospital.	1	2	3	4	5	6	7	NA
5.	Personal contact with the specialist.	1	2	3	4	5	6	7	NA
6.	Hospital representative (e.g. a representative of the hospital who calls or visits you to provide information on the hospital, its physicians, facilities, services, etc.)	1	2	3	4	5	6	7	NA
7.	Patient's health care payer (e.g. patient's insurance carrier, HMO or PPO).	1	2	3	4	5	6	7	NA
8.	Newsletters, brochures or other material sent to you by the specialist.	1	2	3	4	5	6	7	NA
9.	Medical center or hospital referral call service.	1	2	3	4	5	6	7	NA

G. An information source is considered RELEVANT if it provides information that is pertinent and directly related to the specific problem or question being addressed and it does not contain an excess of unrelated or unusable information.

How RELEVANT are each of the following sources in providing information on specialists to whom you could refer a patient? (Circle the appropriate number.)

		Not Relevant						Very Relevant	Not Applicable
1.	The patient or the patient's family (e.g. preference of patient or family)	1	2	3	4	5	6	7	NA
2.	A fellow physician (other than the specialist).	1	2	3	4	5	6	7	NA
3.	Hospital referral directory describing its physicians, facilities, services, etc.	1	2	3	4	5	6	7	NA
4.	Other hospital sponsored material such as brochures or newsletters from the hospital.	1	2	3	4	5	6	7	NA
5.	Personal contact with the specialist.	1	2	3	4	5	6	7	NA
6.	Hospital representative (e.g. a representative of the hospital who calls or visits you to provide information on the hospital, its physicians, facilities, services, etc.)	1	2	3	4	5	6	7	NA
7.	Patient's health care payer (e.g. patient's insurance carrier, HMO or PPO).	1	2	3	4	5	6	7	NA
8.	Newsletters, brochures or other material sent to you by the specialist.	1	2	3	4	5	6	7	NA
9.	Medical center or hospital referral call service.	1	2	3	4	5	6	7	NA

H. Using the definitions previously presented, please indicate how important each of the following are to you in your use of a source from which you could obtain information on a specialist to whom you could refer a patient. (Circle the appropriate number.)

	Not Important						Very Important	Not Applicable
Availability	1	2	3	4	5	6	7	NA
Easy to Use	1	2	3	4	5	6	7	NA
Informative	1	2	3	4	5	6	7	NA
Credible	1	2	3	4	5	6	7	NA
Relevant	1	2	3	4	5	6	7	NA

I. Thank you for answering the preceding questions. So that your responses can be properly classified, please provide the following information about yourself and your practice. Remember, all responses are strictly confidential and will be used only for summary information.

1. What is your primary area of practice? (Please check the appropriate response.)

_____ (1) Family Practice
_____ (2) General Practice
_____ (3) Internal Medicine
_____ (4) OB/GYN
_____ (5) Pediatrics
_____ (6) Other (please specify)_____

2. What is the average number of referrals you make in a one week period? Approx. _____

3. How long have you been a licensed physician? _____ years

4. How long have you been practicing in your current community? _____ years

5. What is your age? _____ years

6. What is the zip code of your office? _____

7. Which of the following best describes your private office practice?

_____ (1) Solo
_____ (2) Partnership
_____ (3) Single Specialty Group
_____ (4) Multi-Specialty Group
_____ (5) Other (please specify) _____

8. Considering your entire patient load, what degree of severity of illness do you generally treat? (Please circle the appropriate number: 1 = Low, 7 = High)

Low 1 2 3 4 5 6 7 High

9. With which hospital are you primarily affiliated? _____

Thank you for your time and cooperation. Please check to make sure you have answered all the questions. If you have any comments, explanations or ideas about any item on this questionnaire, please feel free to make them on any blank space available. Please return the completed questionnaire in the stamped envelope or mail it to:

Mr. William J. Ranieri
Executive Vice President
Southern Medical Association
P. O. Box 190088
Birmingham, Alabama 35219-0088

APPENDIX B

COVER LETTERS

Dear Doctor:

You have been selected from among the physicians in the state of Alabama to help provide information on physician referrals. Referrals are an important part of the primary care physician's treatment options, and the choice of a specialist to whom you refer a patient is important not only to the patient but to you and your practice as well.

We recognize the importance of this decision and would like to know where you obtain information on specialists to whom you refer patients. The only way we know how to find out is to ask you. The information you provide is important and will be used to help in the understanding of this process.

You can be assured of complete confidentiality, and that the information you provide will be used only as summary information. The number on the questionnaire is for mailing purposes only and will not be used to identify you or your responses in any way. If you prefer, you may remove the number.

If you would like to receive a summary of the results, please write "copy of results requested" on the back of the return envelope and include one of your business cards or put your name and address on the back of the return envelope. Please do not put this information on the questionnaire itself.

Thank you for your assistance.

Sincerely,

Dear Doctor:

About three weeks ago, I wrote you asking that you complete a survey on physician referrals. As of today, we have not received your completed questionnaire.

This study was undertaken because of the belief that the referral process is important to the primary care physician and your patients. To our knowledge this is the first study of its type. You were selected from among the physicians in the state of Alabama to provide information on this process and your response is extremely important.

If you have already returned the questionnaire, thank you. If you have not, please take a moment to complete the enclosed replacement questionnaire.

You can be assured of complete confidentiality, and that the information you provide will be used only as summary information. The number on the questionnaire is for mailing purposes only and will not be used to identify you or your response in any way. If you prefer, you may remove the number.

If you would like a summary of the results, please write "copy of results requested" on the back of the return envelope and enclose one of your business cards or put your name and address on the back of the return envelope.

Thank you again for your assistance.

Sincerely,

P.S. Please complete the questionnaire even if you are no longer in active practice or you have specialized and no longer consider yourself a primary care physician. Your answers would be based on your past experiences.

APPENDIX C

VARIABLE DESCRIPTIONS

Table 23

Variable Descriptions

Descriptive phrase	Description
Patient	The patient or the patient's family.
Physician	A fellow physician (other than the specialist).
Directory	Hospital referral directory describing its physicians, facilities, services, etc.
Other material	Other hospital sponsored material such as brochures or newsletters from the hospital.
Specialist	Personal contact with the specialist.
Representative	Hospital representative calling on physicians.
Payer	Patient's health care payer (e.g., patient's insurance carrier, HMO, or PPO).
Newsletters	Newsletters, brochures or other material sent by the specialist.
Call service	Medical center or hospital referral call service.
Likely use	Likely use of the specified source. Derived from question A.
Priority of use	Priority of use of the specified source. Derived from question B.
USE index	Index formed by combining "Likely Use" (question A) and "priority of use" (question B).

APPENDIX D

REGRESSION ANALYSIS--FULL MODELS

Table 24

Regression Analysis--Full Models

Source (dependent variable): Patient

Independent variables		Likely use Adj. R^2 = .301 F = 65.87 Sig. .000 B	SE	Beta	Use index Adj. R^2 = .291 F = 60.45 Sig. .000 B	SE	Beta
Relevant	(B)*	.219	.043	.220	.403	.094	.191
Available	(C)	.142	.044	.134	.237	.095	.106
Informative	(B)	.171	.047	.158	.360	.103	.157
Credible	(B)	.143	.052	.130	.271	.111	.118
Ease of use	(C)	.064	.044	.062	.281	.095	.130
Constant		2.056	.207		4.978	.452	

Source (dependent variable): Physician

Independent variables		Likely use Adj. R^2 = .226 F = 47.70 Sig. .000 B	SE	Beta	Use index Adj. R^2 = .200 F = 38.72 Sig. .000 B	SE	Beta
Available	(C)*	.183	.047	.168	.301	.087	.151
Relevant	(B)	.152	.063	.114	.163	.120[1]	.065
Informative	(B)	.151	.049	.112	.366	.093	.163
Ease of use	(C)	.141	.051	.125	.303	.095	.148
Credible	(B)	.128[1]	.069	.078	.142	.129[1]	.053
Constant		1.456	.319		6.271	.610	

Source (dependent variable): Directory

Independent variables		Likely use Adj. R^2 = .216 F = 42.40 Sig. .000 B	SE	Beta	Use index Adj. R^2 = .167 F = 29.64 Sig. .000 B	SE	Beta
Available	(C)*	.159	.039	.164	.299	.073	.173
Credible	(B)	.116	.050	.153	.342	.096	.175
Relevant	(B)	.132	.054	.119	.099[1]	.102	.050
Informative	(B)	.111	.050	.103	.127[1]	.095	.066
Ease of use	(C)	.065[1]	.044	.064	.126	.083	.070
Constant		.812	.204		4.152	.386	

Table 24 (Continued)

Source (dependent variable): Other Material

Independent variables		Likely use Adj. R^2 = .180 F = 32.93 Sig. .000 B	SE	Beta	Use index Adj. R^2 = .116 F = 19.102 Sig. .000 B	SE	Beta
Credible	(B)*	.221	.047	.223	.368	.084	.220
Informative	(B)	.147	.047	.147	.108[1]	.084	.064
Relevant	(B)	.090[1]	.051	.090	.110[1]	.091	.065
Ease of use	(C)	.012[1]	.038	.013	.094[1]	.070	.063
Available	(B)	.043[1]	.037	.047	.020[1]	.067	.013
Constant		1.098	.163		3.858	.296	

Source (dependent variable): Specialist

Independent variables		Likely use Adj. R^2 = .204 F = 39.92 Sig. .000 B	SE	Beta	Use index Adj. R^2 = .197 F = 36.65 Sig. .000 B	SE	Beta
Available	(C)*	.171	.035	.199	.271	.065	.173
Credible	(B)	.174	.062	.135	.338	.115	.143
Ease of use	(C)	.105	.041	.110	.233	.077	.133
Informative	(B)	.084[1]	.049	.076	.096[1]	.091	.048
Relevant	(B)	.100[1]	.063	.074	.211[1]	.117	.085
Constant		2.338	.297		7.036	.564	

Source (dependent variable): Representative

Independent variables		Likely use Adj. R^2 = .245 F = 47.32 Sig. .000 B	SE	Beta	Use index Adj. R^2 = .214 F = 37.92 Sig. .000 B	SE	Beta
Relevant	(B)*	.253	.058	.240	.421	.112	.218
Informative	(B)	.183	.052	.178	.267	.100	.141
Available	(C)	.132	.039	.140	.250	.075	.142
Ease of use	(C)	-.026[1]	.042	-.028	-.020[1]	.080	.012
Credible	(B)	.062[1]	.057	.061	.138[1]	.110	.072
Constant		1.027	.153		3.275	.300	

Table 24 (Continued)

Source (dependent variable): Payer

Independent variables		Likely use Adj. R^2 = .379 F = 89.13 Sig. .000 B	SE	Beta	Use index Adj. R^2 = .347 F = 73.79 Sig. .000 B	SE	Beta
Available	(C)*	.303	.044	.298	.681	.098	.321
Informative	(B)	.250	.054	.214	.388	.118	.160
Relevant	(B)	.170	.054	.146	.434	.118	.180
Credible	(B)	.061[1]	.057	.049	.030[1]	.123	-.011
Ease of use	(C)	.035[1]	.049	.034	.116[1]	.106	.053
Constant		.760	.149		1.910	.329	

Source (dependent variable): Newsletters

Independent variables		Likely use Adj. R^2 = .269 F = 54.94 Sig. .000 B	SE	Beta	Use index Adj. R^2 = .153 F = 26.26 Sig. .000 B	SE	Beta
Informative	(B)*	.302	.046	.316	.520	.093	.300
Credible	(B)	.191	.049	.200	.294	.099	.166
Available	(C)	.086	.037	.088	.090[1]	.074	.050
Relevant	(B)	.020[1]	.048	.021	-.069[1]	.095	-.040
Ease of use	(C)	.008[1]	.038	.009	-.060[1]	.077	-.066
Constant		.898	.137		3.406	.279	

Source (dependent variable): Call Service

Independent variables		Likely use Adj. R^2 = .376 F = 90.49 Sig. .000 B	SE	Beta	Use index Adj. R^2 = .330 F = 70.49 Sig. .000 B	SE	Beta
Relevant	(B)*	.248	.054	.243	.429	.115	.211
Credible	(B)	.177	.056	.171	.365	.119	.177
Available	(C)	.185	.043	.189	.368	.089	.190
Informative	(B)	.155	.049	.154	.281	.103	.141
Ease of use	(C)	-.053[1]	.044	-.055	.116[1]	.094	-.059
Constant		.614	.160		2.110	.343	

*Cost-Benefit designation
[1] t not significant at .05

APPENDIX E

DETAILED RANK ORDER ANALYSIS

Table 25

Mean Ranking of Likely Use and Source Attributes

			Costs				Benefits					
	Likely use		Available		Ease of use		Informative		Credible		Relevant	
Source	$\bar{X}$	R*	$\bar{X}$	R*	$\bar{X}$	R*	$\bar{X}$	R*	$\bar{X}$	R*	$\bar{X}$	R*
Physician	6.072	1	6.020	1	6.141	1	5.981	2	6.302	1	6.217	2
Specialist	6.008	2	5.299	3	5.635	2	5.997	1	6.135	2	6.218	1
Patient	5.213	3	5.489	2	5.419	3	3.746	5	3.900	5	4.060	4
Directory	3.571	4	4.724	4	5.013	4	4.265	3	4.091	3	4.275	3
Payer	3.518	5	3.764	6	3.817	7	3.145	9	2.987	9	3.241	9
Call service	3.483	6	4.696	5	4.794	5	3.906	4	3.901	4	3.946	5
Representative	3.125	7	3.267	8	3.775	8	3.575	7	3.588	7	3.702	6
Other material	2.919	8	3.614	7	3.966	6	3.599	6	3.592	6	3.661	7
Newsletters	2.838	9	3.001	9	3.411	9	3.367	8	3.307	8	3.483	8
Rank Correlation Coefficient (r_s)			.95[1]		.92[1]		.73[2]		.75[2]		.80[2]	

* = Rank order by mean
1 = $p < .005$
2 = $p < .05$

Table 26

Mean Ranking of Priority of Use and Source Attributes

			Costs				Benefits					
	Priority of Use		Available		Ease of Use		Informative		Credible		Relevant	
Source	$\bar{X}$	R*	$\bar{X}$	R*	$\bar{X}$	R*	$\bar{X}$	R*	$\bar{X}$	R*	$\bar{X}$	R*
Physician	7.941	1	6.020	1	6.141	1	5.981	2	6.302	1	6.217	2
Specialist	7.612	2	5.299	3	5.635	2	5.997	1	6.135	2	6.218	1
Patient	6.523	3	5.489	2	5.419	3	3.746	5	3.900	5	4.060	4
Directory	4.942	4	4.724	4	5.013	4	4.265	3	4.091	3	4.275	3
Call service	3.967	5	4.696	5	4.794	5	3.906	4	3.901	4	3.946	5
Representative	3.871	6	3.267	8	3.775	8	3.575	7	3.588	7	3.702	6
Payer	3.848	7	3.764	6	3.817	7	3.145	9	2.987	9	3.241	9
Other Material	3.460	8	3.614	7	3.966	6	3.599	6	3.592	6	3.661	7
Newsletters	3.068	9	3.001	9	3.411	9	3.367	8	3.307	8	3.483	8
Rank Correlation Coefficient			.93[1]		.93[1]		.85[2]		.87[1]		.92[1]	

R* = Rank order by mean
1 = $p<.005$
2 = $p<.01$

Table 27

Mean Ranking of Use Index and Source Attributes

			Costs				Benefits					
	Use index		Available		Ease of use		Informative		Credible		Relevant	
Source	$\bar{X}$	R*	$\bar{X}$	R*	$\bar{X}$	R*	$\bar{X}$	R*	$\bar{X}$	R*	$\bar{X}$	R*
Physician	7.022	1	6.020	1	6.141	1	5.981	2	6.302	1	6.217	2
Specialist	6.870	2	5.299	3	5.635	2	5.997	1	6.135	2	6.218	1
Patient	5.897	3	5.489	2	5.419	3	3.746	5	3.900	5	4.060	4
Directory	4.327	4	4.724	4	5.013	4	4.265	3	4.091	3	4.275	3
Call service	3.771	5	4.696	5	4.794	5	3.906	4	3.901	4	3.946	5
Payer	3.723	6	3.764	6	3.817	7	3.145	9	2.987	9	3.241	9
Representative	3.524	7	3.267	8	3.775	8	3.575	7	3.588	7	3.702	6
Other material	3.210	8	3.614	7	3.966	6	3.599	6	3.592	6	3.661	7
Newsletters	2.983	9	3.001	9	3.411	9	3.367	8	3.307	8	3.483	8
Rank Correlation Coefficient			.97[1]		.95[1]		.82[2]		.83[2]		.87[1]	

R* = Rank order by mean
1 = $p<.005$
2 = $p<.01$

Table 28

Mean Ranking of Likely Use and Priority of Use

	Likely use		Priority of use	
Source	$\bar{X}$	R*	$\bar{X}$	R*
Physician	6.072	1	7.941	1
Specialist	6.008	2	7.612	2
Patient	5.213	3	6.523	3
Directory	3.571	4	4.942	4
Call service	3.483	6	3.967	5
Representative	3.125	7	3.871	6
Payer	3.518	5	3.848	7
Other material	2.919	8	3.460	8
Newsletters	2.838	9	3.068	9

Rank Correlation Coefficient= .95 ($p<.005$)

*Rank order by mean

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