A DESCRIPTION OF PHYSICIANS' PRACTICE BEHAVIORS AND LEARNING ACTIVITIES ASSOCIATED WITH CHANGES MADE IN A PRIVATE MEDICAL PRACTICE

By

Robert J. Long

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ABSTRACT

A DESCRIPTION OF PHYSICIANS' PRACTICE BEHAVIORS AND LEARNING ACTIVITIES ASSOCIATED WITH CHANGES MADE IN A PRIVATE MEDICAL PRACTICE

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This study has resulted in a description of the role that change and its associated learning activities play in physicians' private medical practices. Grounded research methodology provided the conceptual framework for structuring and carrying out the study. Semistructured interviews were conducted with two specialty groups which included nine obstetrician/gynecologists and eleven internists. The following areas of investigation were included in the study: identifying the various types of changes which occur in practice; identifying learning activities related to a private medical practice; and describing, indepth, specific changes and their associated learning activities.

The findings of this study indicate that physicians' change behavior and associated learning activities are an integral component of a physician's practice behavior and should be viewed as an essential part of the determining

elements which define the boundaries of a private medical practice. These elements include the scope or extent of the medical field encompassing the practice, the depth of knowledge and training within each area of practice, and how close to the frontier of knowledge or cutting edge the physician practices. Many influencing factors control these elements, among them are competition, peer pressure, medical-legal concerns, social pressure, physicians' own psychological needs, and economic considerations. Physicians' change behavior and associated learning activities should be viewed as an integral component of these three determining elements, routinized in the very nature of a private medical practice. Hence, individual instances of physicians' change and learning behaviors are best conceptualized as a part of a broader practice behavior pattern rather than a separate developmental process impacting on a private medical practice.

DEDICATION

To my wife Valeria whose encouragement and assistance has been so important in this effort.

Be like a bird who
Halting in his flight
On a limb too slight
Feels it give way beneath him,
Yet sings,
Knowing he has wings.

Victor Hugo

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DEFINITION OF TERMS

Definition of Terms

The following terms are defined to assure clarity in this study:

Academic medicine - The practice of medicine associated with a university or research facility.

Adult learning - Axford (1980, p. 2) defines adult learning as "planned and organized learning activities chosen on either a formal or informal basis with the conscious intention of self-fulfillment, including information seeking, understanding, skill acquisition, and identifying and solving personal and community problems."

Adoption - Adoption is a decision to begin full use of an innovation.

Andragogy - "The art and science of helping maturing adults learn." (Knowles, 1975, p. 19).

Attending physician - A private practice physician who has admitting privileges at a hospital.

Biomedical field - All activities centered around the science of medicine including clinical practice and research.

Biomedical innovation process - Generation and diffusion of a biomedical technology into medical practice.

Cardiologist - Subspecialist concerned with the diagnosis and treatment of the heart.

Change agent - One whose purpose is to influence others' decisions to change.

Change model - A sequence of cognitive steps involved in the incorporation of a change in ones behavior.

Change type classification - Types of changes physicians experience in their practice, grouped into eight areas. (Geertsma, 1982)

Clinical experience - Those learning activities which occur in an environment where medicine is being practiced.

Coding - Process of isolating the data into individual indices or concepts and reorganizing them into conceptual categories.

Colleague - An associate in a profession.

Communication - "A process in which participants create and share information with one another in order to reach a mutual understanding." (Rogers, 1983, p. 5)

Communication channel - The means by which a message gets from a source to a receiver.

Comparison groups - Group of subjects viewed in relation to another group of subjects.

Comparative analyses - That part of the theoretical sampling strategy that involves the systematic choice and study of several comparison groups.

Conceptual categories - Groupings of data into common areas from which general concepts can be derived.

Consultation - A deliberation between physicians on a case or its treatment.

Continuing adult education - An organized, formal attempt to teach adults.

Cosmopolite - An outlook which extends beyond the immediate environment.

Cross tract transfer - Transfer of an innovation to a completely different unrelated purpose.

Crystalized intelligence - "Performance in which skilled judgment habits have become crystalized (whence its name) as the result of earlier application of some prior, more fundamental general ability to these fields." (Cattell, 1963)

Cutting edge - Frontier of knowledge, having possession of the most up-to-date information in an area.

Deductive logic - Method of thinking where conclusions follow necessarily from the premises.

Depth of practice - Level of expertise within any area of medicine.

Developmental cognitive steps - Different frames of reference for responding to and learning from one's daily experiences.

Developmental task - Both external actions and internal thinking associated with adapting to life's changing circumstances.

Didactic lecture - Systematic instruction through teachings.

Diffusion - The process by which an innovation spreads.

Echocardiography - Sonographic study of the heart and its function.

Fluid intelligence - "Perceiving relations, educing correlates, and maintaining span of immediate awareness in concept formation and attainment, reasoning and abstuacting." (Horn, 1968)

Formal theory - Conceptual theory developed from various empirical areas. This transcends substantive areas.

Grounded research - A method of developing theories, concepts and hypothesis from data which are systematically obtained and analyzed.

Group practice - Two or more physicians practicing medicine in a partnership or corporation.

Gynecology - Branch of medicine which treats diseases of the genital tract in women.

Health care industry - Businesses that produce the tools used in the practice of medicine.

Hematology - Branch of medicine which treats morphology of the blood and blood tissue.

Heterophilous - Interpersonal communication between individuals who are not alike.

Homophilous - Interpersonal communication between individuals who are alike.

House staff - Interns and residents (physicians in a training program) employed by a hospital.

Inductive logic - Act of reasoning from a part to a whole or from particulars to generals.

Innovation - "An idea, practice, or object that is perceived as new by an individual or other unit of adaption." (Rogers, 1983, p. 11)

Innovators - Early adopters, those who adopt an innovation before most of their peers.

Interpersonal networks - Communication channels between individuals.

Innovation-decision process - Rogers (1983, p. 20) defines this as "a process through which an individual (or other decision-making unit) passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea and to confirmation of this decision."

Intentional changes - Those changes that occur when a person clearly chooses a particular change and takes steps to achieve it.

Internist - A physician who specializes in the diagnosis and medical, as opposed to surgical and obstetrical treatment of diseases of adults.

Interview - Conversation with a purpose. Involves both verbal and nonverbal interactions between people working toward a common goal.

Interview strategies - Broad conceptual considerations related to the basic research methodology.

Interview tactics - Using the appropriate order for the interview's statements, questions and probes.

Interview techniques - Actions taken by interviewer during the interview to facilitate communication.

Late-adopters - Those who adopt an innovation after most of their peers.

Learning style - Stereotyped patterns of learning characterized by an individual's strengths and weaknesses as a learner.

Life-cycle - Successive life periods, each of which ushers in its own variety of learning tasks.

Life structure - Basic pattern or design of a person's life at a given time.

Localite - An outlook which does not extend beyond the immediate environment.

Logico-deductive method - Research based on ungrounded assumptions. Developing a theory first and then setting out to prove it true or false.

Memos - A way to store ideas about the data and related information. (note-taking)

Methodological memos - Records of strategies, techniques and tactics of the research.

Nephrology - Branch of medicine concerned with the functions of the kidneys.

New tract transfer - When an innovation cannot be plugged into an established pattern, a whole new activity must be established.

Oncology - Branch of medicine concerned with the treatment of tumors.

Opinion leaders - Influential menbers in a social system.

Orienting focus or concept - General perspective or area of study used to begin a grounded research study.

Practice behavior - Geertsma (1982) defines practice behavior as "any recurring, patterned aspect or segment of the physician's thinking and actions in practicing medicine."

Referral - To send or direct for treatment.

Reliability - Probability that an observation can be repeated either at a different time or at the same time by a second competent observer and give the same results.

Rheumatology - Branch of medicine concerned with the treatment of diseases of the joints and related structures.

Scope - Extent of the medical field that a practice encompasses.

Self-directed learner - One who is motivated by internal incentives, determines personal needs, formulates goals, identifies resources, chooses appropriate learning strategies and evaluates the learning outcome.

Significance level of change - The degree to which a change effects the physician or patient (e.g. non life-threatening versus life-threatening).

Single tract transfer - When diffusion of an innovation follows an established path.

Solo practice - A physician in business for himself, no partners.

Specialty group - Physicians who practice a common subdiscipline of medicine.

Social norms - Established behavior patterns.

Social system - "A set of inter-related units that are engaged in joint problem solving to accomplish a common goal." (Rogers, 1983, p. 24)

Sociometric relationship - Interactions, both professional and social, between individuals.

Subspecialist - Physicians concerned with only one aspect of a specialty

Substantive codes - Those notations that conceptualize the empirical substance of the findings.

Substantive theory - Theory developed from one empirical area and limited to that specific area.

Teachable moment - A receptive period when a person has a need for a skill or knowledge which will solve a life problem (Havighurst, 1972).

Technology cluster - "One or more distinguishable elements of technology that are perceived as being closely interrelated." (Rogers, 1983, p. 26)

Theoretical memos - A record of ideas about codes and their relationships to each other, categories and developing theories.

Theoretical saturation - When instances of a category repeatedly appear and no additional data are being identified that can develop properties of a categories.

Theoretical coding - Those notations that identify how substantive codes relate to each other

Theoretical sampling - Process of data collection for generating grounded theory whereby the analyst collects, codes and analyzes data and determines what data to collect next and where to find them.

Third party payers - Generally insurance companies that pay for a patient's treatment.

Unintentional knowledge acquisition - "Encountering information that proves relevant to one's work while not specifically searching for it, or while engaging in one's habitual current-awareness activities, or through the efforts of a person or agency whose business it is to do so." (Roberts, 1981, p. 158)

Validity - Extent to which the data conform to the facts.

CHAPTER 1

INTRODUCTION

Today's American health care system has become an immense multi-faceted enterprise. Its scope and depth may only be equaled by a few human endeavors. Literally millions of people are involved in health care directly and indirectly. They range from those employed by a large medical support industry to those who operate health care facilities, health care educators, and those directly providing health care. According to the U.S. Department of Commerce (1984), in 1982 the national health expenditure was 382.4 billion dollars. In that same year, the number of people involved in direct patient care totaled 5,513,000 in the U.S. These figures represent only a small fraction of the total health care system and biomedical support industry.

It is within this broad context that individual groups of health care providers, such as physicians, must be viewed. Physicians play a critical role in the health care field as collectively they are involved not only in patient care but many other facets of medicine, such as national health care policy formation, medical research, and the administration of health care delivery systems. While

certainly not all physicians participate at each of these levels, there is a general consciousness of the gravity of the profession and the profound influence it has on our society.

A great deal of attention and resources are used in the training of physicians. The basic format of modern medical education in this country developed around the turn of the century (King, 1984). The most important conceptual change occurring then was the establishment of medicine based on the scientific principles of observation and experimentation. The Flexner report (Flexner, 1910) summarized the national trends and served as a catalyst for changes in medical education (Jarcho, 1975; Chapman, 1974). Up to this time, education of physicians was provided mostly by private independent medical schools with very few opportunities for supervised clinical experiences. In the United Stated, medical schools, hospitals and universities developed independently. Developments at the turn of the century brought about cooperation and, in some cases, merging of these institutions. This resulted in bringing academic theories together with the applied practice of medicine. Following these changes, teaching practices for medical students have included a strong emphasis on the basic sciences taught by the didactic lecture coupled with practical clinical experiences in a supervised setting.

As a result of the emphasis on the scientific method, selection of medical students has been based primarily on

individual predisposition to the scientific process. The population of physicians is not only a select group intellectually, but more specifically leans toward a scientific philosophical bias. Once a member of this subgroup, continued training based on established methodology reinforces such tendencies and further differentiates physicians as a group from the rest of the population.

Some historical perspective can also shed light on physicians as a group and how they have been influenced. Charles Minot (1909), representing what more recently is considered somewhat of an elitist view (King, 1984) describes characteristics necessary of a good medical student, the essential qualities of a physician, and standards for medical schools.

> The man who purposes to study medicine should have in high degree three gifts, not one of which is common among mankind, yet all of which he must have...the power of reliable observation, intellectual endurance, loyalty.
>
> Examinations should have their main use, not as a means of admission, but as a means of exclusion, and the more men of low and middle rank that are excluded the better...they ought to prove that the candidate has the preliminary knowledge of chemistry, physics and general biology without which the pursuit of the medical science is impossible.
>
> ...it is a disgrace to a university to appoint a man as professor chiefly because he is a "good teacher"...only investigators can give university instruction.

These rather extreme views have never been held by all people in the medical field; however, this particular

mentality has made a significant impression on how medical students are selected and on perceptions of physicians' role in society by physicians and other members of society. In addition, this type of thinking and a host of other intluencing social forces have not only shaped medical schools but premedical education, graduate medical education, and continuing medical education as well. It is with this perspective that physicians must be viewed as practitioners, students and members of a larger social system, at least to the extent that they exist as a homogeneous subgroup.

Problem Area

Numerous futurist authors, such as Naisbitt (1983), have outlined the current unprecedented growth in the rate of change and have projected further advances in the technical areas such as medicine. Physicians, for example, are continuously inundated with literature, lectures, and seminars, all presenting innovations which affect various aspects of their profession. To keep abreast in their field, physicians must be aware of what is current, make critical evaluations of these new developments, and be able to adapt and change. A physician's decision to make a change is influenced by a host of factors including the type of innovation, how it has been presented, by whom, numerous social and political forces, individual learning habits, resources available, and the relative advantage over

previous practices. In an effort to identify just how physicians go about making changes in their practices, it would be useful to integrate and evaluate these and other variables by investigating three major areas of study: diffusion of innovations, adult learning, and physicians' actual practice behavior.

There has been a trend in the last several decades to identify stages or developmental cognitive steps associated with various aspects of human life. In addition to the more life encompassing concepts such as Levinson's (1978) life stages, Erikson's (1980) life-cycle stages, and Havighurst's (1952) developmental tasks, there are also hierarchical sequences of development proposed in which adults make successive transformations while integrating and building on their experiences (Weathersby, 1980). An example of such a sequence is Perry's (1970) positions of intellectual and ethical development. In the same vein, but in the area of diffusion of innovations, Everett Rogers (1983) has proposed a series of steps one progresses through while adopting an innovation. This scheme was synthesized from a composite of independent studies and observations drawn from various disciplines and cultures. Although passage through each step is not mandatory, support is given for a logical sequential order of those steps taken.

Like other schemes or models of human behavior, it is uncertain as to what extent such theories can explain, predict, and ultimately be used to influence behavior.

There is the possibility that efforts to construct a change model have been influenced by a tendency to categorize and structure, which may be more influenced by a human desire for order than a true reflection of the change phenomenon. Conversely, if a change model could be developed and substantiated, it would serve as a useful tool to facilitate and understand change better.

The key to identifying a change process is in observing and describing physicians' behavior. The investigation must extend beyond identifying journals read, continuing education courses taken, and with whom physicians socialize. An important consideration which must be examined in addition to these factors is why does the physician change. It is essential to examine the various psychological forces which impact physicians. Simply identifying the mechanics rather than the impetus or motivation is not likely to be entirely productive.

Purpose

The purpose of this study is to describe physicians' behavior as they make changes in their practice. This approach is an effort to integrate both how and why physicians make changes. It is necessary to investigate not only learning activities associated with change such as journals read, lectures attended, and colleagues consulted, but also to correlate these activities with why and how such activities are pursued. Hence, characteristics of

physicians as lifelong learners are viewed with respect to social, psychological, economic and professional influences.

One focus of this description of physicians as individuals involved in learning and making changes is to identify common experiences. From these common experiences, shared learning patterns and change mechanisms can be identified. To do this, the following questions represent general areas of investigation:

1. What are the types of changes made by physicians?
2. Why do physicians seek change?
3. Under what conditions was the change sought and implemented?
4. What learning activities are associated with changes?
5. Why were particular learning activities pursued?
6. Are there common reasons for change?
7. Are there common learning activities associated with change?
8. Are there common methods or processes of change?

These questions do not define the parameters of this study, but do serve as orienting concepts about which to focus.

The medical world is currently undergoing tremendous change, not just in terms of medical advancements but also in its social structure. Physicians' relationships with health care institutions, professional organizations, government, other health care providers, patients, third party payers, industry, and colleagues are all being reevaluated and redefined. For the most part, physicians have little choice but to adapt in response to their ever changing environment. Simple survival in a medical practice requires an ability to change if in nothing more than the

medical aspects of a practice. Making changes requires some kind of internal restructuring whether it involves acquiring new information, redefining concepts or establishing new priorities. Regardless if changes result in cognitive or affective alterations, most change requires learning. The value of this study is in examining the physician as a learner in the change process.

Methodology

The research methodology used in this study is called grounded research. As described by Glaser and Strauss (1967), this methodology provides a means of phenomenologically developing concepts, hypotheses, and theories which are systematically obtained and analyzed from data. Initially, an orienting focus or perspective serves as a point from which to begin. Observations relating to this focus are obtained and used both to guide the ongoing research and inductively develop theory.

The emphasis in grounded research is that the generation of theory involves a process of research. This process begins not with preconceived notions but by building concepts and ultimately theory from data. As the process continues, the data itself shapes and molds the direction of the research. Grounded research differs from the more traditional logico-deductive method in which a theory is postulated from "a priori assumptions." These preconceived notions may or may not have been developed from related

data.

Data collected in a traditional logico-deductive method is focused primarily on verification of a theory. Grounded research, on the other hand, provides a mechanism for generating theory. Generating theory by grounded research methods involves a process of research which is fluid and originates from the data itself. Glaser and Straus (1967) view grounded research as "an ever-developing entity, not as a perfected product." (p. 32)

Grounded research is useful when investigating areas in which little is known and where quantitative methodologies are not useful because of an inability to identify or control variables. Other advantages inherent in grounded research, according to Glaser and Strauss (1967, p. 3) include:

> ...generating grounded theory is a way of arriving at theory suited to its purposed use.
>
> ...laymen involved in the area to which the theory applies will usually be able to understand it.
>
> Theory based on data can usually not be completely refuted by more data or replaced by another theory.
>
> Grounded theory can help to forestall the opportunistic use of theories that have dubious fit and working capacity.
>
> ...help interpret or explain the data in a general manner.

In addition, grounded research provides a mechanism for effectively identifying social interactions and their structural context in society.

Grounded research was chosen as the research

methodology for this study because of the lack of research and knowledge in this area and because describing how physicians go about making changes in their practices does not lend itself to quantitative research methods. Although some research has been done examining aspects of this study, such as physician networking and resources used by physicians, little work has been done centered on the physicians' learning process as the subject of the research. Those studies most similar to the approach taken here are based on logico-deductive theory techniques. Consequently, the physician as a learner, practitioner, and innovator has not been viewed from a grounded research perspective.

The interview technique for data collection was adopted for this study because it could be relatively unstructured, allowing data to emerge from the subjects without greatly limiting participants' responses.

Assumptions

Several assumptions were made at the onset of this study concerning both the research methodology and the study participants. First of all, the grounded research methodology, discussed in Chapter III, has not been a common research technique used in the study of physicians or the general health care field. There has not been an extensive history in this particular area demonstrating the usefulness of grounded research. It is assumed that because of its application in various other fields, grounded research can

also be useful in this area. It is also assumed that a semi-structured interview technique of data collection can yield meaningful and useful data.

The second major assumption concerns physicians' ability and willingness to identify changes in their practices and accurately describe them. It is also assumed that these changes or at least many of them are a result of the physicians' own free will and not simply imposed by some external influence.

It is assumed that changes made in any aspect of a medical practice require learning by the physician. That is, changes are not capriciously implemented but require some kind of information seeking, means of evaluation and/or knowledge for implementation.

Limitations

One of the major areas which defines the limits of this study is the research population. Participants include physicians from internal medicine and obstetrics/gynecology specialties who, upon invitation, volunteered to participate in the study. All participating physicians work in private practice, either in solo or a group practice, and are also volunteer clinical faculty for a state operated medical school. These physicians take part in the learning experiences of medical students and residents by presenting lectures, meeting regularly to discuss specific patient cases, and including medical students and residents in the

care of their patients.

Physicians participating in this volunteer teaching program were chosen for two reasons. First of all, because of the highly demanding daily work schedule most physicians have, obtaining cooperation for this study is more likely from physicians who have at least some interest in the educational process. Thus the selection of this group of physicians excluded others, such as physicians working in health maintenance organizations, public health physicians, and physicians working in industry.

A second reason for selecting this population of physicians involves the geographic proximity to the researcher. This limits the study group to private practice physicians working in a medium size metropolitan city. Because there is no university research facility in the immediate area, this study excludes physicians practicing academic medicine. Additionally, the geographic limitations eliminated physicians who practice in rural areas.

The size and nature of the research group also establishes limitations in this study. Broad generalizations extending beyond the areas studied are limited because the research group is small and restricted to a defined population of physicians. In a descriptive study such as this, the question of external validity is not a significant concern as there is no attempt to achieve representativeness of the experimental findings. Comparing and contrasting the two study subgroups, which is consistent

with grounded research methods, will help to confirm findings about each subgroup and establish a degree of evidence for more general conclusions between the two populations.

Another limitation of this study is the subjects' willingness and ability to give an accurate description of learning experiences associated with changes made in their practices. This may be a result of a physician's desire to meet his or her own ego needs or a sense of responsibility to some other consideration such as a group practice. The ability to accurately recall events over a span of several years also makes it difficult for physicians to give an accounting of their behavior.

The very nature of the research methodology employed in this study sets limitations on the study. Data collected is not only a function of the subjects but also of the researcher's ability to elicit responses, record data accurately, make astute observations, and to direct the study. The general area of reliability is an inherent uncontrolled factor of grounded research. The data are subjected to the interviewer's perspectives, bias, and powers of observation. One effort to reduce these variables is that all the interviews were done by one researcher. Also, when possible interviews were tape recorded and transcribed, providing an accurate account of what was said.

Significance of the Study

The value of this research project is in examining physicians' roles as learners in the change process. The focus is on physicians' behavior and how that behavior relates to the many variables concerning the practice of medicine. This study occurs at the intersection of various disciplines and has the potential of contributing to broad areas of study such as lifelong learning and the change process.

A close examination of physician learning patterns may be useful in better understanding adult learning, particularly in the professions. There has been considerable thought and research in an effort to identify who adult learners are, why they learn, and how they go about learning. What remains to be seen is whether or not the subgroup of physicians conforms to patterns identified in the general population and other subgroups. If there are differences or at least subgroup specific characteristics, are they a function of the individuals attracted to that particular area or an intrinsic element of the profession itself? Can all adults be viewed as one group of learners or are the differences between subgroups too great? Are there significant differences in learning patterns within the subgroup of physicians or even within a specialty group? Is there a developmental pattern to adult learning associated with making changes and can it be generally applied to all adults or are there significant differences

between subgroups within the population?

Identifying how physicians learn may be useful in promoting more effective and efficient learning; however, what might be more useful is identifying why they learn. Physicians have, by virtue of having attended medical school and residency programs, demonstrated an ability to learn in a variety of learning modes and situations. Physicians may need little, if any, help in acquiring information once they are motivated to do so. Therefore, understanding what stimulates physicians to learn may prove to be an effective tool in promoting and facilitating learning.

The study of learning associated with changes is but one element in a broader field, the communication of innovations. This area of study examines aspects of change such as how an innovation is generated, how it diffuses in a social system, characteristics of the diffusing innovation, communication channels used, and the time it takes for an innovation to diffuse throughout a social system. Additionally, a major area of interest is the innovation-decision process. How does an individual or organization go from first knowledge of an innovation, through the investigation and decision to adopt or reject process, and ultimately to a final confirmation of that decision? Studying physicians' learning behavior can contribute to this body of knowledge by identifying learning activities associated with these various aspects related to the communication of innovations. Physicians are a good

group to study change related behavior because medicine is in a constant state of change.

For physicians, change is an integral component of their medical practice. If a pattern of change exists, it is most likely to be identified in this actively changing group.

There is a need to know more about how physicians make changes in their practices and what role learning takes in this process. Adequate, cost effective, appropriate and up-to-date health care depends on keeping health care providers knowledgeable, willing and able to make changes. Among those interested in improving and promoting health care changes are physicians' professional organizations, third party insurance companies, industry, government, hospitals, biomedical researchers, health maintenance organizations, consumers, and continuing medical educators. For the most part, these individuals or organizations have a vested interest in improving the health care delivery system and would benefit by better understanding physicians as learners.

This study is also of significance because it can contribute to the understanding of physicians' learning behavior based on a grounded research methodology. The approach provides a systematic means by which data is collected and from which conclusions and hypotheses are derived. A descriptive approach such as this one has not been typically used in the study of physicians' learning

behavior. Results from this qualitative inquiry can help establish the usefulness of grounded research in the field of medical education.

The Remainder of the Study

In Chapter I, the writer has established a basic orienting concept about which this study centers. A review of the related research establishing background information is provided in Chapter II. An outline of the research methodology and specific implementation of the study is presented in Chapter III. In Chapter IV, the writer presents the findings and discussion of the study. The conclusions and implications of the study are outlined in Chapter V.

CHAPTER II

REVIEW OF THE LITERATURE

A broad base of understanding must be developed in order to identify and understand the learning activities physicians experience as they incorporate changes into their practice. This base includes knowledge of who the physicians are as learners, why they learn and what influences their learning.

To answer these questions, this chapter discusses the literature concerning adult learning, the communication process, cognitive stages in the innovation-decision process and learning as it occurs in the medical field. Characteristics of the two physician groups studied and various social factors affecting them are discussed in subsequent chapters.

The Adult Learner

One primary concept which this study centers on is adult learning. Adults possess unique learning characteristics and are also shaped by many adult-specific factors. It is within the context of these special qualities of the adult learner that this study must be viewed.

The Self-Directed Adult Learner

Unlike younger individuals, adults approach learning with a rich and extensive past history. Kidd (1973, p. 45) characterizes adults as having more experiences, different types of experiences and experiences that are organized differently than other learners. When these adult-specific life experiences interphase with learning experiences, adults are most likely to pursue learning endeavors. Havighurst (1952, p. 4) describes this juncture of life experiences and learning experiences as a "teachable moment." That is, when a person experiences a need for a skill or knowledge which will solve a life problem, their motivation to learn is heightened.

Furthermore, Kidd (1973, p. 37) sees adults solving problems with no "correct" answers. Answers to many adult problems cannot be verified to the point of no doubt. This is the uncertainty that adults must learn to live with. Also, adults are bound by roles and traditions that force stereotyped answers on the adults which may not be entirely rational. Lastly, when adults make decisions, they are likely to have immediate effects upon others.

Knowles (1980, p. 18) describes adults as self-directed learners who are motivated by internal incentives. As a result, the adult learner takes the initiative, determines personal needs, formulates goals, identifies resources, chooses appropriate learning strategies and evaluates the learning outcome. So different is adult learning that

Knowles (1980, p. 19) uses the term "andragogy" to refer to the "art and science of helping maturing adults to learn." Supporting this self-directedness, Tough (1971, p. 16) has studied the adult learner and found that adults engage in about five learning activities per year (one learning activity involving 100 hours) and that 70 percent of these are self-planned. Adult learners are not only self-motivated but pursue learning primarily in informal and independent ways.

The need to progress through a series of sequential steps characterizing human development can be viewed as one source of motivation for inner-directed learning. For example, Erikson (1980, p. 129), has outlined eight stages in a life cycle in which certain developmental tasks must be accomplished and critical issues resolved to progress to the next stage. Levinson (1978, p. 18) describes age-linked periods related to patterns or designs of a person's life at a given time. Learning activities occur when it is necessary to change behavior in order to maintain an equilibrium--goodness of fit--between one's life structure and one's experiences of self. Motivation for adult learning can also be seen as a need to progress through Maslow's (1970, p. 35) human needs hierarchy--physiological, safety, belongingness and love, self-esteem, and self-actualization--where fulfillment of one set of needs is generally achieved before embarking on the next higher level. While it may not be clear if progressive development

through these various schemes is a universal, innate human desire or a dictum of society, it is reasonable to assume that these factors do influence the way adults learn.

Making Changes

Tough (1982) has also studied adults as they make intentional changes. Intentional changes are those that occur when a "person clearly chooses the particular change and then takes one or more steps to achieve it." (p. 20) Four major areas of intentional change, accounting for about 75 percent of all intentional changes, were identified: occupational, changes in human relations, recreational, and changes in the location of residence. (p. 25) The number of intentional changes varies greatly with the level of education and social class. Approximately one-third of all intentional changes are related to one's occupation or profession.

Unintentional knowledge acquisition and change, although not part of Tough's study, does play a significant role in adults' lives. Menzel (Roberts, 1981, p. 158) defines unplanned acquisition of information as "encountering information that proves relevant to one's work while not specifically searching for it, or while engaging in one's habitual current-awareness activities, or through the efforts of a person or agency whose business it is to do so."

Menzel also identified three types of unplanned

acquisitions of information in the biomedical field which include searching for one thing, coming across another; being sought out by a colleague to transmit information; and being told by a colleague while together for another purpose. There are some advantages to unplanned acquisition of information. For instance, interpersonal networks often result in information coming unsolicited from individuals in other disciplines.

Learning as a result of informal contacts and unplanned events can be viewed in relation to formal acquisition of knowledge. Both are essential for good communication and making changes. Menzel (Roberts, 1981) voices a belief that formal and informal knowledge acquisitions are not only mutually supportive but can also be used to enhance one another.

> Will the advances in information engineering ever make informal scientific communication obsolete, or does informal communication play an indispensible role? I believe the answer to that question is that interpersonal and unplanned communications must continue to play their crucial role in science and technology but that formal steps can be taken to maximize fruitful encounters. (p. 155)

Adults Pursuing Education

Houle (1963, p. 7) has summarized characteristics of adults who pursue continuing adult education and found that by far the most influential relationship was "the higher the formal education of the adult, the more likely is that he will take part in continuing education." Members of high

income groups and those in the late 20s to 50 age group are more inclined to seek continuing adult education. The larger the community, the greater length of residence in it, and the number of different kinds of programs available are other factors in adult continuing education. Additionally, married people participate more than singles; professional, managerial and technical people more so than other occupational groups; and finally, white-collar and clerical workers, then skilled laborers and lastly unskilled laborers.

Houle's (1963, p. 15) own research concerning adults' continuing education revealed that all learners studied "had goals which they wished to achieve, they all found the process of learning enjoyable or significant, and they all felt that learning was worthwhile for its own sake." What did differ among these adults was the major conception about the purposes and values of continuing education. Houle derined three subgroups which included those who were goal-oriented, those who use education to accomplish fairly clear-cut objectives; activity-oriented, those who participate just for the intrinsic value of the activity itself; and learning-oriented, those who pursue knowledge for its own sake. Houle qualifies his findings by saying "These are not pure types; the best way to represent them pictorally would be by three circles which overlap at their edges. But the central emphasis of each subgroup is clearly discernible."

Houle (1980) has also identified three modes of learning for the adult professional. The first is the mode of inquiring, which involves creating some new idea, technique or policy. Exploration and discovery are typical activities of this mode. Secondly, the instruction mode is primarily involved with the process of disseminating established skills or knowledge. This is the most familiar because of its common use in classroom instruction. The performance mode involves learning by doing. This is the type of learning mode students in "practical or clinical" experiences engage in. Houle has demonstrated how the invention of new processes can incorporate all three learning modes.

> The decision makers of the profession (sometimes stimulated or assisted by outside opinion) must use the mode of inquiry, sometimes in an elaborate and complex fashion, to identify the essential nature of the new method or theory and explore the ramifications of its application, thus educating themselves to both aspects. When a basic procedure has been established, it is disseminated by the mode of instruction to the other practitioners as well as to concerned external publics. The changed behaviors that should result are then encouraged by the mode of performance so that they become established in practice and are monitored by whatever means seem appropriate in the various workplaces in which professionals are employed. During this whole process, the advocates of alternative methods (including the traditional way of work) will usually actively advance their own views, but they too will shape and spread their views by using the same three modes." (p. 33)

How Adults Learn

Another way of looking at the adult learner is to examine Kolb's (1974, p. 23) learning model. This model

combines learning and problem solving and is both active and passive, concrete and abstract. The four-stage cycle can be conceived as: 1) concrete experiences followed by 2) observation and reflection leading to 3) formation of abstract concepts and generalizations which lead to 4) hypothesis which is tested in future actions, leading to new experiences.

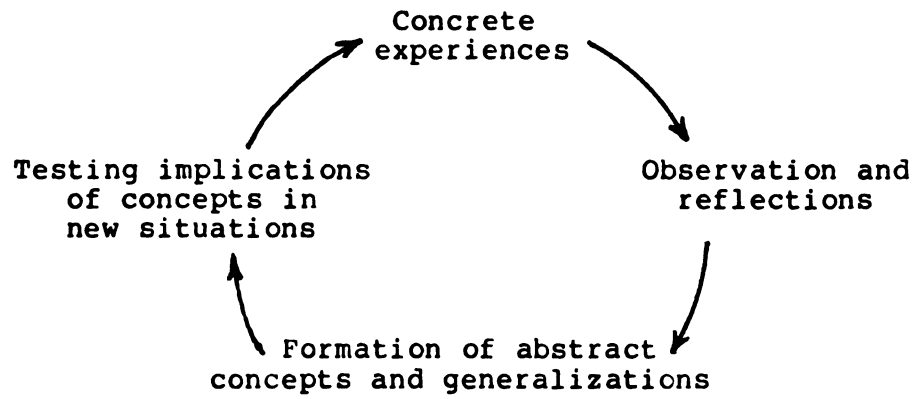


Fig. 1

Several observations are drawn from this model. Concepts in experience are continuously tested and modified as a result of observation of the experience. Kolb (1974, p. 28) states that "In a very important sense, all learning is relearning and all education is reeducation." Secondly, one's felt needs and goals determine to a large degree what learning tasks and experiences are undertaken, and how they are interpreted. Consequently, clear goals and objectives are essential. Thirdly, individual needs and goals influence the learning process in that individual learning

styles develop which emphasize one or more of the components of the model. Kolb (1974b) states that:

> As a result of our hereditary equipment, or particular past life experience, and the demands of our present environment, most people develop learning styles that emphasize some learning abilities over others. We come to resolve the conflicts between being active and reflective and between being immediate and analytical in characteristic ways. (p. 29)

As a result of Kolb's self-descriptive Learning Style Inventory, which measures an individual's strengths and weaknesses as a learner, some dominant types of learning styles have emerged.

Converger--dominant learning abilities are abstract conceptualization and active experimentation. This individual's greatest strength lies in the practical application of ideas and tends to specialize in the physical sciences like engineering.

Diverger--best at concrete experience and reflective observation. This individual's greatest strength lies in imaginative abilities. They tend to view concrete situations from many perspectives and are often found in the humanities and liberal arts.

Assimilator-- dominant abilities are abstract conceptualization and reflective observation. These individuals have an ability to create theoretical models and tend to be in the basic sciences rather than the applied sciences.

Accommodator--is best at concrete experience and active experimentation. Their strengths lie in doing things, carrying out plans and experiments, and in new experiences. These individuals are often in technical or practical fields such as business.

Evidence indicates that one's chosen field of work to an extent helps shape a learning style but it is more likely that a learning style predisposition guides an individual into a particular field. However, this finding was not supported by work done specifically with physicians.

Wunderlich (1978), for instance, found no predominant learning style type associated with physicians. Whitney (1978), also studying physicians, supports this lack of career choice-learning style correlation but did find that learning styles relate to the type of continuing education programs preferred by physicians. Data from this study indicates that family physicians attending a refresher course were more likely to be convergers. Differences were also found when studying instructional methods preferred by physicians.

Influence of Aging on the Adult Learner

Aside from the decline of physiological abilities accompanying aging such as loss of visual acuity, hearing loss, and a slowing of reflexes, adults also change in terms of mental ability with aging. Cattell (1963) and Horn and Cattell (1966) claim that intelligence should be viewed as being composed of two components, each varying differently with increasing age. These two types of intelligence are called fluid and crystalized intelligence.

Fluid intelligence is associated with "perceiving relations, educing correlates, and maintaining span of immediate awareness in concept formation and attainment, reasoning and abstracting." (Horn, 1968) This type of intelligence has a neurophysiological basis and is influenced by biological variables such as heredity, cortical cell count and brain cell injury. Fluid

intelligence reaches its peak before biological maturity (15-20 years of age) and gradually declines from that point.

Crystalized intelligence is associated with "performance in which skilled judgment habits have become crystalized (whence its name) as the result of earlier application of some prior, more fundamental general ability to these fields." (Cattell, 1963) Crystalized intelligence seems to increase from the onset of adulthood. The two types of intelligence are practically indistinguishable in early development; however, a gap develops upon biological maturation and continues to widen with aging. An adult's intelligence seems to remain fairly constant throughout the aging process but the nature of the intelligence does change.

The Communication Process

The communication process is a second fundamental process underlying this study. Everett Rogers (1983, p. 5) defines communication as "a process in which participants create and share information with one another in order to reach a mutual understanding." It is the diffusion process, a specific type of communication, which is of most interest in this study. Diffusion is "the process by which an innovation is communicated through certain channels over time among the members of a social system." (Rogers, 1983, p. 5) This is essentially the same as Berlos' (1960, p. 30) S-M-C-R communication model where a source (S) sends a

message (M) via certain channels (C) to the receiving individual (R).

Most studies of how people make changes in their lives focus on the adoption of an innovation. Change in response to an innovation certainly does not account for all changes made in one's life; however, in a rapidly changing technical field such as medicine, it does play a major role. In Rogers' (1983) text, Diffusion of Innovations, this diffusion process is conceptualized as having four elements: the innovation, communication channels, time, and the social system. This provides a basis for a general understanding of the diffusion process.

The Innovation

Rogers (1983) defines an innovation as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption." (p. 11) It is carefully pointed out that the "newness" aspect of an innovation is not strictly limited to new knowledge but also extends to forming a favorable or unfavorable attitude toward it or adopting or rejecting it. Often an innovation will have both a hardware aspect, such as a new tool, and a software aspect, consisting of the information base for using the tool. Innovations vary greatly in the dominance of either aspect. Information sought about an innovation is usually either software knowledge, which answers the what, how and why questions, or innovation-evaluation knowledge,

which pertains to the advantages and disadvantages of adoption.

Not all innovations diffuse at the same rate. Among the many influencing factors, Rogers (1983, p. 210) has cited five characteristics of innovations which are of greatest significance in explaining differing rates of adoption.

Relative advantage-the degree to which an innovation is perceived as better than the idea it supersedes.

Compatibility-the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters.

Complexity-the degree to which an innovation is perceived as difficult to understand and use.

Trialability-the degree to which an innovation may be experimented with on a limited basis.

Observability-the degree to which the results of an innovation are visible to others.

Another important aspect of innovations is that they are often closely related and adopted as a package. Rogers (1983) refers to this as a "technology cluster," which he derines as "one or more distinguishable elements of technology that are perceived as being closely interrelated." (p. 226) In addition to adopting several innovations simultaneously as a group, the adoption of one may trigger the adoption of several other closely related innovations.

Solo and Rogers (1972, p. 11) have outlined three different ways an innovation can diffuse through a social system, all of which influence the rate of diffusion.

First, a single tract transfer occurs when the diffusion of an innovation follows an established path, as innovations in a technology cluster might diffuse. New tract transfer occurs when an innovation cannot be plugged into an established pattern; a whole new activity must be established. Lastly, cross tract transfer refers to the transfer of an innovation to a completely different unrelated purpose.

Communication Channels

Communication channels play an integral component of the diffusion process as they are being used to transmit messages from the source of information to the receiver. Communication channels can be viewed as either coming from a localite or cosmopolite source and/or as interpersonal or mass media in nature. (Rogers, 1983, p. 198) Evidence suggests that communication channels function differently at various stages in the diffusion process. (Copp, 1957; Beal and Rogers, 1960, p. 6) For example, mass media is more influential at the initial dissemination of information stage, whereas interpersonal communication within peer groups is more important when forming an opinion or making the decision to adopt an innovation. Also channels used by early adopters differ from those used by later adopters. (Beal and Rogers, 1960, p. 19) Often early adopters rely on mass media channels to make adoption decisions, whereas later adopters are more likely to use interpersonal

channels.

Interpersonal communication can be viewed as either being between individuals who are alike or "homophilous" or dissimilar, which is termed "heterophilous." (Rogers, 1983, p. 18) It has been demonstrated that the most effective communication occurs when individuals are homophilous. In fact, a major problem in communication of innovations is that individuals are too dissimilar, heterophilous. There is too large a gap between those who are change agents and the target population. A more desirable situation is when the individuals involved are just slightly different from one another.

Time

The innovation-decision process (discussed later) is viewed as a series of information-seeking and information-processing steps an individual or group goes through when adopting an innovation. The time it takes for this process, the innovation-decision period, is influenced by a variety of factors including the aforementioned five characteristics of innovations. Time related attributes can also be related to the adopters, at least when examining individual-optional innovation decisions.

The innovativeness of an adopter refers to how early an innovation is adopted compared to other members of a social system. Rogers (1983) has identified five categories of adopter innovativeness. The five categories, which range

from high to low, are innovators, early adopters, early majority, late majority, and laggards. Members of each category typically behave in a particular pattern. For instance:

> Innovators are active information seekers about new ideas. They have a high degree of mass media exposure and their interpersonal networks extend over a wide area, usually reaching outside of their local system. Innovators are able to cope with higher levels of uncertainty about an innovation than are other adopter categories. As the first to adopt a new idea in their system, they cannot depend upon the subjective evaluations of the innovation from other members of their system. (p. 22)

Typically, if the number of individuals adopting an innovation is plotted on a cumulative frequency basis over time, an S-shaped curve results. At first, only a small number of individuals, the innovators, adopt, followed by the early adopters, early majority, and so on. The curve or rate of adoption varies in its slope from one innovation to another. Even the same innovation in different social systems will diffuse at different rates, which indicates that social systems play an important role as do the characteristics of the innovation.

The Social System

Rogers (1983) defines a social system as "a set of inter-related units that are engaged in joint problem solving to accomplish a common goal." (p. 24) Generally, social systems consist of patterned communication structures which are both formal (bureaucratic organizations) and informal (interpersonal networks) in nature. The informal

structure, aside from the heterophily/homophily concept discussed earlier, consists of influences such as system norms (established behavior patterns), opinion leaders (influential members in the social system, usually at the center of interpersonal communication networks), and change agents (one whose purpose is to influence others' decisions to change). Because each social system has its own particular variables such as these, diffusion of even the same innovation will vary greatly between different social systems.

The Innovation-Decision Process

The innovation-decision process, which is just one component of diffusion, is of most interest in this study. This process is viewed as a phenomenon which occurs over time and is characterized by a series of sequential learning steps individuals or organizations engage in, when incorporating a change.

Support for Stages in the Innovation-Decision Process

The notion of subdividing behavior into stages has a long history in social psychology. John Dewey (1933, p. 106) describes a five stage process by which problem-solving activity occurs. Much of the evidence supporting the existence of stages in the innovation-decision process comes from agricultural diffusion of innovation studies. (Ryan, 1943; Beal, 1957;

Copp, 1957; Beal and Rogers, 1960).

Wilkening (1953) was one of the first to demonstrate that an individual's decision to adopt an innovation takes place in stages. He describes the adoption of an innovation as:

> ...a process composed of learning, deciding, and acting over a period of time. The adoption of a specific practice is not the result of a single decision to act but of a series of actions and thought processes." (p. 9)

Wilkening cited four adoption stages: awareness, obtaining information, conviction and trial, and adoption.

Several studies of nonfarmers (LaMarr, 1966; Kohl, 1966) involving school personnel also support the notion of stages in the innovation-decision process. Additionally, Coleman's (1966) study of physicians' drug adoption practices supports the validity of stages. While these studies all generally support the concept of stages, there is some disagreement regarding the number of stages and exactly how the process is to be subdivided. (Mason, 1966)

Rogers' Innovation-Decision Process Model

The process of change in response to an innovation has been studied extensively in various disciplines, most notably in agriculture and business. (Rogers and Shoemaker, 1971) While several schemes have been designed depicting this process, the five stage model proposed by Rogers (1983, p. 163) provides the most comprehensive framework and integrates various concepts into the scheme: prior

conditions, communication channels, characteristics of the decision-making unit, and perceived characteristics of the innovation (see Appendix A). This model was derived from a synthesis of various interdisciplinary works, all contributing to a component of the scheme. The five stages of Rogers' innovation-decision process are knowledge, persuasion, decision, implementation, and confirmation.

The knowledge stage begins when an individual is exposed to the innovation's existence and acquires some understanding of how it functions. This stage requires the individual to have a motivation or need. Here a question of passive versus active acquisition of knowledge arises: does the need for an innovation stimulate knowledge acquisition or does the innovation itself create the need? In either instance the individual is stimulated to see how the innovation works, how to use it, and what the principles are underlying the innovation's functioning.

During the persuasion stage, a favorable or unfavorable attitude is formed about the innovation. Unlike the more cognitive knowledge stage, this second stage involves thinking that is more affective in nature. At this stage, information is more actively sought but in a selective nature, thus establishing general perceptions of the innovation's relative advantage, compatibility, and complexity.

At the decision stage, an individual chooses to either adopt or reject the innovation. Often a small scale trial

is part of this stage. Sometimes the trial may be done by a "near peer," thus substituting for an individual's own trial of an innovation.

The implementation stage occurs when the innovation is actually put into use and required an overt behavior change. Informational needs at this stage revolve around operational problems such as "how is the innovation used?" This stage ends once the innovation is institutionalized; that is, it loses its character as a new idea.

The last component of this innovation-decision model is the confirmation stage, in which support for the adoption/rejection decision is sought. This stage can continue for an indefinite period of time and can also lead to a reversal of the original innovation decision if new evidence is encountered.

While Rogers (1983) does argue for the existence of stages in the innovation-decision process, he does state that:

> The evidence is most clear-cut for the knowledge and decision stages and somewhat less so for the persuasion stage. There are rather poor data on distinctiveness of the implementation and confirmation stages. (p. 193)

The Process of Biomedical Innovation

The process of changes in the medical field involves many highly interrelated components. Several authors (Luhr, 1981; Moskowitz, 1981) have attempted to build conceptual models which integrate various components of the biomedical

innovation process. Furthermore, numerous approaches have been taken to investigate the diffusion of medical innovations among physicians. Such efforts include investigating how effectively an innovation has diffused (Stross, 1979), correlating sociometric relationships with diffusion of innovations (Coleman, 1966; Winick, 1961; Menzel, 1955; Wenrich, 1971), developing a change model (Geertsma, 1982), identifying sources of information and communication channels used at various stages in the innovation-decision process (Manning, 1978, 1980), and examining information acquisition and utilization (Bernstein, 1981). Issues centered on continuing medical education have also generated an interest in investigating physicians and the change process.

Biomedical Innovation Models

Two major goals in the biomedical field are to diffuse technologies into medical practices and to remove outmoded technologies. Because this requires coordination involving many participants, a conceptual framework has been sought through which various otherwise unrelated individuals and institutions can work in a coordinated way.

Lohr (1981) describes a two step medical technology assessment "loop." The first step is the generation and analysis of research data. The model conceptualizes an "upward" transmission of data and related analysis from the researcher, who may also be a practitioner, to a level

responsible for further analysis and synthesis. Following this assessment, the second route, interpretation and dissemination, leads "downward" to the practicing physician. Lohr proposes that the medical community plays a pivotal role in this scheme at the assessment level. Physician peer review institutions such as Professional Standards Review Organizations (PSROs) could be charged with this responsibility.

> An "upward" flow of information from the field includes identifying research problems and gathering data for analysis and interpretation, and we have hypothesized that (at least some) PSROs can carry out these tasks in ways that complement or supplement existing data collection activities. To date, little thought has been given to this kind of function for PSROs, so there is a paucity of theoretical or conceptual literature on the topic as it might pertain to PSROs. (p. 11)

Moskowitz (1981, p. 3) has proposed a hypothetical model describing the process of biomedical innovation with a particular orientation toward biomedical research. This model was derived primarily from fields outside the biomedical area.

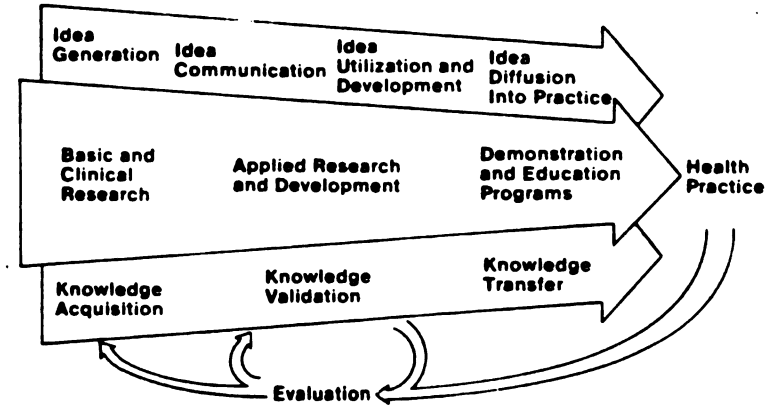


Fig. 2

The top arrow of this biomedical research spectrum indicates an overall flow of innovation. Four distinct stages are identified. The first stage is the generation of ideas in basic, clinical, and applied research. Motivation for these ideas lies in the desire to understand life processes and the disease process more fully. The second stage is the communication of ideas. This refers to the transfer of information among researchers. The third stage describes the development of clinical applications. Here, societal needs dictate the practical applications of the research and focus on the diagnosis and treatment of disease. The middle arrow of this model specifies the categories of research currently funded to advance biomedical research. The third arrow outlines the primary objectives of each phase of the research continuum.

The final component of this model is evaluation and links the four stages. Because an evaluation process is built into a research design, it is an integral element of each stage. This evaluation process is accomplished not only by the nature of the scientific method but also by the peer review system in the biomedical research community. In addition, before a technology is released for general use, formalized evaluation and validation are done in the form of clinical trials or other validation research. This is usually done at the third stage.

Using this model as a conceptual framework, Moskowitz views the health care industry as being significantly

different from other industries.

> In at least one subset of biomedical researchers there is a close relationship between the idea generators (biobehavioral and biomedical researchers) and those who put the technology into practice, physicians. In industries related to consumer goods, such as the automobile and electronics industries, researchers come from disparate basic disciplines such as chemistry and metallurgy. These researchers certainly use the ultimate products of their research but cannot be considered to promote or prescribe them in the marketplace. In the health sector, however, practitioners often enjoy the opportunity of a close relationship with researchers." (p. 4)

The Coleman Study

Coleman's (1966) study is one of the earliest addressing diffusion of a medical innovation and, like many studies done in this era, examines the diffusion of a new drug. While Coleman did not actually develop a change model based on this work, it remains an important component of Rogers' innovation-decision process and also contributes greatly to the understanding of how physicians adopt innovations.

The primary focus of Coleman's (1966) study was to examine those characteristics of physicians that were related to the time of adoption of the specific drug under study. In so doing, the following topics were examined:

1) The doctor's medical and nonmedical background.
2) His orientations and attitudes toward various aspects of medicine and toward his community.
3) His exposure to various formal and informal sources of information about new drugs.
4) His own account of the influences affecting his decision to adopt gammanym (if he adopted it).
5) His general use of the family of drugs which gammanym is a member and his treatment of

specific conditions requiring their use.

6) His relations with other doctors within the local medical community; his friends, his informal consultants, his "advisors." (p. 20)

What is most outstanding about this extensive work is that physicians' behavior was described by written records obtained from pharmacists' prescription files. This rather tangible dependent variable made it possible to accurately follow the diffusion pattern over an extended period of time.

The population under study consisted of 216 physicians practicing in four Midwestern communities. Physicians were chosen from three specialty groups: general practitioners, internists, and pediatricians. Data obtained from these subjects through personal interviews and prescription files revealed information concerning the diffusion of the new drug, characteristics of the innovators, factors influencing physicians' decisions to adopt, and the influence of social and professional networks on the diffusion of the drug.

By using prescription records, the Coleman study was able to accurately determine the rate of adoption and the manner in which the drug diffused whereas most other similar studies relied mainly on physicians' own accounts of their adoption behavior. In a summary chapter, Coleman did state, however, that "in broad outline and in many details, these findings are similar to those obtained by other investigators who relied on physicians' own accounts of what led to their adoption of new drugs." (p. 135)

When considering the actual diffusion of the new drug, Coleman found that physicians' first use of the drug was usually followed by continued use. Not only did the cumulative proportion of doctors introducing the new drug continue to increase, but the number of physicians using the drug exclusively (as opposed to competing drugs) grew from 2 percent two months after introduction to 22 percent after 17 months after introduction. (p. 31) Those adopting the drug earlier wrote relatively few prescriptions for it, thus allowing for a trial period. Later adopters, presumably relying on prior experience of their colleagues, tended to prescribe the drug more often once they adopted it. This cautious trail blazer phenomenon of the innovators has also been demonstrated in the adoption of hybrid seed corn by Iowa farmers. (Ryan, 1948)

Coleman found that there were indeed innovators (early-adopters) and late-adopters of the drug and that innovators of this drug were also innovators with other drugs. Innovators as a group differed from late-adopters in that they were more likely to be highly interested in medicine as a science, to orient their work to others within the profession (rather than to patients or non-medical people), to have a broader orientation to sources of medical knowledge in other communities, to be deeply integrated in the local medical community, to select colleagues as social companions, to have friends who are physicians, to belong to a hobby club with other physicians, and to talk medicine

when with other physicians socially.

In a more subjective component of the Coleman study, physicians' own testimonies were used to identify the sequence of events that led them to try the new drug. Physicians were asked how they first heard about the new drug, where they learned more about it, if there were other sources of information and which source was considered most important. The results of the study indicated that 57 percent of the physicians identified drug companies' detail men as being first to bring the news of the new drug, 18 percent said initial knowledge was received directly from drug house literature, 7 percent identified professional journals and 7 percent said they first learned of the new drug from another physician. (Coleman, 1966, p. 54) Like innovation adoption studies conducted outside of medicine (Ryan, 1943), physicians did not adopt the new drug upon initial exposure. In fact, only 10 percent started the drug use after only an initial introduction while the remaining physicians cited two or more sources (62 percent of these cited three or more sources). (Coleman, 1966, p. 56) As stated by Coleman (1966, p. 55), "mere possession of information concerning the availability of an innovation is almost never a sufficient cause to explain its adoption: information is not enough."

Although the concept of cognitive stages was not a design element in this study, Coleman indicates that the data does support the notion of stages as presented by Beal

(1957). Coleman (1966, p. 58) offers some justification for the assumption that the order in which physicians were influenced by the different media roughly relates to the sequence of stages. If the data is viewed in this light, then it can be seen that "The role of detail men and direct mail drops with the passage of time, while that of colleagues, meetings, professional journals, and drug-house periodicals (house organs) rises." (p. 64) This supports the notion that there are at least two types of media: those that "inform" and those that "legitimate." In this specific case, commercial channels of drug company detail men and direct mail tend to inform while the professional channels including colleagues, meetings, and journals legitimate.

Unlike other findings of innovation-adoption discussed earlier, this study suggests that both innovators and later-adopters go through the same decision-making process influenced by the same sequence of channels of influence. Innovators simply go through these sequences at a greater rate of speed.

A large component of this study consists of developing sociograms of social and professional relations among physicians. From such an analysis, it can be demonstrated that the diffusion of this new drug was a function of sets of physicians acting as communities and not merely as aggregates of unrelated individuals. (p. 130) Given this to be true, it can be seen that the new drug diffused through

the social system in several stages. Initially, those physicians with many professional interpersonal doctor-to-doctor relations were adopters. Next were the physicians tied together through a more socially based network of friendships. The third stage of diffusion involved the relatively isolated physician. The final group of physicians adopting the drug were those who acted independently of the time that their associates had introduced the drug, thus social influence ceased to be effective.

From this study it can be seen that the diffusion of an innovation, at least this new drug, is a result of various factors including attributes of the physician's practice, physician's background, exposure to different channels of communication, professional outlook, and doctor-to-doctor relationships.

The Geertsma Study

The focus of Geertsma's (1982) study was to identify a model characterizing changes physicians make in their treatment of patients. This was accomplished by conducting semistructured interviews with 66 physicians representing five specialty groups: general practice, internal medicine, pediatrics, obstetrics/gynecology, and surgery. The study was designed to determine the ways physicians make changes in their practice behavior by identifying stages in the change process, information sources, and factors influencing

change.

Geertsma defines practice behavior as "any recurring, patterned aspect or segment of the physician's thinking and actions in practicing medicine."

Initially a hypothetical model, constructed by the author, was used to base the interview questions. The model included the following steps:

Priming--the physician feels dissatisfaction with some aspect of his practice behavior.
Focusing--the physician becomes aware of alternatives or new practice behavior.
Rationalization--the physician envisions solutions to any practical problems associated with the potential change.
Triggering--the physician responds by implementing a change after a clear communication regarding the desirability of the change.
Evaluation--after making the change, the physician assesses the practical results.

The results of Geertsma's study indicated that a distinct change process over time, as proposed by his hypothetical model, was not entirely discernible. The first two stages, priming and focusing, were identified quite consistently. The latter was most consistent and provided a basic point of reference. The rationalization stage was present but could not be fixed at any one position in the change process sequence. Triggering was identifiable when it occurred; however, physicians did not frequently implement a change after an initial clear communication of a possible change. Evaluation was rejected as a stage of the change model because it lacked discrete time boundaries and because physicians did not generally make a conscious

determination of the value of a change. According to Geertsma, "The physicians were simply not critical of the changes they made." It was also found that following initial exposure to a possible change, physicians generally entered a period of further thinking about the change before acting. Consequently, a new stage called follow-up was added to the change model.

Following revision of the change model and final tabulation of results, Geertsma's determination was "that each stage in the model might play a part in some changes, but the sequence of priming, focusing, and follow-up constituted the heart of the change process." These results suggested that different types of changes influenced the number of stages identified. If the number of stages identified can be related to the complexity of the change type, then it was concluded that management changes are most complex, followed by drug use and patient relationship. The least complex were diagnostic, administrative and educational changes.

For both the focusing and follow-up stages, the agencies of change or information and advice sources were identified. They included colleagues, journals, conferences, Continuing Medical Education (CME) programs, drug company representatives, and patients. Results indicated that journals and colleague communication were the most important agencies of change. Colleague communication was especially important at the follow-up stage.

Sources of Information and Communication Channels

Various aspects of the innovation-decision process with respect to sources of information and communication channels have been investigated within the medical field. These studies can be loosely correlated with Rogers' innovation-decision model.

Christensen (1979) examined pediatricians and physicians practicing in a health maintenance organization (HMO). The source of first knowledge for two new drugs was identified and found that for one drug, colleagues were most influential, while drug company representatives were identified as most important for the second drug. Sources used by physicians for general drug information were uniformly found to be literature-based. Colleagues were most influential in persuading physicians to adopt a new drug.

Fineberg (1978) studied the dissemination of three medical findings among 354 anesthesiologists. The major source of information for one of the new medical findings was journal articles but for the other two, the importance of published papers was equalled by colleagues. Additionally, physicians were just as likely to change in response to a new finding whether they learned it from published papers, colleagues or continuing education courses.

A study of internal medicine house staff (Weinberger,

1982) as they incorporated preventive medicine into their practice identified sources of information related to the decision to change. Reading was found to be more significant an influence than any other information source including peers.

Manning (1979) studied how cardiologists first learned and continued their education in echocardiography. Results indicate that the printed page and self-instruction were the most important means of medical education for both stages of the innovation-decision process. Meetings and conferences were the next most important sources followed by discussion with colleagues and then courses. In a second study, Manning (1980) investigated how 449 general internists first learned the clinical principles of a particular drug and also how they updated their information. Medical journals were the most common sources of information at both stages of the innovation adoption process. In descending order, the next most popular sources were Continuing Medical Education programs and discussion with colleagues, Medical Letter, pharmaceutical company representatives and then hospital rounds. In comparing the two studies, Manning concludes that "physicians may use different sources according to the complexity or applicability of the information."

Harelik (1975) found physicians rated professional journals and the Physicians' Desk Reference (PDR) as the best sources of drug information, and Smith's (1975) study

found that physicians depend primarily on journals and texts for drug information. Stinson (1980) studied how physicians stay abreast of current advances in medicine and found that the use of various information sources was related to factors such as type of practice, specialty, location of practice, physician's age, and the size of the physician's primary hospital. This study showed that medical literature was the most common source of information. Other information sources included one to five hours each week in discussions with colleagues, five to ten hours each year at local professional meetings, five to ten hours per year at state meetings, 10 to 15 hours per year at national meetings, and 10 to 15 hours per year at medical school sponsored educational courses. In a study whose purpose was to follow the dissemination of new information (Stross, 1981), medical journals were the most common sources of information.

Information Acquisition and Utilization

Like so many other areas in this highly technical and rapidly changing age, the knowledge explosion, coupled with advances in communication, has created both tremendous benefits as well as some dilemmas. One such problem area is the acquisition and utilization of knowledge by physicians. The increasing quantity of literature alone is staggering (Durack, 1978) and illustrates some of the problems physicians face in their lifelong learning efforts. Price

(1963, p. 8) describes the exponential growth rate of scientific literature to be about six to seven percent each year, thus doubling in size every 15 years. Additionally, Warren (1981, p. 20) demonstrates the tremendous growth in biomedical serials by citing that 70 years ago there were only 1,000; 50 years ago, 1,500, 30 years ago, 4,000; ten years ago, 14,000; and currently there are more than 20,000 journals. At present the National Library of Medicine (NLM) collects approximately 3,000 journals published throughout the world and indexes them in the computerized Medical Literature Analysis and Retrieval System (MEDLARS). (BRS Database Guide, 1982) This database contains about 3,600,000 documents with a monthly increase of 20,000 citations.

The problem for the physician is not just one of learning new information. It involves considerably more effort. Physicians must acquire a source of information, determine what is applicable to his or her area of medicine, and decide whether or not the information is useful in their practice. Critics maintain that one major problem is that much of the literature is poorly researched and written. (Rutstein, 1961) Also there is the problem of a certain bias created when manufacturers promote products and take an active role in physician education. (McLaughlin, 1965; Avorn, 1982) This requires the physician to make judgments concerning the usefulness, value, and validity of others' work. The remaining problem is that of incorporating the

acquired knowledge into practice.

Summary

While various attempts have been made both in the communication and continuing education fields to identify a conceptual framework which integrates learning behaviors with a change process, no confirmation of a model or consensus of opinion has yet been developed.

Much of this work done in the area of information source, communication channels and stages in an innovation-decision process addresses the topic in such a way that the physician tends to be the target of information dissemination efforts rather than the object of investigation. Consequently, these studies tend to focus on the mechanics of diffusion rather than a conceptual framework built around the physician as a learner. For instance, there is often no effort to differentiate how a physician obtains information and what influences the decision to adopt or reject an innovation.

It is the intention of this study to focus on the physician as a learner. It is important to view the physician in the context of adult learning theories in association with the communication process, innovation diffusion studies, innovation-decision models, medical innovation models, and the magnitude of knowledge to be learned. Additionally, various sociological and psychological considerations must be taken into account in

an effort to gain a holistic view of the physician as a learner in the change process.

CHAPTER III

METHODOLOGY

Introduction

The purpose of this study is to identify physicians' learning activities associated with changes made in their practices. This is not a highly tangible area of study nor is the information sought at an easily identified, superficial level. For these reasons, grounded research was selected as the research methodology. This methodology provides for the necessary flexibility and sensitivity in data collection needed to identify physicians' change behaviors. Little work has been done in this area; therefore its study requires an open investigation, one that looks for new information and insights rather than verifying preexisting notions. From conclusions and hypothesis identified as a result of this study, further research can be initiated to verify, more quantitatively, the findings here.

This chapter will first describe the theory of grounded research and the interview as a research tool. Secondly, it will describe the study population and outline in detail the methodology used in this study.

Grounded Research Theory

Grounded research, as described by Glaser and Strauss (1967), Schatzman and Strauss (1973), and Glaser (1978) is a sociological method of discovering theory from systematically obtained and analyzed data. The basic concept about which grounded research centers is that it is the data that both initially provide direction and continually shape and modify the research. That is, conclusions, hypotheses and theories are developed directly from the data obtained in the area of study. This method provides the first step in discovering what concepts and hypotheses are relevant for a given area. Grounded theory differs from the traditional logico-deductive theory in that the latter is a process of verifying preconceived or "a priori" assumptions. Grounded research provides a process for identifying theories which are derived directly from the data.

The grounded research method is a conceptual process used to develop theory from data.

> Generating a theory from data means that most hypotheses and concepts not only come from the data, but are systematically worked out in relation to the data during the course of the research. Generating a theory involves a process of research. (Glaser and Strauss, 1967, p. 6)

Glaser (1978) has summarized and expanded upon previous works to provide a basic outline for conducting grounded research but cautions that there is no exact step-by-step procedure that must be followed. The following concepts are

essential components of grounded research. They may take on various forms in their execution.

Orienting Concept

A grounded research study begins with an orienting concept or perspective which can be considered the problem area. By design this focus is vaguely defined, thus allowing for modification once data collection begins. Initial entry into a research field must be done with as few predetermined ideas or "a priori hypotheses" as possible. This allows for conceptualizing and conceptual ordering of the emerging data into a body of theory, unencumbered by a preconceived theoretical framework.

> Beyond the decision concerning initial collection of data, further collection cannot be planned in advance of the emerging theory (as is done so carefully in research designed for verification and description). The emerging theory points to the next steps. (Glaser and Strauss, 1967, p. 47)

Theoretical Sampling.

> Theoretical sampling is the process of data collection for generating theory whereby the analyst jointly collects, codes and analyzes his data and decides what data to collect next and where to find them, in order to develop his theory as it emerges. This process of data collection is controlled by the emerging theory. (Glaser, 1978, p. 36)

As data is obtained, it is grouped into conceptual categories. Through a process known as comparative analyses, data from within the same study group or from another group is viewed in relation to the developing conceptual categories. Saturation occurs when all aspects

of a category have been identified and further data fails to reveal new properties of a category. The result of theoretical sampling is to elevate the data to a conceptual level where a few concepts represent an array of data. Grounded theory is based on the discovery of conceptual categories and their interrelationships, not upon individual facts. From these categories and the abstractions which develop from them, the central theoretical framework or core theory emerges.

Theoretical sampling involves both inductive and deductive logic. Initially, grounded theory is induced or drawn from data after data collection begins. Once conceptual categories are formed, the direction the research takes is deductively determined. At this point the developing theory guides further data collection. Herein lies the flexibility and sensitivity of grounded research. At any time in the research a shift of plan or emphasis can be made. As more information is revealed the researcher is able to use that information to guide the research. This enables the researcher to identify what is actually occurring in the field and to pursue new areas of interest while the research is ongoing.

> Generating theory and doing social research are two parts of the same process. How the analyst enters the field to collect the data, his method of collection and codification of the data, his integrating of the categories, generating memos, and constructing theory--the full continuum of both the processes of generating theory and of social research--are all guided and integrated by the emerging theory. (Glaser, 1978, p. 2)

Comparative Analysis

Comparative analysis is that part of the theoretical sampling strategy that involves the systematic choice and study of several comparison groups. This requires either examining the same group in a variety of instances or the same category in multiple groups. Initially the need for comparative analysis is to validate facts. The replication of data in a variety of settings and conditions is necessary to confirm data so they can contribute to a conceptual category. Secondly, comparative analysis can help establish the structural boundaries of facts, thus increasing the categories' generality and explanatory ability.

> The basic criterion governing the selection of comparison groups for discovering theory is their theoretical relevance for furthering the development of emerging categories. The researcher chooses any groups that will help generate, to the fullest extent, as many properties of the categories as possible, and that will help relate categories to each other and to their properties. (Glaser and Strauss, 1967, p. 49)

Comparative analysis also requires that additional data be constantly viewed in relation to existing data and to conceptual categories.

Two basic kinds of theory can be generated by comparative analysis. Substantive theory is developed from one empirical area and is limited to that specific area. Concepts identified in a substantive area describe that setting and concepts associated with it. No generalization is made from one situation to another. Formal theory, on the other hand, is developed from a conceptual area. It

transcends substantive areas, again using comparative analysis to identify conceptual qualities from a variety of areas. A close relationship exists between the two types of theories in that concepts identified in various substantive areas are drawn together to form formal theory. Hence both substantive and formal theories are grounded in data.

Theoretical Saturation

Saturation occurs when instances of a category repeatedly appear and no additional data are being identified that can develop properties of the category. At this point data concerning the same category must be identified in other groups until the repetition occurs once again. By maximizing the differences in groups, the varieties of data concerning a category will increase, thus developing many diverse properties of the category. Achieving theoretical saturation can occur at most any time during the research, making it impossible to predict at the onset of the research how many subjects within a group and how many groups will be sampled. Theoretical sampling based on saturation of categories differs significantly from statistical (random) sampling in terms of what is considered an adequate sample.

> Theoretical sampling is done in order to discover categories and their properties, and to suggest the interrelationships into a theory. Statistical sampling is done to obtain accurate evidence on distributions of people among categories to be used in descriptions or verifications. (Glaser and Strauss, 1967, p. 62)

Theoretical sampling requires that the groups used for

saturating categories be as diverse as possible. Statistical sampling, however, is dependent on techniques of random and stratified sampling. Such sampling is not necessary for theoretical sampling as the purpose of grounded research is not to demonstrate magnitude of theoretical relationships or an ability to generalize.

Coding and Data Analysis

The purpose and design of the grounded research methodology is to generate a set of categories and their properties which can be integrated into a theory. In such a methology where the emerging data controls the direction of the study, the key element is the coding and analysis of the data.

Coding refers to a process of isolating the data into individual indices or concepts and reorganizing them into conceptual categories. Thus, coding provides an important link between the data and theory formation.

> Coding gets the analyst off the empirical level by fracturing the data, then conceptually grouping it into codes that then become the theory which explains what is happening in the data. Coding for conceptual ideas is a sure way to free an analyst from the empirical bond of the data. (Glaser, 1978, p. 55)

Codes provide a condensed, abstract view of the data. This conceptual scope allows the researcher to transcend the empirical nature of the data.

Glaser (1978) describes two types of codes: substantive and theoretical. Substantive codes conceptualize the empirical substance of the findings. The

objective is to code different incidences or behaviors into as many categories, both new and old, as possible. In doing this the core relevancies emerge and provide direction through the process of theoretical sampling. Theoretical coding refers to identifying how substantive codes relate to each other. Like substantive codes, theoretical codes emerge during the research. It is from these codes that conclusions, hypotheses and theories are formulated. Theoretical codes provide an integrated scope, a broad picture and new perspectives.

Another important step in the coding and analysis of data is the writing of memos. Menos are a way to store ideas and can be written from the very beginning of data collection to the end of the research. Memos can be done on any aspect of the information seeking process including the related literature, the actual data and even from previous memos. Memos can be viewed as either theoretical or methodological. Theoretical memos represent ideas about codes and their relationships to each other, categories and developing theories. Methodological memos concern strategies, techniques and tactics of the research. It is the theoretical memo that elevates the data to a conceptual level.

Nature of Grounded Theory

The purpose of grounded research is to generate theory that accounts for behavior observed in the area of study.

Grounded theory provides explanations rather than validating preexisting assumptions. The result of the grounded research methodology is to conceptualize data, thus raising the level of thought to a higher plane where a few concepts indicate a large array of independent incidences. Grounded research produces a stable, well substantiated theory. Glaser and Strauss (1967) contend that:

> Theory based on data can usually not be completely refuted by more data or replaced by another theory. Since it is too intimately linked to data, it is destined to last despite its inevitable modification and reformulation. (p. 4)

Glaser (1978) lists four criteria that grounded theory should meet which enables it to be of practical use. First, the categories must "fit" the data. That is, data should not be forced or selected to fit pre-conceived or pre-existent categories. Nor should data be discarded in favor of keeping an existing theory intact. To accommodate the emergence of differing data, categories must be constantly reviewed. "Our position is that the reality produced in research is more accurate than the theory whose categories do not fit, not the reverse". (p. 4)

Grounded theory must also "work." By this Glaser means that the theory must be able to explain what happened, predict what will happen and interpret what is happening in a research area. This is achieved by the systematic and analytic approach of grounded research.

Thirdly, grounded theory must also be "relevant." The theory must reflect what is actually going on in the

research area. Relevance is achieved because the methodology allows core problems and processes to emerge.

Modifiability is the fourth of Glaser's criteria. Theory must be able to change as data continues to be collected. Theory is an ever-developing entity. It is not a perfected product. As the world changes and hence the data, so to must the theory be modifiable.

The Interview

The actual tool used to collect data in a grounded research study has a significant influence on both the process and outcome of the research. For this reason it is important to describe the data collection method and identify how it relates to other components of the study. Personal semistructured interviews were used as the data collection tool in this study.

An interview is a purposeful conversation. It involves both verbal and nonverbal interactions between two people who are working toward a common goal. (Fenlason, 1962) Its primary function as a research tool is to gain information and acquire insight. Gorden (1980, p. 5) states that "Interviewing is most valuable when we are interested in knowing people's beliefs, attitudes, values, knowledge, or any other subjective orientations or mental content." The personal interview was chosen for this study because, when compared to other data collection methods such as participant observer or pure observation, it provides data

within a relatively short period of time, encourages greater participant participation and it lies within reasonable limits of accessibility to the research field. Additionally, the interview method is useful in a grounded research study because of the flexibility it offers. For instance, the interviewer can identify and pursue areas of interest while conducting the interview. The personal interview is not locked into a rigid predetermined structure. Also, the direction and/or scope of the study can be altered from one interview to another. Other advantages include an opportunity to motivate the respondent to supply accurate and complete information during the interview, to guide the respondent in his interpretation of the questions, to gain greater control over the interview situation and to provide the interviewer a greater opportunity to evaluate the validity of information by observing the respondent first hand.

Conducting a series of interviews requires the interviewer to have an understanding of three basic areas: the influence of an individuals background, their view of the world and the social role they occupy in the social system; the facilitators and inhibitors of communication which interact during the interview; and interview strategies, techniques and tactics used to gather meaningful and valid data. The researcher's understanding and abilities in these areas will greatly influence how the research is designed, the various directions and forms it

will take while in progress, and the way the data is collected and interpreted. Furthermore, both the researcher and study participant's behavior must be viewed with respect to these areas. The interview is a two-way conversation, the behavior of the interviewer, data collection methods, direction of the interview and data analysis must all be viewed in the same conceptual context of culture and customs as is the behavior of the participant. The interview is a dynamic interchange where each individual's behavior is shaped by the others and by all those influencing forces acting on each person.

Backgrounds, personality and behavior, and roles

Backgrounds. Each person's background is shaped by individual differences in heredity, environment, experiences, culture and customs. An interviewer must strive to understand and accept people of varying backgrounds so that individuals' backgrounds can be a contributing factor in the understanding of the subjects' behavior. Likewise, the interviewer must be aware of his or her own background as it effects the process and interpretation of the study.

People's lives represent accommodations to cultural patterns and standards traditionally held by society. Culture influences individuals' lives through the impact of other's behavior upon them and by imitation and instruction of others. Fenlason (1962, p. 52) has outlined nine

concepts of culture which are applicable to an individual's life:

1. Every culture is of paramount importance to its possessor. It is alien only to those of other cultures.
2. To understand individuals in another culture it is necessary to have some appreciation of their culture.
3. One who functions in a culture is part of it, and every phase of his life and thought reflects that culture.
4. Behavior may be a response to distant rather than proximate stimuli.
5. A knowledge of the specific conditioning to which an individual has been subjected shows the functional relationship of things which are not logically related.
6. One can be physically and geographically in a culture and yet not psychologically in it.
7. In order to understand present behavior we must view it as a cross section of the past.
8. If we know past behavior, we can predict certain types of present and future behavior.
9. All our worlds are self-complete and self-contained; clashes and discord are part of normal functions.

The interview lies within the context of these concepts and must be viewed in relation to them.

Personality and Behavior. A person's personality and behaviors which express that personality are those significant features of an individual which repeatedly occur. The personality of both the interviewer and subject have an influence on the interview. Fenlason (1962, p. 98) describes ten generally accepted ideas of personality and behavior which are useful to the understanding of the interview method and data analysis.

1. The individual is a human being who functions in and is conditioned by his environment and his life's experiences.
2. Emotional needs take priority over reasoning.

3. Behavior is symptomatic, purposeful, and in response to our inner needs and strivings.
4. Behavior can be understood only in terms of our own emotional and intellectual acceptance.
5. Constructive, lasting results ordinarily come from satisfying, successful experiences.
6. There is a tendency to be what others consider us to be.
7. Behavior may be symptomatic of a serious disorder in the body of society as well as an individual failure to adjust.
8. A person cannot achieve his potentialities unless his fundamental needs--physical and emotional--are cared for.
9. Ideas become active only when charged by the desires and inner needs of the individual.
10. Modification of behavior results from facing the limitations imposed by the reality factors of any situation.

Role. A social role represents the way in which an individual behaves within a social context. Behavior within a role is controlled or at least influenced by societal and institutional factors and conditions, and by physiological and psychological forces within an individual. As a result, a range of perceptions and expectations develops which defines an individual's performance of specific activities and tasks. Social roles are related to one another. Not only do expected role performances demand expected behavior but also roles can dictate behavior of others toward a role. Social roles are learned during an individual's life and are constantly modified and reordered. In an interview situation both the interviewer and subject occupy certain roles within the context of the interview. Also, each member of the interview brings a host of behaviors which are a result of conditioning from the many roles each occupies.

Facilitators and Inhibitors of Communication

By nature of the interview method, it is highly dependent of the ability of both the interviewer and subject to communicate with one another. Although the subject has agreed to participate in the study, it is primarily the responsibility of the interviewer to see that the interview yields meaningful and valid data. To do this the interviewer must be aware of those conditions, actions and behaviors which either help or hinder communication. This knowledge must then be used to structure and control the interview in such a way as to maximize valid data collection. Gorden (1980) has described eight inhibitors and eight facilitators of communication which influence the interview. While being able to totally control or influence each of these influencing factors is not possible during the interview, it is at least important to acknowledge their presence.

Inhibitors. The first four inhibitors of communication tend to make the respondent unwilling to give information. The remaining four tend to make the respondent unable to give information even though willing.

1. Competing demands for time. The respondent feels there are other ways he should or would like to spend the interview time. The interviewer does not necessarily place a negative value on being interviewed, there are just competing demands.
2. Ego threat. The respondent withholds information when his self-esteem is threatened. This could lead to the respondent hiding information, being afraid of interviewer disapproval, not admitting an anxiety (even to himself) or fear of losing status.

3. Etiquette. People differ from one another in their roles and status in society. This creates a certain selectivity of information flow which can inhibit communication both up and down the status hierarchy. Both the nature of the situation as well as the relationship between individuals can inhibit communication. It is not always appropriate to say the same thing in any situation to any individual.
4. Trauma. A particular situation or topic may be associated with an acutely unpleasant crisis experience and hence cause the subject to either consciously of unconsciously withhold information.
5. Forgetting. The respondent is unable to recall certain types of information, particularly when dealing with facts of the past. This loss of memory may be hastened by selective psychological repression which makes it easier for the ego-defense system to reconstruct the past by simple ommission, addition or distortion.
6. Chronological confusion. The respondent confuses the chronological order of his experiences. This can happen either by confusing the sequence of events or incorrectly assuming that one condition or event was true at an earlier point in time. Here there is a tendency to utilize hindsight in interpreting events of the past.
7. Inferential confusion. Respondents may make an error in induction when asked to convert concrete experiences into higher level generalizations or may err in deduction when given concrete examples of certain types of experiences provided by the interviewer. Two sources of either type of error are the respondent's failure in abstract logic and a distortion of thinking which may be produced by strong attitudes and preconceptions.
8. Unconscious behavior. Information about a person's behavior which is not consciously directed is difficult to obtain. This behavior may result from custom or having subliminal responses to cues from others or from acute emotional stress where behaviors deviate fron normal patterns.

Facilitators. The facilitators of communication are those actions, behaviors or human phenomenas which can influence the social-psychological forces of an interview in a positive way. The interviewer may both take advantage of these facilitators as they just simply occur or in some

instances manipulate them to increase the flow of relevant information. The eight facilitators are:

1. Fulfilling expectations. This can be viewed as the "power of positive expectations." It is the responsibility of the interviewer to communicate a general expectation of cooperation as well as a more specific expectation of response to individual questions.
2. Recognition. People need recognition and the esteem of others and will perform for them. This can be provided by the interviewer in a sincere way during the interview.
3. Altruistic appeals. People tend to identify with a high value or cause which extends beyond immediate self-interest. This internalized response to some group value generally increases an individual's self-esteem. Understanding the respondent's value system can allow the interviewer to take measures to improve communication.
4. Sympathetic understanding. Most people have few opportunities to converse with a good listener. The interviewer can use this desire to be understood to improve communication.
5. New experiences. People generally enjoy new experiences. The novelty of the interview could provide interest in the interview and stimulate information flow.
6. Catharsis. This is the process by which people obtain release from unpleasant emotional tensions by talking about the source of their tensions and expressing their feelings. The interview provides an opportunity for the expression.
7. Need for meaning. People seek answers to questions such a "Where an I going?" Or "Why do events happen as they do?" Often a psychological tension (cognitive dissonance) develops in a individual when encountering any incongruence of facts, assumptions or interpretations.
8. Extrinsic rewards. These rewards other than those gained directly from the interview that encourage the respondent's participation. For instance, the interview may help solve a non-related problem which interested the subject.

Interview Strategies, Techniques and Tactics

To insure that the interview is indeed a conversation with a purpose, the interviewer must have a degree of

control over the interview. This control or manipulation can be exerted to varying degrees and at three main levels which are strategies, techniques and tactics. These controls can range from being planned for in advance to those which must occur spontaneously during the interview.

Strategies. The strategies used to develop a series of interviews include some of the broader conceptual considerations which are closely related to the basic research methodology. Strategies include determining who the interviewer will be and establishing the basic approach taken during the interview. Many strategies can be established at the onset of a study, however when using grounded research, new strategies are formulated and old ones modified along with the evolving research methodology.

Techniques. Interview techniques are those actions taken by the interviewer to minimize the inhibitors and to maximize the facilitators of communication. These may be verbal or nonverbal in form and are employed during the course of the interview. Some verbal forms used as techniques are: providing definitions of terms, helping the respondent understand the question, providing criteria and facts to be used by the respondent in making judgments and discovering the respondents' own contexts.

One crucial element of the interview is the posing of a question by the researcher. Techniques used to improve the communication of a question include using a vocabulary which is understood by the subject and not loading the question in

favor of a particular response. Also the scope of a question varies from a broad type which is useful for identifying the chronology of personal experiences, perceptions of facts and perspectives, to narrow questions which tend to reduce ego threat. Questions can also be open-ended or closed. Open-ended questions are more useful in discovering unanticipated responses, perspectives and hierarchy of values. Closed questions are useful when identifying specific facts. Closed questions tend to have motivational value in that they shorten the interview, thus reducing the problem of competing time demands. In any case, when structuring the questions, the interviewer should consider the type of information being sought as well as the effect upon the respondent.

Nonverbal communication, although not easily identified, does have a significant effect on the information flow during a face-to-face interview. Nonverbal communication tends to produce direct and immediate responses which circumvent the conscious deliberative process. Interviewers must develop techniques which increase sensitivity to nonverbal cues from the subject, be more aware of interviewer nonverbal messages and learn to control those signals. Gorden (1980) has described four modes of non-verbal communication which most nonverbal cues fall into.

1. Proxemics communication is the use of interpersonal space to convey meaning. The distance between individuals or between microphone and

subject should be controlled so that the positioning is not too close or far away. Positioning varies depending on different subjects, sex combinations and age variations.

2. Chronemics communication is the use of time in conversations to convey meaning such as feelings, attitudes and desires. The interviewer can control for example, his own rate of speech (pacing) and length of pauses between responses (silent probe). The silent probe is likely the most useful of the nonverbal techniques.
3. Kinesic communication refers to the use of body movements to convey meaning. Such movements include body posture, feet movement, hand movements facial expressions and eye movements. The researchers greatest use of kinesic communication is with facial expressions and eye movements.
4. Paralinguistic communication is the use of volume, quality of voice, accent and pitch to convey meaning. Altering any of these variables in a sentence can markedly alter its delivery and the way it is perceived.

Tactics. Interview tactics consist of using the appropriate order for the interview's statements, questions and probes. Any behavior used as a tactic must be viewed in a chronological context, that is, knowing what came before and what is expected to come after the tactic. An appropriate question or probe used at one point in an interview may have an entirely different effect at another time. The degree to which tactics can be planned in advance depends on the type of information sought, the setting of the interview and the amount of information desired. As an example, the probing question is a common tactic used when seeking further information or clarification. It is a tactic that cannot be planned in advance. A second useful tactic is the informal post-interview which is a short relaxed discussion after the formal interview. This tactic

has two main uses. Firstly, it is used as an ego-builder designed to leave the subject in a good mood. Secondly, it can be used to detect inhibiting effects of the formal interview.

Reliability and Validity

Reliability refers to the probability that an observation can be repeated either at a different time or at the same time by a second competent observer and give the same results. Validity refers to the extent to which the data conform to the facts. A relationship exists between reliability and validity in that the reliability of the data can be perfect but the observations may be erroneous. For instance, the respondent may consistently either intentionally or unintentionally provide misinformation. Consequently, if observations are to be valid, they must be reliable, but reliability does not guarantee validity.

The problem in proving validity in a traditional logico-deductive methodology is that most observations of behavior are indirect. Consequently, validity of the indicator must then be demonstrated. Glaser (1967) maintains that in a grounded research, validity can be obtained by replication using comparative groups. Furthermore, Glaser (1967) says:

> ...even if some of our evidence is not entirely accurate, this will not be too troublesome; for in generating theory it is not the fact upon which we stand, but the conceptual category (or a conceptual property of the category) that was generated from it. (p. 23)

As long as categories are adequately saturated, the findings will be representative of the circumstance or phenomena being studied.

Methodology for this Study

Grounded research methodology is a dynamic research approach, integrating the problem area, researcher, subjects and the study environment, all as part of a methodological process. As the research evolves these classes of variables are continually evaluated and redefined. The following is a description of these variables and a detailed outline of the research protocol.

The Reseacher

Like other variables in this study, the nature of the researcher plays an important part in the research process. Although the data is systematically obtained and analyzed, the interpretation and decision to proceed in any particular direction is primarily a function of the researcher. The researcher is a product of heredity, the environment and past experiences. Additionally there are emotional, economic, social and psychological forces acting on the researcher. The researcher is not an unbiased, independent third party whose presence in the study environment can be dismissed. There must be some understanding of the reseacher in relation to the study and an acknowledgment that, like other research variables, the researcher is a

part of the ever evolving process of grounded research.

The researcher conducting this study is a 34 year old Caucasion male born, raised and schooled in an industrialized midwestern state. An undergraduate degree, majoring in biology and minoring in behavioral psychology was obtained in 1973 from a mid-size state university which initially began as a teachers college. In 1975 a masters of science was earned from a large urban state university. During this time research training was essentially quantitative in nature with some exposure to observational field study.

Upon completion of the masters degree, employment was obtained at a large community college located in the same city where this research project is undertaken. At the college this researcher is an instructor of human anatomy and physiology. Additionally, some form of formal education has been pursued on at least a part-time basis during this teaching assignment. One learning activity undertaken during this time was a partial completion of a nursing program. Another experience involved a field study of the educational activities at one of the local acute care hospitals. Medical education was a primary focus of this study. These experiences offered the researcher an opportunity to experience a hospital clinical environment and gain insight into the operation of a general acute care hospital.

The Setting

The research environment is an influential factor in a study such as this one and must be considered when identifying physicians' behavior. All the participants involved in this study practice medicine in a medium size midwestern industrialized city with an urbanized area population of approximately 375,000 people (1980 census). Four general acute care hospitals are located within the study area with a total of about 1650 beds. Each hospital has its own area specialization and there are varying degrees to which each is specialized.

While none of the area hospitals are owned or managed by a research organization such as a university medical school, all are teaching hospitals. The hospitals, along with a coordinating local medical education agency, provide the last two years of clinical education for over 70 medical students. Additionally, there are more than 250 residency programs associated with the hospitals which prepare physicians for state licensing and specialty board examinations.

The Study Population

The study population consists of two allopathic specialty groups, including nine obstetrician/gynecologists and eleven internists. Within each group there are varing degrees of subspecialization (Appendix B). All physicians work in either solo or group private practice and have

admitting privileges in at least one of the area hospitals. The age range of participants was from 32 to 58. All physicians studied are Caucasian males with the exception of one foreign-born English speaking Caucasian woman.

The study participants have, for the most part, received much of their education and training in the state where this study was conducted. About one half of the physicians attended medical school in this same state. Additionally, most of the participants received their internship or residency training at one or more of the hospitals in which these study subjects practice.

All physicians in this study are volunteer clinical faculty for a state supported medical school. This clinical program is coordinated and administered by a local medical education agency. Volunteer teaching is done in addition to a physician's private practice. The function of the clinical faculty is to provide teaching and supervision for medical students as they rotate through various specialty areas.

Identifying the Study Participants

At the onset of this study, the exact number of participants and the specific groups involved was not determined. As the research evolved the character of the study population took shape. This is consistent with the grounded research methodology.

Prior to any participant interviews, an interview was

conducted with an obstetrics/gynecology resource physician who served as both the director of city-wide obstetrics/gynecology programs for a local medical educational organization and the program director for one of the local hospital's obstetrics/gynecology residency programs. The purpose of this orienting interview was to gather general information about the obstetrics/gynecology specialty. Data gathered during this interview concerned areas such as:

1. What kind of work obstetrics/gynecology physicians do.
2. The kind of people who seem to be attracted to this specialty.
3. Some history of the specialty group in the local area.
4. Influencing factors such as social, political and economic pressures that shape the specialty and those in it.
5. What type of changes have occurred in the specialty and how those changes have changed the specialty and those who practice in it.

After completion of the obstetrics/gynecology interviews and prior to interviewing any internists, a similar orienting interview was conducted with an internal medicine resource physician who, in addition to his private practice, serves as director of medical education for one of the area hospitals.

Obstetrician/gynecologists were the first physicians to be invited to participate in this research project. Initially 20 names were randomly selected from an alphabetized list of 38 obstetrics/gynecology clinical faculty and a letter of invitation was sent to each

(Appendix C). The purpose of the random process was to acquire an even distribution of data collection within the group rather than an effort to establish a basis for generalizing research findings beyond the parameters of this study group.

Along with the letter a self-addressed, postage paid postcard was included for the physician's response. Those physicians who responded positively to the invitation were contacted by telephone and appointments were made usually within a two week time. Physicians who did not respond to the initial letter were sent a second letter once again asking for their participation (Appendix D). Physicians who chose not to participate and those who did not respond to either invitation were not contacted again. For every physician who chose not to participate, a new name was randomly taken from the remaining names on the original list of physicians. The same process of invitation and follow up was followed for each of the replacement physicians until the list had been exhausted.

Initially the format for recruiting internists was similar to that used for obstetrics/gynecology physicians. A list of 20 volunteer clinical internal medicine faculty, consisting of an equal number of general internists and subspecialists, was developed by the internal medicine resource physician. These were physicians who the resource physician believed would be willing to participate. Invitations to participate were sent to each physician along

with a self-addressed, postage paid postcard. This letter differed from that sent to the first group only in that it identified both obstetrician/gynecologists and internists as study subjects. Follow-up letters were sent to those physicians who did not respond to the initial request to participate. Approximately half of the internal medicine participants were obtained in this way. Because of a low positive response rate from the initial invitations and due to time constraints the remainder of the internal medicine subjects were obtained by personal request from both the internist resource physician and the chief executive officer of the local medical educational agency with whom this research project is affiliated. Some of the physicians from the original list of 20 internists were contacted again and the remaining physicians were chosen and asked to participate by the internal medicine resource physician. These physicians were chosen based on perceptions of their willingness to participate.

Interview Format

The semi-structured interview used in this study should be viewed as a research tool that changes and evolves during the course of the study. As the data reveal the nature of physicians' learning activities associated with changes made in their practices, the scope and direction of the inquiry changes form. Consequently, the interview format changes to accommodate new study pursuits. Thus the semi-structured

interview format served as a framework providing order to the interview and at the same time retaining a degree of flexibility. This allowed the interview to flow more as a conversation than a question and answer dialogue. Using the interview as a framework also allowed for changing the order and nature of topics discussed during the interview, to consider time limitations, and to pursue topics of interest during the interview.

Interview Introduction. Each interview began with a brief introduction which included information about the interviewer, the nature of the research methodology and the purpose of the study. This took about five minutes. The essence of the introduction is as follows.

> Thank you for your willingness to participate in this study. I am a doctoral student in education at (name of university) This study is part of my degree requirements. One of my major areas of study has been lifelong learning. I have been learning about how and why adults learn in response to changes in their lives. Specifically, my interest is in identifying the type of learning activities physicians engage in when making a change in their practice. I have chosen physicians as a study group because the entire field of medicine is well known for its rapid growth and it would seem that physicians must have to make many changes to keep up in their field.
>
> The research methodology I am using is called grounded research. Basically this approach begins with an area of study, in this case, learning in response to changes occurring in a physician's practice. During the study, data is compiled and systematically analyzed. As a result, conclusions and theories are drawn from what is directly observed. In other words, there is no theory that I am trying to prove or disprove. There are no right or wrong answers. Your input, answers and observations, are the data that will form any conclusions or theories resulting from this study.
>
> Aside from my graduate studies I am also an instructor of anatomy and physiology at (name of

college) and have had some hospital clinical experiences. Please feel free to use your medical language when talking about your practice. If you say something I don't understand I will ask you to explain further if necessary.

If you have no objections, I would like to tape record our conversation so I can refer back to it at some later date. I assure you that you will remain completely anonymous. You have been coded with a number so your name will not appear on any transcript or final writing of this study. Do you have any questions before we begin?

Development of the Interview Components

The development of the interview format was gradual and based on previous interviews. Each interview presented new information and more questions. The development of the conceptual components was an effort to maximize data collection, verify previous findings, and answer questions resulting from earlier interviews. Hence, these components changed form during the course of the study and different aspects of each were emphasized at different times.

The first interview was loosely structured. The physician was asked to identify a change made in his practice and discuss how and why it had occurred. Due to problems of recall and inability to structure his thinking, the next interviews were structured into two conceptual components. This inability to easily perform the task produced behaviors such as looking at his watch, giving abrupt answers, and becoming restless. These types of behaviors were seen throughout the interviews and were used by the interviewer as signals to change the course of the

interview.

The first component was designed to help the physician identify the various changes which have occurred in his or her practice within the last two years. There was no attempt to develop a complete cataloging of each change type which could then be used to compare one physician's experience with another. It was determined that this was neither feasible nor productive in terms of understanding physicians' learning activities.

Throughout the first eight interviews, as more was understood about physicians' response to change, the need to identify these findings in relationship to physicians' as learners, their needs, habits, and motivations became important. Hence the development of the third component. This component evolved during the last several obstetrics/gnyecology interviews and was fairly consistent through the sixth internal medicine interview. At this time, less effort was spent on components one and two and more emphasis was placed on component three. For the remaining internal medicine interviews, the third component was further expanded to identify more about physicians' information storage and retrieval systems. The emphasis here was in understanding how and why information storage and retrieval systems developed, to what extent they are used, and in what way they influence learning associated with changes made in practice.

In order to allow for a free and spontaneous interview,

a rigid sequence of interview components was not followed during the interview. For instance, if a conversation moved into another component area and was constructive, it was allowed to continue. The purpose of the interview format was not to impose a rigid control on the conversation but simply to help give the researcher a way of structuring the incoming data and to help move the interview in a positive direction if necessary. Also, the order and emphasis on individual questions within each interview component was not strictly adhered to. These factors depended largely on the physicians' interest, willingness, abilities, subjects being discussed, and time.

First Interview Component. The first component of the interview was a cataloging of the various changes the physician had made in his or her practice. This was done initially to identify changes made by the physician and so the interviewer could have several options for more detailed discussions. The need for this structure was determined during the first obstetrics/gynecology interview. Because of the first physician's difficulty in identifying recent changes, this portion of subsequent interviews was more structured, reducing the difficulty of the physician's task.

Following the initial interview, eight change types were presented, one at a time, to help organize the physician's thoughts and stimulate recollection. The change types were developed by Geertsma (1982) who, after conducting interviews, identified changes made by physicians

and grouped them into eight classifications. These change types are not mutually exclusive as some changes do fall within several classifications. For each change type the physician was asked to think of any change he or she had made, regardless of its significance to the practice or patient care. These changes were to have been made within the last two years. The purpose of the time limitation was to both help organize the physician's thinking and to minimize problems with recall. It was specifically stated that the change need not be the most important change made in the practice. The eight change types are:

1. administrative/office procedure
2. drug use (new drug or new use of existing drug)
3. patient relationship and education
4. technical aspect of diagnosis
5. diagnosis approach
6. technical aspect of management
7. management approach
8. own education

In the event the physician did not completely understand what was meant by the change type, an example was given. These examples are listed on a data sheet. (Appendix E) The physician's understanding of the change type was determined by observed facial expressions, length of time prior to responding, length of response, patience, questions posed by the physician, and by the appropriateness of the responses.

Brief notes were taken on a data sheet (Appendix E) during this first component of the interview which enabled the researcher to refer back to the change during subsequent discussions. Some changes required short discussions for

purposes of clarification or to determine if pursuing the change later would be useful. As the changes were being listed and discussed, an indicator was placed on the data sheet next to those changes which might be discussed in more detail in the second part of the interview.

Following the last change type, several questions were posed to identify the scope of physicians' exposure to changes. First, physicians were asked to identify their learning resources and indicate the order of importance to them. Second, they were asked, "Of all the new things that you come across each year what percent of them do you actually incorporate into your practice?" The purpose in asking these questions was to get the physician to link the specific changes just outlined with where these ideas come from and put in perspective the changes they have made with respect to the total mass of new information to which they are exposed.

Second Interview Component. The second component of the interview consisted of detailed discussions concerning two or more of the previously stated changes. The number of changes discussed depended on the nature of the changes, time spent on each change, extent of the physician's learning activities associated with the changes, the amount of time available, and the willingness of the physician.

The decision to chose one change over another was based on considerations such as:

1. The novelty of the change.

2. How long the change had taken.
3. The complexity of the change.
4. How closely connected the change was with other changes made in the physician's practice.
5. If this particular change had been discussed with other physicians.
6. How often the change is used.
7. Who made the decision to change.
8. How interested the physician seemed to be about the change.

Some changes were chosen because they had been discussed with other physicians. This helped to saturate the research categories. Other changes were chosen to contribute to research categories such as to what degree a physician has control in implementing a change, how does competition influence change, what affect medical-legal problems have on making changes, and how varying degrees of specialization influence change in a practice.

There was no predetermined criteria for deciding which of the changes would be chosen for further discussion as there was no way of predicting physician's responses. The decision was made based largely on the intuitive judgment of the researcher at the time.

At the beginning of each detailed change discussion, physicians were asked to outline the sequence of events and activities that led to making the change. To get the conversation started, physicians were asked to go back in their thinking to before they had any knowledge of the innovation or change and to explain how they dealt with the situation at that time. This question not only served to establish a point from which to begin a discussion about the

change but it also provided a brief historical perspective. Such a view was necessary for understanding why and how the change was made. Following this response the physician was asked if they were more satisfied, as satisfied or less satisfied with that practice compared to all the other activities in their practice. The purpose of this question was to identify a motivation for making the change. Why did the physician make the change? Was there an outstanding problem that needed to be addressed or did the change just happen to come along?

As the detailed description of individual changes progressed, probing questions were asked when the information was not volunteered, or to keep the discussion centered on the subject. These probing questions were initiated after the first interview. The wording and order of these questions developed from each subsequent interview during the first five interviews. From that point this portion of the interview remained fairly constant. These questions that developed do not represent the only questions that were asked in each individual interview.

1. When did you first learn about the change?
2. How did you first learn about the change?
3. What prompted your first learning of this change?
4. Were you actively seeking the solution to a problem or did it come about as part of your routine of keeping informed and up-to-date?
5. Why did you happen to pick this particular change?
6. Did you acquire additional information after first learning of the change?
7. What did you do to learn more about the change?
8. How long did it take you to decide to change?
9. When did you decide to change?
10. What influenced your decision the most to adopt the

change?
11. From the time you decided to change to the time you actually implemented the change, did you pursue any learning activities? What were they?
12. What activities have you been involved with in conjunction with this change since its adoption?

These questions were designed first of all to help establish a sequence of events and activities associated with each change. This helped to better understand the changes and put them into perspective with the rest of the physician's practice. Secondly, their purpose was to identify not just the mechanism of change such as how and when, but also why the change was made and what the physician's motives were for making the change. In other words, why would the physician want to change and go about the necessary learning activities associated with making the change? Physician's responses were recorded on the data sheet (Appendix E) for use during the interview.

As more obstetrics/gynecology physicians were studied, the form of the interview changed. With each interview, the researcher became increasingly familiar with the type of changes characteristic of the specialty. Consequently, less time was needed for cataloging changes. This enabled more time to be spent in detailed discussions of individual changes. Additionally, as more data were compiled, categories of learning and change behavior emerged. Each additional interview was an opportunity to explore properties of the study categories. When further data collection did not reveal any new properties of the

category, saturation had occurred. At this point in the research, the saturated categories, along with unanswered questions, contributed to the direction of the study.

During the development of the interview questions, some topics were initiated but eliminated after a first attempt. For instance, in this component, an effort was made to identify the significance to the physician of each change discussed in detail. Five levels of significance, adopted from Geertsma (1982) were used. They included:

1. physicians' convenience
2. patients' convenience
3. preferable treatment, not life-death involving
4. major system involved
5. life-death or morbidity directly involved

The purpose of doing this was to learn more about the change and the physician's motivation for pursuing it. After using these questions in one interview, it was determined to be too time consuming, difficult to explain, and failed to yield information that could not be obtained from other parts of the interview.

The choice of categories, degree of saturation, and the direction pursued were all decisions deductively derived by the researcher. As a result of this grounded research methodology, a third interview component was developed.

Third Interview Component. The third component of the interview was initiated during the last two obstetrics/gynecology interviews and continued to varying degrees throughout the remaining interviews. This interview component was designed to initiate conversation that would

reveal more information about the physician as a learner. The core questions were:

1. When you read a journal, listen to a speaker or interview a drug company sales representative, what motivates you to pursue one of the many things that you are confronted with?
2. Within the last year, what practice or activity were you so displeased with that you actively sought a change?
3. Think of all the different areas of learning that you experience. List the major categories. For instance: a) patient care and treatment b) business aspect of your practice c) leisure activity d) family e) personal growth.
4. Prioritize these categories in terms of the amount of time and energy spent in each.
5. Do you set aside a time for learning? How much time? When? What type of things do you learn during this time?
6. Do you find that this amount of time just keeps you caught up or are you able to pursue areas of interest?
7. What are these areas of interest? Lately, what have you pursued?
8. What motivates you to pursue learning in these areas?

Initially, following question number four, physicians were asked, "What percent of you as a learner does each category make up?" This was not an attempt to quantify the data but to simply give a clear view of the different areas in which physicians learn. This proved difficult to obtain, highly subjective, and failed to contribute meaningful data.

The extent of this inquiry was dependent on the time remaining in the interview and the willingness of the physician to participate.

The ninth obstetrian/gynecologist interviewed (Dr. 109), was the last of the original 38 physicians who were invited to participate in the study. In all likelihood a personal

appeal by an inside contact such as the obstetrics/gynecology resource physician could have increased the number of obstetrics/gynecology participants; however, at this point in the study, the decision to change study groups was made. The primary reason for the decision was based on the need to broaden the research categories by studying those categories in another group. By the ninth obstetric/gynecology interview, the data were not revealing any new properties of the original categories, thus saturation had occurred. The secondary consideration was that participants who first declined and then were prodded into participating may have been less than willing subjects and thus may not have contributed meaningful or sufficient amounts of data to the study.

The series of internal medicine interviews paralled, to a degree, those of the obstetrician/gynecologists. The first several interviews focused on learning about the physicians, the nature of the specialty and the type of changes made in the specialty. Research categories and their properties established during the obstetrics/gynecology interviews were further investigated to reinforce and expand those categories and to establish new ones.

As the initial research categories within the group of internal medicine physicians reached saturation, more emphasis was given to the third component of the study. Especially during the later interviews, this third component

was further expanded to identify physicians' routine learning behaviors and to learn how they respond to being constantly confronted by an ever increasing volume of information. Typical questions concerning this area were, "How do you store and retrieve information?" and "How secure do you feel about the effectiveness of your information storage system?"

Closing the Interview. The procedure for closing the interview and the interview follow-up was the same for both study groups. At the conclusion of each interview, physicians were thanked for taking the time to participate in the study and for being willing to talk about their practice. At this point the audio-recording was stopped. This was done to create a more casual and open environment in case the recording was inhibiting in any way. Physicians were then asked if they had any questions or comments they would like to make. This part of the interview varied in length depending of the physician's schedule and interest in the study.

Interview Follow-up

The follow-up procedure for each interview consisted of a written post-interview note, a transcription of the audio-recording and a thank you letter sent to the study participant. The post-interview note included the researcher's impressions of the interview such as the length of time the interview took, the willingness of the subject

to participate, any particular attitude or environmental condition worthy of noting and the ability of the participant to answer questions. Additionally, data collected after the audio-recording had stopped was documented. These post-interview notes were written within several hours of the interview. (See Appendix F for an example.)

Each interview was documented to facilitate data analysis and to insure accuracy of the reported interview. At the beginning of each audio-recorded interview, the researcher stated the date and the participants code number. Throughout the interview the physician was not referred to by name nor were there questions asked that would reveal the identity of the physician. Following the interview the audio-recording was transcribed by a typist and returned within approximately one week. (See Appendix G for a typical example of the transcription format.) Two interviews were not audio-recorded, one due to recorder failure and another at the request of the physician. In both cases, detailed notes were taken during the interview and a report was written directly following the interview.

Thank you letters (Appendix H) were sent in two groups. The first set was sent following the obstetrics/gynecology interviews and the second set following the internal medicine interviews.

Handling the Data

Upon receiving the typewritten transcript of the interview, the data were initially analyzed to organize them into the various developing research categories, to identify new categories and to make notations regarding the direction of the study. Notations were made directly on the typewritten transcriptions. As the study progressed, the data from each interview was compiled onto a single large data sheet to help visualize and assess the data. This helped the interviewer to see strengths and weaknesses in the interview, trends in physicians' responses and provide yet another way of looking at the data. As part of the continuous process of data analysis, research notes were written in addition to the initial individual interview analysis. These notations were taken from all the data collected and were both methodological, referring to how the research was being conducted and theoretical, which involved handling the findings of the study. The sequence of research components and their development as outlined earlier in this chapter are a result of this process of ongoing notation and analysis.

Reliability and Validity

Reliability and validity of a study such as this one are by the nature of the study difficult to demonstrate. There are some aspects of the research methodology which do contribute to reliability and validity; however, in light of

the type of research, neither consideration was of primary importance to the study. There are aspects of the research method that do contribute to the reliablilty of the findings including:

1. All the interviews were conducted by the same interviewer.
2. A consistent format was used for all interviews.
3. All interviews were well documented either by audio-recording or by the researcher in written form.

These factors deal mainly with the actions of the researcher. In a study such as this, there is little opportunity to observe the participants under the same conditions.

There are two elements of the research which contribute to the validity of this study. Firstly, the interviewer was familiar with the biomedical language used by physicians. This improved communication and understanding, thus allowing the interview to progress more smoothly. Secondly, at various intervals during the interview the researcher confirmed the comments made by the physician by briefly recapitulating the conversation. The physician then had the opportunity to correct any misunderstandings or omissions.

CHAPTER IV

FINDINGS AND DISCUSSION

Introduction

The initial focus or orienting concept of this grounded research study was to describe physicians' learning activities associated with changes made in their practices. It is from this point that the study begins and develops. In a grounded research study such as this, the research findings must be viewed not just as the end product of a methodology but as influencing factors in an ongoing research process. The results of one portion of the study determines the direction of the ensuing research. Because of this determinative nature, the presentation of the findings in this chapter will be chronologically sequenced and their influencing role as part of the research methodology discussed. Presented in this chapter will be the findings and discussion of the obstetrics/gynecology and internal medicine resource interviews; the first obstetrics/gynecology interview; the remaining obstetrics/gynecology interviews, considered together as components one, two, and three; and the internist interviews, also presented collectively in three components.

The Obstetrics/Gynecology Interviews

Of the 38 obstetrician/gynecologists invited to participate, 26 replied after the first or second letter of invitation. Of those who responded, 10 volunteered to participate and 16 declined. One physician who volunteered was out of state and would not be returning for six months. Due to the time element this physician was not included in the study. Although physicians were not asked to explain why they declined to participate, several indicated that they did not have the time or that their partner was participating and felt that their participation would not be necessary. One physician remarked, " -- lately I haven't had time to go to the john, let alone participate in a research project." Presumably the competing demand for time was a major participation deterrent. Further evidence of this was revealed during the interviews. Physicians often commented on the fast pace of their lives. This became apparent as the physicians described their practice. The fact that most interviews were conducted during the physicians' day off or after work hours also indicated that these physicians have little spare time.

Obstetrics/Gynecology Resource Physician

The obstetrics/gynecology resource physician interviewed prior to the participant interviews had a unique vantage point in that he was both a practicing obstetrics/gynecology physician and an obstetrics/gynecology

residency program director. This enabled him to view the specialty both as a participant and as an observer. It is from this perspective that the resource physician described the nature of the specialty and character of those in the practice. The essence of the interview is as follows:

> The obstetrics/gynecology physicians in this town are associated not just professionally but socially as well. Physicians do interact professionally with hospital affiliated functions and educational activities but also belong to a local social organization. This is a loosely structured group that allows physicians an opportunity to get to know each other and exchange information and concerns. This social aspect of practice does have some influence in that a person cannot just set up practice in this community without considering the social environment. There is a certain degree of networking and relationship building that must be accomplished in order to successfully practice in this town.
>
> Obstetrician/gynecologists as a group range from those who are rather conservative father-figure types to those who see their role more as health facilitators. Younger physicians seem to be coming out of the medical schools with less of the fatherly attitude. Also, society has changed somewhat in its expectations of physicians.
>
> Obstetrics/gynecology physicians are currently subjected to several social pressures that are having a significant impact on their practices. First, the birth rate is not as high as it once was and there are still many physicians. This has created a certain degree of competition in the field. Second, the medical-legal problem is particularly acute for obstetrician/gynecologists as they are the most commonly sued group of physicians. This creates many pressures and very high insurance premiums. Obstetrician/gynecologists are particularly vulnerable to being sued because they are easy targets. Injury or death of an infant, for instance, is a very emotional situation and can easily be used to play on the sympathy of a judge or jury. One scenario that sometimes occurs is that a physician will lose a suit and his premiums will increase. In order to offset the increased cost, the physician must increase his patient load which in turn increases his chances of making errors and being sued again. This downward spiraling eventually forces some physicians out of business.
>
> Lastly, the resource physician discussed several

> current changes in the field such as ultrasound, new generation antibiotics and vaginal deliveries for mothers who previously have had caesarean-sections. Several information resources were discussed including the Journal of Contemporary Obstetrics/Gynecology.

Following this interview a brief survey of the obstetrics/gynecology literature was done to identify current trends and innovations in the field. Several areas of interest identified were: colposcopy, nuclear magnetic resonance, electronic fetal heart monitoring, relating biparietal diameter with weight of the fetus, chorionic villi sampling, cryosurgical units and carbon dioxide lasers in obstetrics/gynecology surgery.

The First Interview

The results of the first obstetrics/gynecology interview are presented apart from the others in this specialty group because the methodology used during the initial portion of the interview was significantly different from subsequent interviews. Interviewing techniques and tactics were often modified from one interview to another; however, the greatest changes occurred following this interview. While the volume of data generated during this interview concerning specific changes is less than other interviews, the interview did have an important influence on the understanding of physicians' practices and the development of a more effective interview format.

After an introduction and orientation to the purpose of the study, Dr. 101 was asked to identify any changes made in

his practice within the last two years. It was stated that these changes need not have been the most significant changes made in his practice and that they could be as small as, for example, changing the type of suture used for a particular procedure. Dr. 101 had a difficult time identifying any changes and after several moments of contemplation began by saying, "Well I guess the most important change I have made within the last two years was to ..." Dr. 101 also stated that it was difficult to identify changes because of the gradual way in which most changes take place in his practice. "Things just seem to flow or blend in." These comments and others during the interview made it apparent that the need to structure one's thinking in order to improve recall and ordering of events and actions places an additional burden on the physician. This effort extends far beyond simple recall of single events. There either did not seem to be the necessary motivation on behalf of Dr. 101 to make the extra effort to structure his thinking, to increase his recall, or it was too difficult a task.

Three changes were identified during the interview: the addition of a new partner to the practice, the purchase of a new colposcope, and the practice of performing vaginal child births on women who previously had caesarean-sections. The purchase of a new colposcope was the first change to be examined in detail. This purchase was the third in a series of the same instrument used in the office, each being more

versatile and sophisticated than the former. The physicians in this group had been using this same colposcope at one of the local hospitals so they were familiar with it and had little difficulty when deciding to purchase a new one. Dr. 101 first learned of the colposcope in 1970 when he received a brochure from a university medical school advertising a course in its use. The first colposcope was purchased about one year after this course was taken by Dr. 101. Continued learning about the colposcope has been accomplished by reading journals, talking with colleagues, using the scope and by taking two additional courses, one in 1976 and another in 1981. Dr. 101 said his motivation for making the commitment to a new piece of equipment initially was because, "that was the way things were going, so I wanted to keep up." The incorporation of this technique into Dr. 101's practice has been gradual and seemingly at a pace consistent with the development of the instrument and technology.

The second and final change discussed in detail was the procedure of delivering children vaginally with mothers who had previously delivered via caesarean-section. This has been a highly selective practice which has developed within the last year. In the past the saying has been "once a section, always a section." Dr. 101 first considered this procedure after reading a growing number of journal articles addressing the issue. "This seems to be in line with other things like mirrors in the delivery room and father

participation. The patients want this so we have changed to accommodate." The physicians in Dr. 101's group practice began very conservatively in implementing this change and have continued based mostly on their own experiences but reinforced by evidence in the journals.

As a result of this initial interview, subsequent interviews were structured differently in order to improve the quality and quantity of data. During this first interview, changes were discussed as they were initially mentioned. This allowed for little flexibility in guiding the interview which tended to restrict data collection. To remedy this problem and the difficulty of recall, the interview was given more structure. Initially, two components were developed, the first outlining the various changes made and a second which examined several of the changed in more detail. The purpose of the first component was to divide the recall task into smaller, more manageable units, thus providing the physician a more specific area (change type classification) in which to focus. This also gave the interviewer an overview of the various changes made and an opportunity to select specific changes for the second interview component.

Obstetrics/Gynecology Interviews--First Component

Using the eight change type classifications (Appendix E) to help physicians identify changes in their practice did provide a large quantity of useful data. The total number

of changes identified per physician ranged from six to 23. During this first component many of the same changes were mentioned, although no one change was consistently emphasized or shown a particular interest in over the others. Each change was discussed only to the extent needed for a basic understanding by the interviewer. As the interviews progressed, less time was needed explaining each change because many changes had been discussed in previous interviews. The following is a brief outline of the changes identified in each change type classification and related significant observations.

Administrative/Office Procedure. The type of activities identified in this change type classification were changes in billing, dictating patient notes and progress records, cross referencing of diagnoses of patients, increasing the office space, adding a partner, hiring an office manager, hiring a personnel consultant and patient scheduling.

The business aspect of a private practice was most evident during this part of the interview. Since most physicians interviewed practice in a group, there are varing degrees to which they are involved in the business of the practice. This involvement ranges from primary control to none whatsoever. Several physicians expressed a lack of preparedness, disinterest or dislike for this aspect of a private practice.

Drug Use. Changes involving drug usage were generally

the easiest for the physicians to identify. This is probably due to the relatively high frequency of use. The types of changes in drug usage identified involved those used for stopping premature labor, treating genital herpes, tranquilizers, new generation antibiotics, treating condyloma acuminata and oral contraceptives. Another type of drug usage change involved using different combinations of new and existing drugs. Brief discussions about drug usage during this part of the interview indicated that this is an area of practice that changes rapidly and one in which the physicians' own experiences are influential in determining their use of a drug. For instance, several physicians described situations where they went back to using a previously prescribed drug because the new one produced too many harmful side effects or it turned out to be less effective than predicted.

Many drug changes, like the new antibiotics, are not conceptually new methods of treatment but simply new generations of existing drugs. The gradual evolutionary nature of these types of changes seemed to make it easier to incorporate them into practice.

Patient Relationship and Education. This area of practice had one of the lowest number of changes. Most physicians indicated that once they had set up their practice and mode of operation they have not changed. Some changes that were identified included giving patients more handouts and using some audio-visual aids. Interestingly,

the medical-legal climate has stimulated some changes. For instance Dr. 105 states:

> I think we've become much more careful about documentation, information that we give them--we try to be as informative as possible about procedures and about risks, because of the medical-legal climate. We're much more sensitive to the medical-legal climate today, which was something that wasn't there 20 years ago. Documenting everything in the chart, even to the point of having patients sign, sometimes, the fact that you told them something.

Dr. 106 echoed this concern by saying:

> Because of the problem of being sued, we are now having patients sign informed consents for many of the procedures which we do. This shows that they have been told about the procedure.

Technical Aspect of Diagnosis. The purpose of this change type classification is to identify new equipment, techniques or tests used in the diagnostic process. The most common type of changes were in the use of ultrasound, office D and C's, hysteroscope, performing routine blood sugars on obstetric patients, measuring height of fundus for identifying growth problems, use of laser treatment, and measuring fetal lung maturity. The surgical subspecialist obstetrician/gynecologist interviewed had the greatest number of changes in this area, some of which included new absorbable long retention sutures, soft tissue clamps, retractors and suction catheters. Overall, the general obstetrician/gynecologist does not use many tools and tests.

Diagnosis Approach. This change type classification was difficult for most physicians to respond to in that it required looking at an overall approach to identifying a

medical problem rather than a specific act or treatment. Also, because some of the change types are not mutually exclusive, there were changes mentioned involving other change types that might also fit here. For instance, a new test which would be considered a technical change might also play a key role in changing the way a physician approaches a diagnosis. Some of the changes mentioned included screening all pregnant patients for diabetes, routinely checking blood work measurements (MCV's), becoming more conscious of nutrition and using gonadotropins for diagnosing ectopic pregnancies.

Technical Aspect of Management. This change type classification involves changes in techniques, tests or tools that are used to manage a patient's condition once the diagnosis has been made. These changes include longer retention of superpubic catheters, use of Rhogam before delivery in Rh negative women, use of prostaglandins to bring on labor, increased use of fetal monitoring in labor, fasting blood glucose test rather than glucose load test, more aggressive suctioning of meconium, different surgical approaches, using a birthing room and allowing obstetrical nurses to have a much broader opportunity to intervene. Some changes in this change type classification are due to the change in technical diagnostic procedures previously described.

Management Approach. The relatively few changes identified in this change type classification parallels that

of the diagnosis approach classification. The basic ways in which medical conditions are handled, or protocols, do not change at the same rate as, for instance, drug usage. Changes in these areas require much larger conceptual innovations which are not as common. Some examples mentioned included being more aggressive in dealing with growth retardation during pregnancy, no longer using pre-operative radiation therapy in the management of endometrial cancer, trying to treat subclinical viral lesions of the genital tract, less radical excisions for vulval carcinoma, fewer drugs used, increased use of caesarean section in breech presentations, inducing all gestational diabetics, vaginal deliveries after a first caesarean section, and trying to help patients to be more responsible for their own health.

Own Education. Physicians identified the least number of changes in this change type classification. All but one physician stated they had made no changes within the last two years in the way in which they approach their own education. Most physicians indicated that once they set up practice and established habits, they had not changed. One physician did begin studying microsurgery at a dog lab which prepared him for using the microscope in surgery. This was a different way of acquiring knowledge for him.

Also, during this portion of the interview, physicians were asked to identify all their sources of information. Journals and meetings were the most consistently cited

sources. At least one of the physicians interviewed belonged to a journal club where colleagues gather to discuss some of the latest developments in the literature. Meetings included national, state and local professional organizations, continuing medical education programs and hospital meetings. Other sources included audio tapes, courses, textbooks, local peers and medical experts. Several physicians stated that teaching medical students and residents served as a source of information mainly because they have to prepare talks which makes them read the literature. Some physicians expressed a need to keep up on the literature just to keep ahead of the residents. In several cases, physicians learned of new drugs or procedures from the residents at the hospitals and made changes in their practices as a result.

Keeping up with the literature seemed to be a constant battle and a source of some anxiety. Many physicians often had a stack of journals, reprint articles and various other materials sitting on the edge of their desk waiting to be reviewed. Often physicians expressed in despair that they were behind in their reading. Dr. 103 did state that he set aside a time every day to read his journals.

Dr. 107 had a unique way of getting himself to do his reading and at the same time focus on what authorities in his specialty felt were important. Each year Dr. 107 takes the obstetrics/gynecology residency exam. This more or less shocks him into reading for the next several months in areas

where he feels he is lacking.

When physicians were initially asked about their information sources, they did not mention their own experiences; however, as the interviewing progressed this source of information became increasingly apparent. Physicians' own experiences must be viewed differently than other information sources. Their experiences are not a result of a designed experimental study but an accumulation of evidence based on trial and error. There are differing degrees to which physicians like being on the "cutting edge" in their practice. Physicians close to the edge use more of their own experiences and seek the latest experiences of their colleagues and the journal articles citing clinical trials. Other physicians may feel less comfortable working in untested areas and prefer to wait until an authority sanctions a particular practice or wait until there is a large volume of supporting evidence. Here it can be seen that the difference in physicians' approach to their practices also influences the way they seek information and learn.

Local authorities or area experts are also a very important source of information for most physicians. These physicians are either subspecialists whose area of expertise is highly focused or general obstetrician/gynecologists who happen to take a particular interest in one aspect of the practice and become an authority. Dr. 104 is an example of a physician who over the past 30 years in practice has been

an area expert on several topics. Dr. 104 describes a diffusion of information pattern which typically occurs. It can be described as an inverted pyramid model.

> ...usually one man will get interested in something and goes off and studies it. He becomes adept in the new procedure and then comes back and starts teaching the residents...other guys get interested and he may give a lecture or two. Some of the procedures we've monitored as the other doctors start doing it to make sure they know how to do it and that sort of thing.

Dr. 104 also provided an anecdote which shows a lighter side to making changes in practice, acquiring new information and disseminating medical knowledge.

> ...by mistake they gave me a suture that normally the heart surgeons use on heart valves, and I looked at it and looked at the needles attached to it, and I thought, "Gee, this would be really great for this procedure," so I said, "Don't throw it away--I'll use it." It has a suture on both ends, which made it real handy--we didn't have to be rethreading or working an area--if you drop a needle, you could really lose it forever.
>
> So I started using it and I had to write a letter to (physician), who is one of the leaders in the field in California, and said I came across a suture by error and you ought to try it, and now he tries it and he goes all over the country--meetings all over the country--he's always on the program--and now that's his suture.
>
> ...it's the one I found here by mistake! That's how medical knowledge gets diffused.

Obstetrics/Gynecology Interviews--Second Component.

The focus of the interview's second component shifted between the first and the last interviews. The initial conversations and questions centered on the sequencing of events and learning activities associated with each change. This general research category was investigated throughout

all the interviews but as basic patterns emerged, more attention was given to why certain learning activities were pursued. It is from this second research category that the initial portion of component three developed.

The number of changes discussed in this portion of the interview ranged from one to five per physician. Most interviews included either two or three changes. The total number of changes for all eight obstetrics/gynecology interviews using this first component format totaled 21. Most changes discussed had been made between one and two years prior to the interview. The most recent change was initiated eight months before the interview. Several changes had been initiated more than two years ago but minor alterations had since been made. New drugs and "tools of the trade" were most commonly discussed rather than diagnostic or management approachs. It would seem this is because the former were more commonly cited as changes made in practice and because they seemed to present the least recall problems. Drugs, for instance, often have release dates that help mark time and thus provide a frame of reference for the physician.

Most obstetrician/gynecologists were either satisfied or less than satisfied with how they were handling a particular condition prior to their knowledge of an innovation or change. This evaluation was made relative to their level of satisfaction of all the other activities in their practices. One physician was pleased with the

conventional method of treatment and had few problems with it but changed when a new drug treatment was available and was demonstrated to be superior. When physicians were asked if first learning of a change was a result of actively seeking the solution to a problem or routine keeping informed and up-to-date practice, all physicians cited the latter. Several physicians stated at this time that they did not consider themselves innovators or particularly like change in their lives. These physicians preferred to wait until a change was well established and leave the risk and experimenting to someone else.

Most physicians first learned of an innovation or potential change through journals, colleagues, meetings or company representatives. The information source from journals is primarily from articles, not from advertisements. Interestingly, company representatives were mentioned several times as first sources of information; however, they were not listed during the first component by any of the physicians as sources of information. In fact, several physicians mentioned that although there were a few good company representatives, by and large they were not trusted to give accurate and nonbiased information.

Most physicians indicated that the decision to change was based on the change being a better way of handling a particular situation. Specifically, issues like cost to the patient, patient compliance, large volume of convincing

evidence in journals and fewer complications were major factors in change decisions. Several physicians stated that they made the change because authorities such as the American College of Obstetrics and Gynecology had endorsed the change and they simply conformed to avoid possible lawsuits. One physician made a change in his practice based on desires of his patients.

The period of time between the decision to adopt and the actual implementation of a change varied from days to months, depending on the nature of the change. This time usually included few additional learning activities. One physician stated that before implementation he continued to read the journals to learn more specifics about the change. Two other learning activities included talking with a partner and identifying the materials needed in a surgical supply catalog.

Following implementation of a change, most physicians continued learning about the change by reading journals, talking with colleagues and noting their own experiences with the change. Continued learning activities associated with specific changes essentially became part of the physicians' keeping current practices where the physician simply keeps an eye out for any new developments in his or her current practice.

The following three examples of changes and associated learning activities illustrates the range of activities identified within the obstetrics/gynecology study group.

Example 1. This is the simplest and least involved type of change observed. Dr. 102 routinely orders blood tests for all his pregnant patients. When the blood work is done at the hospital, many tests are performed. Some of these tests are of interest to Dr. 102 and some are not but are done as part of the package of tests. One such routine test which is not specifically ordered by Dr. 102 is the Mean Corpuscular Volume (MCV). This test is a measure of the body's ability to produce hemoglobin. A low test value indicates a condition known as hemoglobinopathy, a relatively uncommon abnormality. If this test were positive for a patient, further tests would need to be performed to identify specifically what was causing the condition.

As of late August, Dr. 102 did not consider this lab value in assessing the health of his patients. This test was relatively new and had not yet been incorporated into Dr. 102's routine. At this time, Dr.102 attended a local continuing medical education (CME) program which included some discussion about this test. Dr. 102 stated that when he heard the speaker mention that physicians could be liable if they did not pick up a patient with hemoglobinopathy after receiving a lab report with a positive result, he decided to immediately start considering this test result. Once identifing the lab value ranges and protocol from the CME program, Dr. 102 did not pursue any further information about the test or its related condition.

Example 2. This example of a drug usage change is

typical of the majority of drug changes where the change does not represent a new conceptual idea or methodology. Many of the changes physicians encounter are of this nature.

Dr. 103 is an obstetrics/gynecology oncologic surgeon who one year ago adopted a new generation antibiotic, Cefobid, for prophylatically treating his surgical patients. Most surgery Dr. 103 performs involves the genital tract which becomes easily infected. Prior to surgery three to four doses of a broad spectrum antibiotic are given to establish a tissue level of antibiotic appropriate for the anticipated organisms. Cefobid is the latest in this series of antibiotics. Dr. 103 first learned of the new drug in mid-1983, first from reading journals and then by drug company representatives. Other sources of information included Drug Bibliography, clinical trials and reports of clinical studies.

> We principally hear it from the pharmaceutical houses' representatives who come and present the data about the drug and give us reprint articles, all of which strangely are in favor of the drug!
>
> Well, we looked at the cost--I guess that's the thing that really influenced us. Since it's really a twice a day dosage, it really wasn't any more expensive than the three or four times a day dosage of some of the alternatives or the prior generation of category of drugs. So we said, "Why not just try the new one?" It's only twice a day--expense is the same. The bacterial spectrum looks better, on paper at least, and so in a matter of just two or three weeks of checking that out with the pharmacist to be sure that the cost is comparable...

Dr. 103 has continued learning about the use of Cefobid by reading articles in journals when they appear and

reviewing literature that drug company representatives provide.

Example 3. Dr. 107's change in becoming more aggressive in suctioning of meconium from the fetus at delivery represents a change in the category of technical aspect of management.

> We've always been concerned about meconium in the past and felt that it may reflect fetal distress, and it may or may not do that, but we have learned that if the fetus at delivery does inhale the meconium into his lungs, it can cause a terrible pneumonitis, and so we have become more aggressive with visualizing the vocal cords and suctioning that even down below the vocal cords, which was never done before the last couple years.

Dr. 107 was unclear whether he first learned about this suctioning of meconium at a hospital or department meeting where clinical problems are discussed or from reading journals. He thought that perhaps he received information from these two sources at about the same time. Dr. 107 immediately became more sensitive to this procedure and soon attended a special seminar to improve his skills performing suctioning. The seminar was taught by a perinatologist from one of the local acute care hospitals. Local obstetricians were instructed about neonatal resuscitation, the management of newborns and complications. During the seminar the obstetricians used anesthetized kittens to practice visualizing the cords and suctioning. Dr. 107 found the experience very useful and amazingly similar to intubating humans, except for the kittens' sharp little teeth.

Obstetrics/Gynecology Interview--Third Component

The first two components focused on how changes and associated learning behaviors take place. The parameters outlined by the three examples illustrates the scope or degree of variation which loosely defines the relationship between making changes in practice and associated learning behaviors. As this area became repetitive, that is, reached saturation, the question of why physicians pursue learning not directly associated with changes in practice, what type of learners they are and how they go about learning, became important. Some of these concerns were identified during the earlier interviews and stimulated the development of the third research component. It became apparent that the way a physician learns in response to a change is dependent on the type of learner he or she is. A physician's innovativeness, willingness to learn and ability to make changes are all interrelated and highly dependent on the nature of the individual physician as a learner. This component was initially introduced in a simple form during the last obstetrics/gynecology interview and expanded with the beginning of the internist interviews.

The last obstetrics/gynecology interview initially followed a similar course as the previous interviews. Dr. 109 outlined the various changes made and described one change in detail. The third component began by Dr. 109 responding to a question about what motivates him to pursue one of the many things like journal articles that he

routinely encounters. Dr. 109's response was, "Pertinence to practice. How germane is it to my personal practice." Dr. 109 then picked up a stack of journals to be read and reviewed the table of contents.

> "Outcome and Effect of Medical Intervention in Women Experiencing Infertility Following Removal of an Ectopic Pregnancy." That's something that's germane to my practice. "The Role of a Swan-Ganz Catheterization in Severe Pregnancy Induced Hypertension." Well, I know that's something to think about, but I'm probably not going to read the article.
>
> I've never put in a Swan-Ganz catheter in my entire existence, but a case was presented recently from another physician right next door, in fact, in which a Swan-Ganz catheter was strongly recommended. Well, the thing is, now at least I have a perception of under what set of circumstances a Swan-Ganz catheter might be of value. I don't have to read this article now. But at least I can say, "Hey, that patient is experiencing these kinds of things, and I think I'm going to ask (physician) to come over and see my patient to see if this patient might benefit from the Swan-Ganz catheter. And so prior to either this article, if I had chosen to read it, or prior to the presentation of that particular case, which I had never seen before, I would not have even thought of using the Swan-Ganz catheter.

Continuing in this same direction, Dr. 109 was then asked how, when confronted with many articles or lectures that are germane to his practice, does he decide to pursue one rather than another. Dr. 109's response was that his choice is based on his perception of personal deficiencies.

Dr. 109 also identified a special learning need which subspecialists like himself have. To maintain their status as a "super authority" in a specific area they must improve already good knowledge so that it is superior to others in the local community. Subspecialists must be at least better informed than the person who just read the latest review

article.

The last part of this interview centered on looking at Dr. 109's total learning activities, not just the medical aspect, but all areas of of his life. Dr. 109 prioritized the major areas of learning in his life. By far the greatest time and energy spent on learning was with his medical practice. A distant second area was with a nonmedical related hobby. Areas three and four were associated with medical administration and medical societies.

The last question asked was, "Do you set aside a time for learning?" Dr. 109 said that he set aside the time from 5:00 until he falls asleep after the office closes. This involves approximately one to one and one half hours, four days a week. This amount of time is sufficient to allow him to pursue areas of interest if he picks and chooses what he looks at. Again, those things that he usually chooses are related to areas he perceives as his weaknesses.

The Internal Medicine Interviews

A common change pattern with associated learning activities was identified as a result of the obstetrics/gynecology interviews. This behavior pattern typifies physicians as being in a general state of alertness for information which is relevant to their practice. Here the term "relative to their practice" includes anything that improves a way of solving a particular medical problem, is

more convenient for the patient or physician, reduces the medical-legal problem, helps the physician's business become more viable and competitive, and makes physicians secure in knowing that they are using the best available methods of treatment. What is relative to practice can also be considered motivational.

For the most part, physicians structure their busy lives in such a way that they establish a communication network. Physicians read the literature, exchange information with colleagues, use resource people such as drug company representatives and pharmacists, and attend meetings. Additionally, physicians use, to varying degrees, their own experiences as sources of information.

Once confronted with information associated with a particular change, the learning behaviors that follow depend largely on factors such as how strongly the "authorities" endorse this change, the volume of literature associated with the change, usefulness to practice, and the cost versus benefit consideration. Learning activities associated with changes made in practice vary considerably. In an instance where there is a strong motivation to change such as a medical-legal problem, few if any learning activities may follow the initial exposure. Other changes may require additional information-seeking about the subject or about how to implement the change. This latter learning behavior seems to be directly proportional to the degree of uncertainty or complexity of a change.

The establishment of an information network provides the physician a mechanism for incorporating learning and changes into the routine of practice. These clinically based physicians are for the most part reactive rather than proactive learners. The routinization of learning keeps the physician at a comfortable distance from the cutting edge. Physicians do not have the time or energy to pursue learning activities in every area of their practice. They must rely on their information network to keep them adequately informed and up-to-date.

It is with this perspective that the study was continued with the second study group, the internists. The objective of the study from this point was to describe properties of the general research categories identified in the obstetrics/gynecology specialty group, to expand the parameters of the categories and to identify instances that did not conform to or fit the categories.

Of the 20 internists initially contacted by a letter of invitation, five responded positively. The remainder of the study subjects were recruited by personal invitation. Most physicians were very reluctant to take the time to participate in the research project. Response rate was much better when physicians were personally asked by a colleague.

The Internal Medicine Resource Physician

The interview with the internal medicine resource physician, like that of the obstetrics/gynecology resource,

yielded information about the specialty from an individual practicing within the specialty but at the same time removed somewhat by activities in medical education. After discussing some preliminary findings from the obstetrics/gynecology interviews, two areas of interest were discussed. The general conversation is as follows:

> The distribution of health care provided by physicians in private practice, as in this town, differs considerably from the type of medicine practiced in a university research community. The purpose of a private practice system is to distribute the best care possible, with what resources are available to the greatest number of people. Research oriented health care, on the other hand, focuses large amounts of resources on relatively few patients. It would not be possible to provide this kind of care on a large scale. So, because of limited resources there is an inverse relationship between the quality of care an individual receives and the quality of care for everyone in a community.
>
> Internal medicine as a specialty is primarily involved in treating disease processes. Internists are best known for being good diagnosticians. Diseases are treated with drugs, diet and exercise. Internists are generally not involved in surgery, childbirth, the reproductive system or mental illness.
>
> Internists can be grouped into three different categories: general internists, subspecialists who also practice general internal medicine and those subspecialists who have basically a consultative practice. The third group relies heavily on referals from other local physicians.

Internal Medicine Interviews--First Component

Physicians were asked to identify changes made in practice based on the eight change type classifications. To establish a base of understanding of the specialty, more time was spent on this component during the first several interviews. Less effort and time was spent on the first component during subsequent interviews so that more time

could be devoted to the third research component. During the final interviews, there was only the briefest investigating in this area, just enough to identify several changes that could be examined in more detail in the second research component.

The distribution of changes identified within each change type classification paralleled those observed in the obstetrics/gynecology specialty group. The greatest number of changes were seen in drug usage which is not surprising considering the nature of the specialty. The following is a brief outline of the changes identified in each of the eight change type classifications and related significant observations.

Administration/Office Procedure. Most of the internists interviewed practiced in large group practices with as many as nine physicians in the group. Because of the size of the practices, many physicians were able to make large, expensive changes in this change type. Office computerization, principally for billing purposes, was the most commonly cited change. Other changes included adding new partners, revising an employee manual, and starting a routine of evaluating office staff twice a year.

One physician was relatively new in practice and had experienced a marked increase in patient load within the last two years. At the start of Dr. 115's practice, most patients were new and required an hour-long physical exam. This was time consuming; he was able to see only a few

patients per day. More recently, Dr. 115 is seeing those same patients for 15 minute office calls which has increased his patient load. This also changes the way Dr. 115 practices because he is increasingly seeing patients who are coming to him for specific problems rather than routine health care.

Dr. 114 has also experienced an administration/office procedure change which has altered his basic mode of practice. Recently, Dr. 114 and several other physicians changed their practice from being hospital-based to a private corporation. This has required Dr. 114 to take on more administrative responsibility, become more specialized in his practice, more dependent on his partners and changed the focus of his practice from a patient to a service and hospital-based consultant focus. This also changed the way in which Dr. 114 relates to the people he serves.

Drug Use. Changes in this change type classification fell within five general areas: anti-anginal and hypertension, anti-inflammatory, newer antibiotics, antidiabetic agents, and arthritic medications. Within each of these areas there are many individual, but closely related, new drugs.

Dr. 111, a subspecialist, said that a large part of his drug usage changes involved new protocols for existing drugs, not new uses, but new ways of using them for the same conditions.

Patient Relationship and Education. Educating patients

about procedures and health care following acute medical conditions such as heart attacks was an important part of practice and an area where physicians had made recent changes. Speaking to this subject, Dr. 113 said, "I think patients demand it now." Several physicians stated that they have made an effort to train or hire nurses who can provide much of the patient education.

Several topics were discussed in association with this change type classification that were only tangentally related but revealing.

Dr. 111 has become increasingly cost conscious when dealing with patients. This interest in cost containment is in response to a national crisis in rising medical cost. According to Dr. 111, what motivates physicians to be concerned about cost is local peer pressure.

> ... we also have very strict review committees set up in the hospitals that look at what you do and people who are on those committees will come and speak to you directly...

Physicians in general are concerned about policing cost because they feel if they don't, it will be imposed on them by government or third party payers, which in many instances is already occurring. This pressure requires the physician to stay on top of things and is one reason for information being communicated.

Dr. 115 has recently changed the way he relates to his patients by trying to tailor his educational efforts to the individual patient. "The same approach can't be used on

everyone." Also, with patients who have multiple areas of concern, such as smoking, excess weight, and poor diet, Dr. 115 has learned to prioritize what he wants the patient to do and try to accomplish in stages over a long period of time, rather than hitting the patient all at once.

Dr. 120's change speaks best for itself in his own words.

> I have made my patients more responsible for their own care. That is, I don't feel as responsible for them as I once did. This was a real turning point in my practice. I was going crazy with worry about them before I started verbalizing agreements with them and asking if they had questions and helping them to understand their condition. We basically enter a partnership. Like a contract.

Technical Aspect of Diagnosis. The most commonly cited "tool of the trade" type of changes included the use of echocardiagraphy, nuclear cardiology, nuclear radiology, CAT scans, flexible sigmoidoscope, and in-office glucose testing and pulmonary functions test. Most of the changes in this area involved the use of sophisticated equipment or techniques that are performed by subspecialists or technicians in the local hospitals.

Dr. 111 cited one technical change, the nuclear magnetic resonator (NMR), that has not yet reached this area but is an innovation he has been learning about in anticipation of someday making its use a part of his practice. Dr. 111 first learned of the NMR two years ago from the journals. Since then, there have been two local conferences where visitors from centers that have NMRs have

given presentations.

Diagnostic Approach. Some of the changes made in this change type classification, not associated with those related to changes in technical aspect of diagnosis include increasing the number of stool specimens ordered per year for detecting hidden bleeding, more mammography, more thyroid function tests, and looking for more neuropathy signs in diabetic patients.

Dr. 115, one of the younger physicians interviewed, stated he has become increasingly sensitive about considering all variables concerning a patient including age, activity, life style and habits when making a diagnosis, not just the particular signs and symptoms presented by the patient.

Technical Aspect of Management. Several technical changes identified which have changed the management of a condition include new tests for measuring drug concentrations, use of ultraviolet light in peritoneal dialysis to decrease the spread of bacteria, and more sophisticated pacemakers.

Management Approach. Those changes in management approach identified which were not related to a technical aspect were more aggressive use of steroids in higher dosages for glomerulonephritis, increased emphasis on home blood glucose and blood pressure measuring, and use of more potassium-sparing diuretics.

Own Education. Only one internist cited a change in

this change type classification. Dr. 115 is a relatively young physician whose interest in the literature has shifted from basic research, which he was most interested in during his residency and before his Boards, to clinically oriented articles. He has also shown more of a preference recently for review articles.

The next portion of this change type classification, like the obstetrics/gynecology study group interviews, focused on the various information sources used by the physicians. More emphasis was given to why sources of information were used, under what circumstances, and how physicians manage the information they obtain.

The most commonly cited sources of information were journals, colleagues, meetings and textbooks. For the most part, the information sources used by the two specialty groups were very similar. Several physicians mentioned throwaway publications as information sources but were skeptical of them because of their affiliation with profit-oriented businesses. Reading journals was the most important source of information. Physicians benefit from their reading by identifying new things they can use in their practice, reviewing what is happening in basic research, identifying what is going to be available in the future, and reinforcing what they already know.

There are several ways in which physicians manage their journal reading. Most physicians routinely review their journals on a daily or weekly basis and have developed some

kind of system to save the information that is relevant to their practice. Most physicians create their own resource library. Physicians keep these libraries in their homes or offices. The particular system used varies from simply saving the whole journal, to cutting and filing in an indexed, cross-referenced storage system. Dr. 120, for instance, likes the journals with the advertisements in the front and back of the journal so he can tear out all the pages with advertisements, review the articles and file the remaining portion of the journal.

These information storage systems are highly personalized and in a sense are both a security system and an extension of the physicians' internal data base. Dr. 114, for instance, has a rather extensive information storage system. This subspecialist collects articles related to his subspecialty and review articles in general medicine. Dr. 114 tries to "skim" these articles or review the abstracts before filing them. Even if he doesn't read them at all, he at least has a visual image of the article and knows it is there if he needs it.

Physicians use their resource libraries to find information concerning a particular case, prepare for a presentation they are going to give as part of their volunteer teaching responsibilities, prepare for journal club, and prepare for hospital section meetings.

Dr. 112 has been questioning his information acquisition and storage system in light of advances in

computer usage.

> I'd say in the last couple of years the articles have tended to be pulled and stacked and haven't gotten into the files, and I'm tending to do that less and less with the advent of computer searches, because it's far easier and two of the drug companies will do it for us in (subspecialty). I'm sure that's true of others. We can call a number and they will give us a computer printout. They do the same thing at the libraries, but the library would cost the hospital. The drug companies will do it for you for free, and I think they probably even have a bigger source of computer--bigger computer source, so I tend to do that. I've found my files are obsolete. I'm really beginning to think--and maybe this is an excuse--but I'm beginning to think that it's a frustrating effort to try to keep one's own files. I just don't think that's--in today's world of computers, that's not a very practical thing to do.

Learning from colleagues is an important part of physicians' information acquisition system. Colleagues can include residents, group partners, local attending physicians, subspecialists, and physicians in research centers. Most of the information obtained from colleagues is case related. Physicians consult with their peers when they have a difficult case, need additional information, or just would like to confirm that what they are doing is acceptable. Younger physicians rely more on older established physicians. Some physicians in large practices find colleague consultation particularly convenient because they often have a good resource within their own office. In fact, in some group practices, each physician is a resource for a particular area of practice and keeps everyone up-to-date in that area. Subspecialists whose main area is rather narrowed but who still practice some general medicine often find residents useful sources of information. Because

residents are preparing for Board exams and have a broader exposure, they are often very knowledgeable in areas where subspecialists have little contact.

Dr. 113 is a subspecialist whose business primarily consists of referrals from other physicians and consultations. As part of his role as an area expert, Dr. 113 disseminates information to other physicians such as general practitioners and internists who are not involved in his subspeciality. When providing consulting services, the other physicians must have some knowledge of certain protocols in order to facilitate Dr. 113's efforts. This is information that Dr. 113 forwards to his colleagues.

> Of course, we usually have letters telling them about a new drug and telling then why we do certain things (like you need certain blood counts, check this, and particularly like some of the patients come down from the smaller cities) so I usually send them a letter saying I suggest using this drug and please get a CBC, BUN, or something like that.

Dr. 114 identified yet another colleague information acquisition method. Dr.114 is a consultant for a bio-medical company which pays a stipend to send him to special conferences several times a year. At these conferences, 40 to 45 other consultants from all over the country exchange information with each other and company representatives. Here Dr. 114 has an opportunity to speak directly with researchers and other clinicians.

Several physicians expressed mixed feelings about physicians who practice academic medicine. On the one hand, private practice physicians rely on academic physicians for

developing and promoting changes in medicine and for information resources. On the other hand, private practice physicians feel that the "ivory tower" physicians are too far removed from "the real world", practice in an ideal environment, and often expect private practice physicians to do things that are not feasible. Dr. 118's comments were particularly interesting in light of this observation.

Dr. 118 is a subspecialist who "markets" himself as a consultant in a highly specialized area of practice. Dr. 118 had been practicing at a university hospital and moved into private practice within the last two years. When questioned about his learning relationships with other physicians, he indicated a disappointment in private practice physicians' motivations when it comes to learning. He believes that economic incentives are a dominant influencing factor in their behavior and thought this to be so to the point of interferring with the transfer of information from one physician to another.

Learning from meetings includes a broad range of activities from local hospital to national meetings. Local hospital meetings seem to be viewed differently depending on the degree of specialization. General internists who often rely on their peers and subspecialists in the community to learn new things, find the meetings are valuable experiences. Subspecialists who have a very narrowly focused practice find some of the meetings less beneficial. National meetings offer more opportunities for all

physicians to find useful learning opportunities.

Dr. 112's comments focus on another useful benefit of attending meetings.

> ... you're stimulated again to be thinking in a logical and precise fashion, where I think if you see patients and get in a rut, doing a routine every day, you tend to get a little sloppy in your thinking. So I think it hones your thinking process. So, you know, when I talk to the residents and tell them what I think the advantage of going to meetings are, those are the kinds of things I try to emphasize, rather than you're going to come away with a cure for something, cause if that's what you go to a meeting for, I think you're disappointed.

One of Dr. 111's information acquisition methods is closely tied with the technical aspect of management category. Dr. 111's method of treatment for his patients with malignancies is in a constant state of evolution. The protocol for treating specific conditions is constantly changing, based on experiences with the treatment methods. Dr. 111 belongs to a nationwide organization that collects data from physicians all over the country and provides participating physicians with a bimonthly update on how well a particular protocol is doing. In addition, physicians have telephone access for even more up-to-date information. Dr. 111's own experiences with a particular protocol alone would, at best, be anecdotal and give him little ability to make decisions based on the merits of a particular treatment. By contributing his data to a larger information system, Dr. 111 can watch the research develop as all the data come in and then be provided with what he considers to be the most up-to-date treatment available to the private

practice physician. Furthermore, this organization sponsors meetings in which participating physicians can on a more personal level discuss the protocols.

> ... I have not personally attended. I have not been brazen enough--I'm getting to that stage where I'd feel comfortable to stand up in front of the smartest people in the world, as far as I'm concerned, in this field, and voice my opinions. Yes, they have meetings where this committee that's in change of this protocol meets and where I'm welcome to attend. No, I've not personally attended those sessions to date. Partly it's a matter of time and partly it's my bowing to the "greater gods" in (subspecialty).

Dr. 111 also commented that when he has a question in a familiar area, he simply looks in the Index Medicus for the latest articles by those authors he considers to be authorities.

Internal Medicine Interviews--Second Component

The way internists go about making changes paralleled, for the most part, obstetrician/gynecologists. There were no contradictory findings between the two groups although properties of research categories differed in degree. Some areas of study were expanded but did not negate previous findings.

In summary, most internists were well aware of changes in their own areas prior to the availability of an innovation. Research articles in journals were by far the greatest sources of first information. Further information was obtained from meetings and colleagues. Once the change was made available, physicians usually adopted rather quickly. Few physicians used advertisements or company

representatives for information sources or decision making. Several physicians stated that they did not see company representatives or even let them in their office. Following implementation, physicians evaluate the practice based on their own experiences with the innovation and wait for updating information from review articles or toxicity reports. These sources of information come either from journals, reports at meetings, or local colleagues.

One factor that greatly influences change behavior and learning patterns is that most internists studied are either subspecialists or general internists who have narrowed their practice to a limited area such as diabetes. Other patient problems are more often referred to a subspecialist or the physician uses the consultation services of another physician. This allows the physician to concentrate on being better informed in at least one area.

The internists did differ from the obstetrician/gynecologists in two areas. First, the medical-legal concern, although definitely noticeable, was not as acute a problem for the internists. Second, there is no strong nationwide organization that officially sanctions certain practices. As a result, some physicians enjoy a sense of freedom from being controlled while others would feel more secure having someone else determine standards of practice, thus relieving them of some of the responsibility and decision making of their practice.

In a sense, standards of practice or acceptable

practices are being determined by government, Medicare, third party payers (insurance companies), health maintenance organizations (HMOs), and industry. The organizations have an influence on what will be paid for any given treatment or procedure. If the physician charges more than what has been established or deviates from standard practices, it is the patient who then must pay the difference. This creates a physician-patient problem for the physician as most patients can not, on their own, afford expensive medical treatment. Dr. 120 expanded on this issue in his conversation about controls being externally imposed on the medical profession in an effort to solve the cost containment problem. His response to the question, "Do you feel that there are abuses, unnecessary procedures done by physicians?" was:

> Certainly. It is a struggle that all of us must contend with. The problem is that patients do not appreciate the cognitive type of things we do and don't want to pay for them. They don't see the thought work that goes into an hour office call, the phone call to a colleague, the reading, etc. They think 75 bucks for what? But do a procedure that costs the same and they don't mind paying. Usually the third party picks up the cost so they don't really care. Since many physicians feel that they cannot charge what they feel they are really worth, they decide to make their money from procedures.

The following examples further illustrate internists' practice behavior.

Dr. 114 is a subspecialist in a group practice where each partner has specific areas of expertise and is responsible for keeping the others in the practice up-to-date in his area. This group systematically develops

standard protocols for certain aspects of their practice which are then compared to state and national results. Based on a comparison of data and evidence in the literature, the group made a decision to switch to a new drug. This change will take place as soon as the drug becomes available. Dr. 114's relationship with his partners is more structured and involved than other groups of internists, his adoption pattern for this particular change is highly quantifiable compared to other physicians' change behavior, but his learning pattern for changes related to his subspecialty is characteristic of his specialty group.

Dr. 120 very succinctly illustrated some points he had been making throughout the interview by describing his motivation for making two changes in his practice: increasing examination of diabetic patients for neuropathy signs and better foot examination, and doing more pulmonary functions tests during routine physical examinations of his patients who smoke.

> About 50% altruism and 50% fear. It should be done to protect the patient but also I could be liable if I failed to keep very close check on my diabetic patients.

> Well, the ivory tower (academic medicine) says that all smokers should have this done at their annual checkups. The other motivation is that it is a procedure that I can make a good profit on and it doesn't require any of my own work. We hire a technician to do it.

Internal Medicine Interviews--Third Component

Following the last obstetrics/gynecology interview in

which a preliminary third component was initiated, more effort was given to investigating internists as learners. The general areas of interest include why physicians are motivated to learn and make changes, how physicians make decisions about what to learn, how physicians learn, and what part learning plays in the non-medical aspect of physicians' lives.

Physicians were first asked to identify one aspect of their practice that they were so displeased with that they actively sought to make a change. None of the physicians interviewed could cite such a change having been made in the last two years. Typically, the answer to this question was that they are unhappy or insecure about many aspects of their practice and are always looking to improve. When a possible improvement in practice is identified from their readings, colleagues or meetings, they evaluate the pros and cons and consider it for adoption. If implemented, physicians judge the change and its continued use on their own experiences, others' experiences, and updated information obtained from journals and meetings.

The second question of this component concerns what prompts physicians, when confronted with so many learning opportunities, to select one area or topic over another. For instance, when a physician goes to a national meeting, why does he or she select one presentation over another? When looking through journals, what motivates the physician to look at one particular article? This question elicited

two types of responses. Most literally taken, physicians described what stimulates them to pursue learning activities. Further discussion revealed the more underlying motivations for continued learning.

Most physicians are stimulated to seek learning experiences that have direct practical application to their practice. Physicians feel they have little time to explore areas or topics that do not directly apply to the type of patients they see. Generally, physicians look for very specific, current information concerning those areas they see most frequently. They use review articles or condensed information in areas they have less need for but wish to be reasonably informed. Dr. 112's description of his journal review behavior is fairly representative of the responses identified.

> ...in a general medical journal like, well, the New England Journal I try to read as much as I can of that, because I feel that gives me an opportunity to keep up in general medicine. In the medical specialty journals like Annals or the Archives of Internal Medicine, basically what I do there is I would just pick out (subspecialty) stuff and read that. In the Annals if there is something that would catch my eye as being a real significant review article or a big advance in the general field of internal medicine, I would tend to either read it or pull it out and say, "I'll read it some other time," which I've found over the years that once I do that, that's as good as saying I'm not going to read it.

Physicians also mentioned that they liked to pursue learning activities involving new or revolutionary types of changes rather than the more typical modifications or evolutions of existing practices. Several physicians said that their

choice of learning activities also depends on the source of the information. That is, credibility, experience and degree of authority in the area of a author or lecturer were influencing factors on a physician's decision to pursue a learning activity. Lastly, physicians may seek information in areas where they anticipate they will have a need, again based on serving a specific clientele.

Some physicians were also able to identify the deeper underlying motivations for continuing to seek new information and make changes in their practice. Physicians responding in this way generally cited several motivating forces. A physicians' pride or self-respect is an important factor. Especially in a teaching hospital situation, physicians do not want to look like a "dummy" in front of their colleagues. Therefore, learning activities are important for consultations with peers, preparing presentations for conferences and being accompanied by residents are primary motivators. Competition and the need to "market" themselves as a subspecialist are also important motivations for pursuing learning. Several physicians expressed a need to bridge a knowledge gap, investigate things they do not feel comfortable with or relieve a feeling of inadequacy in an area. Another motivation is to do the best they can for their patients. Dr. lll treats many terminally ill patients and spoke to this point.

> ...it sort of provides you with a security blanket that I'm doing the best job that anybody can do. I know as much as anybody knows about these areas, and I can't

> save you. In other words, how would I feel if I thought that I knew less than--these people were dying under my care and I thought that somebody else really knew more than me.

Dr. 120 candidly outlined three reasons why physicians pursue learning. First, physicians are "altruistic." The overwhelming majority of physicians genuinely want to help others. "Greed" is another motivating force. Physicians do want to make a good living. Thirdly, physicians learn out of "fear." For example, physicians fear loss of their practice, lawsuits and not being a good physician.

Next, physicians were asked about how they organized their learning activities. Since most physicians cited journals as their major sources of information, they were asked if they regularly set aside a time for reading and if that amount of time is adequate to keep up on the literature.

Responses ranged from not designating a specific time each day or week to being highly structured with a specific time set aside just for reading. The amount of time spent reading also varied. For example, some physicians said they read 30 minutes per day after the evening newspaper, two to three hours per week in the evenings and on their day off, and another reported reading 15 to 30 minutes per day with no set time.

Anxiety about not keeping up with the literature was felt by many physicians. Comments expressing this feeling included: "Journals just keep piling up, it's impossible."

and "It's just a matter of keeping my head above water." To relieve this problem, physicians develop a method of reviewing the journals and extracting the information they desire. Many physicians said that when they go through their journals, they read the titles and determine if the article contains something that is relevant to their practice. That is, do they have patients who would benefit if they read the article or would this information improve their practice. If the article is thought to be useful, physicians may either read the abstract, read the last sentence of the abstract, read the entire article, or clip and file the article. As a result of this method, physicians spend time reading mainly those things that are case related, commonly seen in practice, or having direct clinical application. Some physicians seemed more comfortable with this picking and choosing method than others. Several physicians who very strictly apply this system said that they were actually able to have enough time to explore areas of interest on occasion or to do some non-medical reading.

The selective method of journal review is typical of the type of prioritizing physicians must do in their practice. For example, Dr. 119 has no partners and practices general internal medicine. Most of his patients are people, like diabetics, who need maintenance care, most are not critically ill. Dr. 119 admits that he could be a "better" physician by reading and pursuing more learning

activities but has established certain other things in his life, such as his family and church, as high priorities. He has subsequently designed his practice within these parameters.

Dr. 120's comments illustrate another aspect of how physicians manipulate their lives to solve the problem of information overload.

> There really isn't anything that you can do about slipping back, it is going to happen. In academic medicine you have the time to read and investigate new things, you don't have that luxury in private practice.
>
> Physicians in academic medicine are really just subspecialists anyway. It is much easier to be and feel up-to-date that way. That's what usually happens in private practice also. For instance, I have narrowed my practice to one group. Therefore I can be an area expert in that one area. This gives at least some security about keeping up-to-date.

The final portion of the third component was an attempt to identify what part of a physician's total learning behavior medicine takes up and what other learning activities physicians pursue. All physicians stated that by far, medicine consumes most of their learning activities. Learning outside of medicine includes reading and engaging in activities such as special interests or hobbies. Aside from reading for pleasure, for instance a novel, physicians read to obtain information about topics such as history, current events, philosophy, religion, personal growth, photography, sports, and investing. Activity oriented types of learning, like those involving hobbies, include taking classes, sailing, tennis, church involvement, and nature enjoyment.

CHAPTER V

CONCLUSIONS AND IMPLICATIONS

This study has resulted in a description of physicians' practice behavior and learning activities associated with changes made in practice. The purpose of Chapter V is to qualify these findings with respect to the research methodology, summarize and draw conclusions based on the physicians' behaviors outlined in Chapter IV, and to correlate learning associated with change to the general patterns of a physician's practice.

Methodology

In addition to describing physicians' practice behavior and learning activities, this study has demonstrated that grounded research methodology can be used to generate meaningful and useful data. Grounded research has not commonly been used in this area of study. Consequently, there has been little history upon which to prove this methodology's ability to produce theory.

This study began with a broad orienting concept which guided the initial data collection. As data were collected, they were coded and separated into research categories. These categories served as a way of organizing the data

as they continued to accumulate and to compare groups of similar data to other categories or data from another study group. The direction of the research was in fact ever evolving as questions and conclusions, based on previous data, were used to guide future data collection. The presentation of the findings in Chapter IV and the resulting conclusions presented in this chapter substantiate the usefulness of the grounded research methodology in this area. The results of this study provide proof of the research methodology's success at producing meaningful and useful data which can be used to formulate theory. To wit, the proof that paint, brush and canvas can be used to produce a painting is in the painting. Thus, as a result of this methodology's theoretical sampling, comparative analysis and theoretical saturation techniques, sufficient data were obtained to describe physicians' learning and change behaviors and to formulate substantive theories, that is, theories based on a limited empirical area. Theories identified in a substantive area relate to that setting and specific populations. They are not generalized from one situation to another. Therefore, concepts related to this study will not be extrapolated to other settings or populations.

The findings and theory formulation resulting from this research also attest to the usefulness of a semistructured interview as a tool for collecting data. The semistructured interview establishes a framework for organizing data

collection. At the same time it provides the necessary flexibility needed in a grounded study. The semistructured interview, like all other research tools, has its inherent flaws including the inhibitors of communication, the willingness and ability of the subjects to respond, and the researcher's perceptual and interpretive limitations. However, this research tool did produce large amounts of useful data that articulate successfully with a grounded research methodology.

Physicians' Practice Behavior

The data from this study indicate that a physician's practice is more than just the sum of all the many influencing factors affecting a physician's professional role. It is the cumulative result of each factor modifying other factors and being modified itself. To understand any one influencing factor's effect on a physician's practice, that factor must be viewed in relation to the practice as a whole. It is with this perspective that the role of learning associated with change in a physician's practice is viewed here.

The nature of a physician's practice appears to be determined by a host of interrelated, interdependent influencing factors. Among these are the physician's abilities, psychological makeup, priorities, and limitations. A physician's practice is also shaped by many sociological factors such as demographic changes, technical

advances, the nature of clinical problems encountered, and public pressure. Additionally, economic influences such as the medical-legal climate, competition, and rising insurance costs all weigh heavily on the nature of a physician's private practice.

Practice Behavior Paradigm

The nature of a physician's medical practice as identified from the findings of this study, can be viewed as the intersection of three primary determining elements. Practices vary in the scope or extent of the medical field which the practice encompasses, the depth of knowledge and training within each area of practice, and by how close to the frontier of knowledge or cutting edge the physician practices. In a sense, the resulting practice can be seen as an entity whose parameters are defined by a host of influencing factors.

The scope of medical practice is influenced by a range of factors imposed both externally and internally. A physicians' practice is initially defined by the specialty area. This provides a basic area in which to practice. Further definition involves subspecialization, individual special interest, training and skills. Those factors that keep a practice within certain boundaries include certifications, medical-legal considerations, peer pressure, resource availability, need within the community, competition, need for consults and referrals, and the

physician's character.

A physician's depth of practice refers to the level of expertise within any area of medicine. Generally, the depth and scope of practice are inversely related. Physicians who have a small scope of practice are usually highly specialized and serve as local authorities. Those physicians whose practice encompasses a broader range of medicine do not have the depth within any one specific area. These physicians will make referrals or obtain consults more often than those of a more narrow range. The enorminity of the medical field, the training and skills required in any one area, and the need to keep updated, all make it virtually impossible for a physician to practice at a great depth in all aspects of the practice and still maintain a large scope.

The cutting edge in medicine can be viewed as a constantly progressing state of understanding and practice which is considered acceptable by authorities in specific areas. In some instances the cutting edge is well defined; in others there is a broader uncertainty about what is acceptable practice. In some areas of medicine the rate of change and progress is slow while others progress more rapidly.

Physicians' practices were viewed as being in a constant state of change and generally seemed to keep pace with the movement in the medical field. Differences were observed however, in physicians' proximity to the ever

progressing cutting edge. These differences appeared to be based primarily on the physician's character or personality--how comfortable a physician feels practicing at the edge of knowledge. As a practice approaches the cutting edge the personal demands and responsibilities of the physician increase. For instance, physicians close to the cutting edge must be more knowledgable about current practices, rely more on their own trial and error experiences, make more critical judgments, and take more risks. Physicians differ in their willingness to accept these responsibilities. Hence, the degree to which a physician feels comfortable close to the cutting edge, to a large extent, determines the nature of the practice. Generally, physicians whose practice is narrow in scope are closer to the cutting edge than those with a broader scope.

Regardless of the proximity to the cutting edge, physicians must maintain a reasonable distance to that edge of knowledge in order to sustain a viable practice. A major factor forcing growth, change, and continued learning is the medical-legal climate. If a physician were practicing below what is considered standard practice, any problems that might occur could lead to damaging lawsuits. Physicians are also in competition with one another which stimulates growth. Additionally, peer pressure is exerted, both socially and professionally. For instance, hospital peer review boards monitor physicians' practices in the hospitals and exert pressure on physicians' practice behavior.

Physicians' own personal standards, ego needs, altruistic aims, and economic motivations all contribute to maintaining an acceptable distance to the cutting edge. Finally, subspecialists like the cardiologist in this study, who rely on consults and referrals, are extremely dependent on the medical community's perceptions of them as being close to the cutting edge. This necessitates that they be more informed and up-to-date than their colleagues.

The following illustration (Fig. 3) demonstrates the relationship between the elements of a private medical practice.

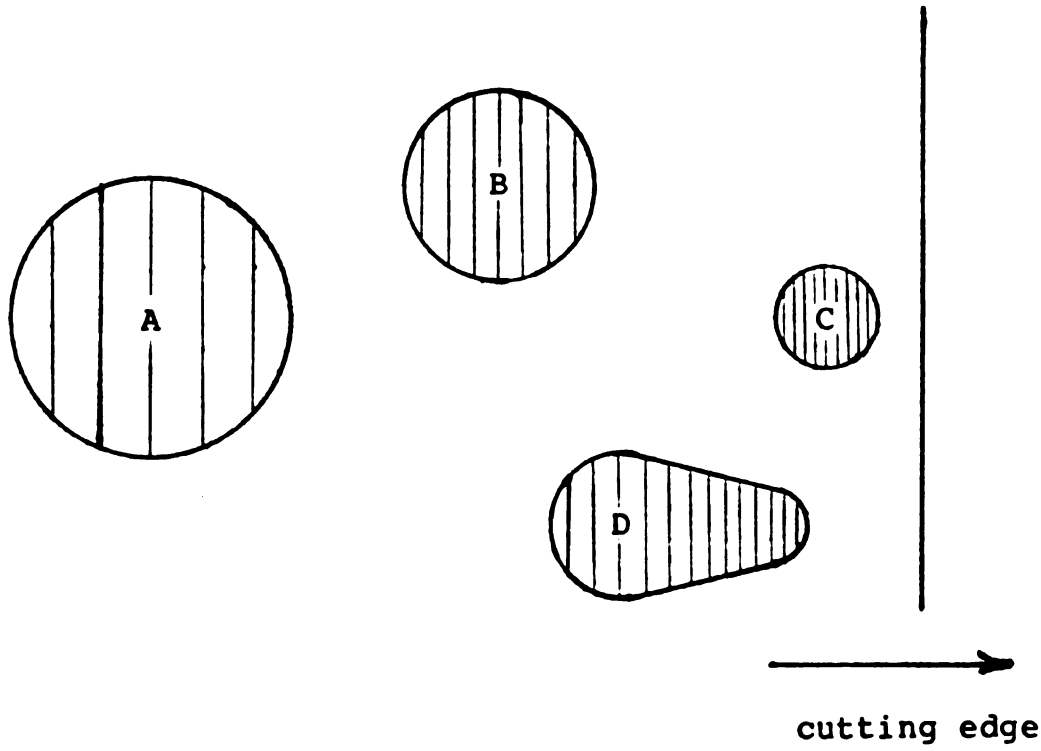


Fig. 3

The vertical line on the right indicates the cutting edge of medicine. This line is characterized by a constant state of

change, as it progresses toward the right. The linearity of the line depicted here should not be construed as representing a uniform state of progress in all aspects of medicine nor does it suggest there is always a definitive division between standard practice and the unknown. Figures A, B, C, and D symbolize typical private medical practices. The scope of the practice is indicated by the relative size and shape of the figure. For instance, the larger the figure the broader the scope of practice. The distance of the figure from the vertical line represents the proximity to the cutting edge. The depth of practice is represented by the density of the vertical lines within the figure. The greater the density of lines, the greater the depth of practice.

It is essential to understand that each practice type occupies a necessary and useful position in a health care delivery system. Each is highly dependent on the others. No relative value or merit can be affixed to a practice based on its elements of scope, depth, or proximity to the cutting edge.

Physician A's practice, like those of Dr. 105, Dr. 108, and Dr. 119 in this study, is typified as being broad in scope, at least within the context of the specialty. This physician practices well within acceptable limits but for the most part acts conservatively, prefers not taking risks, and does not particularly like making changes or perhaps has other priorities that preclude expending the effort required

for making changes. Physician A prefers to wait until the "authorities" have sanctioned a practice or lets "near peers" do the experimenting. The distance from the cutting edge and subsequent lack of depth, necessitates a broad scope of practice. To maintain a practice at this level of depth requires a scope that is broad in nature as the physician cannot rely on referrals, consults or reputation to support the practice. This physician must serve a larger, more diverse population which is typical of the general internist and general obstetrican/gynecologist seen in this study.

Practice C is characterized by a narrow scope, great depth, and functioning close to the cutting edge. Physicians in this type of practice are risk takers, enjoy challenges, rely more on their own experiences and judgments, are highly committed to the medical practice, and are up-to-date on all the latest thoughts and practices in their specific area. These physicians rely greatly on referrals and consults from other physicians. In this study, some physicians belonging in this group include those subspecialists in hematology, nephrology and oncology.

Circle B represents variations between practices A and D, that is, varying degrees of specialization.

Practice D is typical of many physicians whose practice is relatively broad in scope but function at a deeper level in one aspect of practice. Within this specific area of practice this physician functions closer to the cutting

edge. This type of practice may be a result of a physician's personal interest or a need within the community. Several internists studied such as Dr. 120, belong in this group because of their efforts to expand from a more general practice into a specific area like diabetes.

The Role of Learning in a Physician's Practice

Physicians' learning activities are an integral part of a private medical practice. Learning is not just done in addition to other practice behaviors. It is routinized in the very nature of a practice. Hence, learning both shapes and is shaped by many other influencing factors and plays an important role in determining the scope and depth of a practice.

According to the findings of this study, each physician builds his or her own information network through which he or she acquires knowledge. This network evolves along with the developing practice and usually includes journals, colleagues, subspecialists, meetings, allied health professionals, continuing medical education programs, textbooks, and courses. It is this network that establishes a knowledge base which in turn determines the boundaries of a medical practice. The extent of the information network is parallelled by the practices' scope, depth, and distance from the cutting edge. For instance, a physician cannot realistically practice outside the scope of an established practice without a sufficient knowledge base. If a practice

is to move in a particular direction, a corresponding change in the information network must occur. Furthermore, just keeping a practice at a steady pace with the cutting edge requires maintaining an active information network.

While the information network does define the practice, it generally does not extend beyond the scope of practice. There is a point of diminishing returns where a further learning investment will not yield any greater benefit to the practice. In fact, it may actually detract because there will be less time spent at income generating activities. Most physicians' lives are too busy to extend their knowledge base far beyond practical use. For most physicians, maintaining an up-to-date knowledge base congruent with the scope of their practice is in itself a challenge.

An information network begins developing early in a physician's training. Physicians spend many years establishing a general base of knowledge which will allow them to function as independent agents in a private practice health care system. As the physician progresses, the nature of the practice and corresponding information network become more defined. The physician gradually establishes an information gathering routine which includes specific sources of information such as certain journals and a group of trusted colleagues. Although the information network does develop into a fairly stable behavior pattern, the many other influencing factors in a practice such as competition

and the medical-legal climate do create a degree of instability. This requires physicians to periodically adjust or alter their information network depending on the needs of their practice.

Evidence from this study suggests that most physicians establish an information network including a filing, storing and retrieval system, which is integrated into a daily routine. Thus, learning becomes a routine of practice. Most physicians described their learning habits as a matter of picking and choosing from a voluminous information base what they feel is important to their practice. Usually, those areas pursued are case related. As information is presented through the information network, physicians select those topics relating to areas which they encounter most often, feel deficient in, or pose a particular current problem to them. Other reasons for topic selectivity may involve anticipated needs, desire to expand the scope of practice, or fear of a medical-legal problem. One instance where physicians do extend beyond their information network is when preparing for a lecture, presentation, or teaching experience. These activities require the physician to seek out information rather than waiting to be exposed to it. Another instance where physicians go beyond their information network is when they need to make a change in their practice that cannot be accomplished within the limits of their knowledge base.

Physicians' information networks and learning behaviors

can be further illustrated by viewing them in relation to the practice behavior paradigm. The type of routine learning activities required to maintain practices A, B, C, and D differ. Physicians whose practices are characterized by practice A generally look for review articles when reviewing a journal. This search covers a broad range of topics. Likewise, when choosing a conference or lecture to attend, these physicians will seek out known authorities who provide an up-to-date review of a particular topic. Practice A type of physicians must be familiar with advances in many area but do not necessarily need to know all the specifics. Their knowledge base should be great enough to at least make the appropriate referral or consult in areas that are not routine to their practice.

Practice D type of physicians are subspecialists who keep in touch with general medicine but focus mainly on very specific detailed information concerning their area of expertise. When reviewing a journal, these physicians may read the abstract of a review article but will more than likely read and file a detailed article which pertains directly to their practice. Subspecialists must be more informed in their particular area than anyone else in the community, even at the expense of having a broader knowledge base. Most of these physicians' patients have been referred to them by another physician so the patients' broader health concerns have already been considered.

Physicians in a practice D situation share

characteristics with physicians in both practice types A and C. These physicians still maintain a fairly broad scope of practice but do have an area of medicine they specialize in. A physician may, for instance, have a large number of patients who are diabetics. As a result, this physician will pay more attention to information related to diabetes than other physicians. This learning behavior reinforces the specialization.

Learning Associated with Making Changes in a Practice

Most changes physicians make are a result of knowledge gained through their information network. In the constant effort to keep pace with the cutting edge, physicians routinely identify aspects of their practices that can be improved or up-dated. Other reasons for making changes may include those which are externally forced on the practice such as changes in hospital procedures, laws, the type of clinical problems encountered, and insurance policies. Physicians may also make a conscious effort to change the scope of their practice. Regardless of the reason for the change, actions must be taken to incorporate that change into practice. To varying degrees, this requires physicians to engage in some learning activities.

Changes physicians make in their practice differ greatly from one another. Some changes are small, can be implemented immediately, and have very little influence on the other aspects of the practice. Others are more complex,

take more effort, and have a large impact on the rest of the practice. Some changes are within the scope of a practice while others push the practice into new areas.

There are different reasons for making changes. Changes must be viewed with respect to psychological, social, economic, and political factors that influence the change process from the onset. These factors control why the change is initiated, how it is to be acquired, and what effect it will have on the physician and the practice. Physicians' response to change will differ depending on all the many variables affecting their practice. For instance, if the "authorities" have determined a new standard procedure, a physician may, for fear of liability, immediately adopt that change with little investigation. On the other hand, a physician, contemplating the purchase of an expensive piece of equipment, has a complex problem to solve. This physician must determine if the change will make the practice more competitive, if it can be accommodated in the office, to what extent the new equipment can be used, which one is the best buy, and what is the cost-benefit ratio.

Just as each change differs from another, so do the learning activities associated with these changes. Learning activities for some changes may be very few and can be done within the established information network. Other changes may require extensive learning efforts and extend beyond the physician's normal learning patterns.

The nature of change and its associated learning activities in a private medical practice is diverse and complex. There are many influencing factors affecting both the change and the practice. Change should not be viewed as a single process composing part of a physician's practice. Changes and their associated learning activities may be grouped, based on commonalities; however, it is unlikely that a uniform pattern or model can be used to explain or predict how a physician will behave in practice. It would be more useful to consider a change and its learning activities in relation to the scope of practice, its depth, distance from the cutting edge, and the many influencing factors affecting the practice. Hence, individual instances of physicians' change and learning behaviors are best conceptualized as part of a broader practice behavior pattern rather than a separate developmental process impacting on a private medical practice.

Summary

As a result of this description of obstetrician/gynecologists and internists' practice behaviors, the following hypotheses can be established. Due to the research methodology used, these hypotheses are limited to this study population.

1. Physicians' practice behavior can be examined using a grounded research methodology and yield substantive theory. This qualitative analysis of behavior establishes a framework for identifying changes and learning activities associated with changes

made in practice. The ability to develop the research format throughout the study provided the flexibility needed to move the research in directions not forseen at the onset of the study. This is especially important when studying an area in which little previous research has been done.

2. The interview technique is a useful tool for obtaining data when studying physicians' practice behavior. The form of the interview was able to be changed to accommodate the nature of the grounded research methodology. Also, data pertaining to specific subject areas could be obtained from several physicians which contributes to the validation of the findings.

3. Change and its associated learning activities are integral parts of a practice, both influencing and being influenced by the many other factors affecting a practice. Each change influences a practice in a unique way and is best viewed in relation to the various elements of a practice rather than part of a general change process impacting on a medical practice. Contrary to models proposed by others, there is no evidence, based on this study, supporting a predetermined sequence of behaviors comprising a change process which accounts for all change activities occurring in a private medical practice. Different change types require different learning activities and actions.

4. Physicians are constantly in a state of alertness for information that is pertinent to their practice and keeps them up-to-date. This behavior is routinized in the very nature of the medical practice. Physicians constant alertness keeps them continually exposed to new information. They receive journals, attend meetings, participate in hospital activities, and consult with colleagues and subspecialists, all as part of their medical practice experience. Most physicians are aware of an innovation, at least in their own area of expertise prior to its general acceptance.

5. Physicians are stimulated to learn and change as a result of altruistic motivations such as doing the best thing for the patient, economic motivations, peer pressure, ego needs for achievement, competition, and fear of legal problems or loss of practice.

6. Physicians establish an information acquisition network as part of their routinely keeping informed and up-to-date practices. This network provides the knowledge base which in turn defines the boundaries of

the medical practice. Physicians must operate within their knowledge base because of peer pressure, need to maintain a credible reputation, competition, altruistic motivations, and medical-legal considerations. This information network develops and changes as the practice grows and matures. Also, just to maintain a practice at a constant level (scope, depth, and proximity to the cutting edge) requires an active information acquisition network.

7. Physicians handle the large amount of information they routinely encounter by selecting those things that are most important for maintaining their practice. This method continuously shapes the knowledge base which subsequently defines the nature of the practice.

8. Journals provide the primary source of new information for physicians. Different groups of physicians seek different kinds of information from journals. Physicians in a more general practice are inclined to seek review articles than subspecialists, who select more specific information such as clinical trial reports.

9. Most learning activities physicians pursue have a direct practical application to their practice. Physicians are too busy to spend much time learning information that is not relevant to their practice. Most of the learning activities physicians pursue during their routine information acquisition activities are in areas of their practice in which they feel a deficiency. Physicians may pursue an area, however, in which they anticipate a need. Additionally, when physicians engage in routine information acquisition activities such as reading journals, their choice of subjects depends on the source of information, its credibility, degree of authority, and extent of experience.

10. Most learning activities are a result of a physician's routinized information network, hence, physicians are basically reactive rather than proactive learners. For the most part physicians wait until they encounter information through their information network rather than actively pursuing knowledge. In order to maintain a viable, competitive practice, this requires establishing and sustaining an active information acquisition network.

11. Physicians develop their own personalized mechanisms for identifying, filing, storing, and retrieving information which is considered relevant to their practice. These resource libraries are an

extension of the physician's internal knowledge base and are part of the routinized information acquisition network.

12. Physicians' teaching activities provide one of the major sources of learning that occurs outside their established information acquisition network. Presenting a lecture or topic review often requires an active pursuit of information which may extend outside the realm of information deemed of practical use. It may also require actively seeking information which lies outside their established information storage and retrieval system.

13. Following the implementation of a change, physicians use both their own experiences and their information acquisition networks to continue to learn more about the new practice. Subspecialists tend to rely more on their own experiences than do physicians in a more general practice.

14. Physicians' willingness to tolerate uncertainty, assume responsibilty for decisions, rely on their own experiences, and keep up-to-date, all determine the nature of a private medical practice. Physicians' practices differ with respect to the scope or extent of the medical field in which they function, the depth of knowledge and training within each area of practice, and by how close to the frontier of knowledge or cutting edge they practice. These personal qualities to a great extent, determine what type of practice will develop.

15. The scope and depth of a private medical practice are inversely related. As the scope or extent of the medical field encompassed by the practice increases, it becomes more difficult to maintain a great depth of knowledge in every area. Conversely, as the scope narrows, the depth increases. Specialization, or narrowing the scope of a practice, reduces the impossible task of maintaining a large knowledge base in multiple areas.

16. Influencing factors such as peer pressure, competition, the medical-legal climate, and altruistic motivations force physicians to maintain their practices at an acceptable distance to the cutting edge. If a physician's practice falls behind, any or all of these factors could either force up-dating or termination of practice.

17. The depth of a practice and proximity to the cutting edge are directly related. As physicians'

knowledge base increases, it becomes more up-to-date. For instance, subspecialists' narrow scope and great depth necessitates being very close to the cutting edge if they are to be considered area experts and subsequently maintain a referral based practice.

18. Physicians practicing close to the cutting edge rely more on their own trial and error experiences, seek the latest experiences of their colleagues, and pursue journal and meetings focused on the latest developments in a narrow specific area. These physicians are willing to practice in areas of uncertainty. Physicians further from the cutting edge prefer less reliance on their own experiences and would rather use practices which have been sanctioned by authorities or supported by a large volume of evidence.

Implications

There are several implications concerning this study that should be discussed. These include the future use of the research methodology, the usefulness of these findings in promoting and facilitating change in physicians' practices, and related areas of future investigation.

Methodology

The basic concept of the grounded research methodology is to begin an investigation by initially drawing conclusions based on empirical data obtained from just a few study groups. From this point, additional groups are observed in an effort to both expand and further define the initial findings. As a result, the empirical data drawn from each group is elevated to a conceptual level and it is at this level that the study groups are compared. From this analysis of conceptual data, formal theory, with a greater power of generalization, can be established.

It has been demonstrated in this study that grounded research methodology has been useful in providing an initial view of physicians' change behavior and learning activities associated with change. These findings have been elevated to a conceptual level but await further comparative analysis with other study groups in order to establish formal theory about physicians' change behavior. Therefore, in keeping with the grounded research methodology, the next step in this investigation would be to study several more private practice specialty groups, then study physicians practicing in a different setting such as a health maintenance organization or academic medicine. This would serve to better substantiate the private practice change behavior and also determine if there are unifying elements of change behavior common to all physician groups. If common elements were identified, the next step in the grounded research methodology would be to compare physicians' behavior to that of other professional groups such as architects, accountants or attorneys. This could result in a formal theory regarding how adults in professional careers respond to change.

Application

The insight gained from this study about obstetrician/gynecologists and internists' practice behavior and learning activities could be used to facilitate and promote change within these specialty groups. For instance,

it would be useful to understand the nature of the target population with special attention to their scope of practice, depth, and proximity to the cutting edge, prior to initiating change efforts. Also important to know is how and why physicians make changes, what learning activities they engage in, and what are the influencing factors affecting the practice. Using this knowledge to develop a practice based approach, an effective strategy for implementing change could be accomplished. This differs form a change process approach where the emphasis is placed on providing the correct information to the target population, in the proper sequence, at the appropriate time, and by the most useful communication channel. These techniques would be helpful in addition to, but not independent of, a practice base approach.

Topics for Further Research

There are several topics concerning change and learning behavior identified in this study that are worthy of future investigation. Most notably is the development and use of a physician's personal library. Physicians' personal libraries play an important role in determining the parameters of a medical practice. It would be useful to know how physicians determine what information will be saved amd how it will be stored and organized. Also of importance are what mechanisms physicians have for retrieving the information, under what conditions do they use their

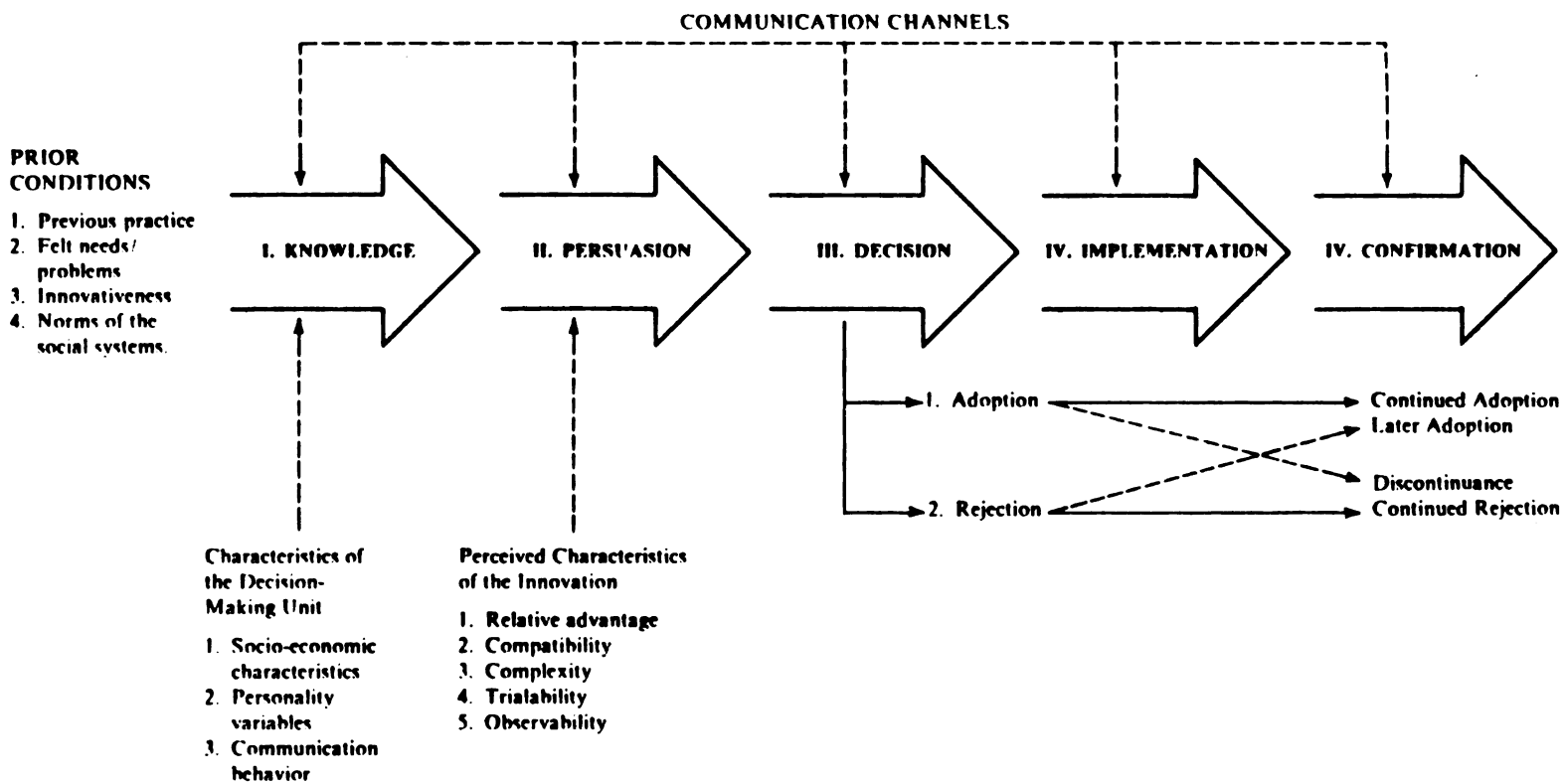
libraries, and to what extent. This knowledge would be useful for physicians wanting to develop or improve their information storing system. Disseminators of information could also benefit by knowing how to present materials that can be easily assimilated into a physician's private library.

A second area of further investigation involves identifying the role of teaching in the process of change and associated learning behaviors. Many physicians cited teaching as one of the primary non-case related reasons for learning. Understanding the extent of the relationship between teaching and learning would be useful to many areas of medical education, as well as adult learning in general.

APPENDIX A

ROGERS' CHANGE MODEL

Rogers' Change Model



Taken from Rogers, 1983, p. 165

APPENDIX B

PHYSICIAN PROFILE

PHYSICIAN PROFILE

PHYSICIAN	MEDICAL SCHOOL	DATE GRADUATED	INTERNSHIP	RESIDENCY	SUBSPECIALTY
Dr. 101	in state	1961	in city	out of city	
Dr. 102	in state	1975	out of state	in city	
Dr. 103	out of state	1955	out of state	out of state	oncology
Dr. 104	in state	1944	in city	out of state	
Dr. 105	in state	1954	in city	in city	
Dr. 106	in state	1968	in city	in city	
Dr. 107	in state	1967	out of state	out of state	
Dr. 108	out of state	1961	out of state	out of state	
Dr. 109	in state	1955	in city	in/out city	
Dr. 110	in state	1967	out of city	in city	
Dr. 111	out of state	1972	in city	in city	hematology
Dr. 112	out of state	1964	out of state	out of state	rheumatology
Dr. 113	out of state	1953	in city	in/out of city	
Dr. 114	in/out of state	1971	out of state	in/out of state	nephrology
Dr. 115	out of state	1979	in city	in city	
Dr. 116	out of state	1964	in city	out of state	
Dr. 117	out of state	1972	in city	in city	
Dr. 118	in state	1969	out of city	out of city	cardiology
Dr. 119	in state	1970	in city	in city	
Dr. 120	out of state	1972	in city	in city	

APPENDIX C

LETTER OF INVITATION

Letter of Invitation

(date)

(name)
(address)
(csz)

Dear Dr. (name)

Would you help us? We are beginning an educational research project that examines how physicians go about making changes in their practices. The primary emphasis of the investigation is adult learning. We will accomplish this task by interviewing 20 OB-GYN physicians in the (name of city) area. We hope you will consent to be a part of the study.

As a participant, you will be asked to identify recent changes made in your medical practice and to explain in detail the processes that led to the adoption of those changes.

Initially this will involve an hour-long interview in which two or three changes will be examined. A follow-up interview may also be necessary to provide further clarification and to obtain your reactions to research findings.

Upon your consent to participate, you will be contacted for an appointment. To facilitate the interviewing process it would be helpful if, prior to the interview, you would think about some changes which have occurred in your practice and list them. These changes can involve any aspect of your medical practice such as those involving a new technology, treatment, or diagnostic methodology. These changes can be of any magnitude. They do not need to be the most outstanding change you have made.

Enclosed is a postcard for your reply. If you have any questions concerning the project, please contact either of us at the (name) office (phone). Thank you for your consideration and we look forward to your participation in the project.

Sincerely,

(name)
Ph.D. Candidate
Adult and Continuing
Education, (school)

(name)
(title), (school)
(title), (organization)

APPENDIX D

SECOND LETTER

Second Letter

(date)

(name)
(address)
(csz)

Dear Dr. (name)

On (date) you were invited to participate in a research project involving physician learning activities associated with changes made in medical practice. We are approximately half way through the project and are now awaiting consent to participate from the remainder of those invited.

Your involvement will include an hour-long interview in which we will discuss how you have gone about making several changes in your practice. We do have some time restrictions and would like to complete the interviewing stage of the project in the near future. Would you please consider participating? You may send in the card provided or have your office call (phone) at (name of organization) to schedule an appointment.

Thank you for your consideration and we are looking forward to including you in our project.

Sincerely,

(name)
Ph.D. Candidate
Adult and Continuing Education, (school)

(name)
(title), (school)
(title), (organization)

APPENDIX E

INTERVIEW OUTLINE

INTERVIEW OUTLINE

First Interview Component

1) Identify as many changes as you can which you have made in the last two years in each of these catagories.

   a. administrative/office procedure (writes up drugs generically)

   b. drug use (any new drug or new use of an existing drug)

   c. patient relationship and education (providing genetic counseling)

   d. technical aspect of diagnosis (ultrasound in aortic aneurysms)

   e. diagnosis approach (makes nutritional assessment of patient)

   f. technical aspect of management (recommend continuous insulin infusion)

   g. management approach (gives fewer drugs, treats coronary artery disease more aggressively)

   h. own education

2) List all your information sources.

3) Of all the new things that you come across each year, what percent of them do you actually incorporate into your practice?

Second Interview Component

1) (name of change) was a change you made within the last two years. Go back to a time before you had any knowledge of this change. How did you deal with this situation?

2) Compared to all the other activities in your practice you engage in, would you say that you were less than satisfied, satisfied or more than satisfied with what you were doing?

3) When did you first learn about the change?

4) How did you first learn about the change?

5) What prompted your first learning of this change? Were you actively seeking the solution to a problem or did it come about as part of your routine keeping informed and up-to-date practices?

6) Why did you happen to pick this particular change?

7) Did you acquire additional information after first learning of the change?
What did you do to learn more about the change? Was it actively or passively acquired?

8) How long did it take you to decide to change? When did you decide to change?

9) What influenced your decision the most to adopt the change?

10) From the time you decided to change to the time you actually implemented the change, did you pursue any learning activities? What were they?

11) What activities have you been involved with in conjunction with this change since its adoption?

Third interview component

1) When you pursue a journal or listen to a speaker etc. what motivates you to pursue one of the many things that you are confronted with?

2) Within the last year what practice or activity were you so displeased with that you actively sought a change?

3) Think of all the different learning activities that you engage in. List the major categories. For instance: a) patient care and treatment b) business aspect of your practice c) leisure activity d) family e) personal growth

4. Prioritize these categories in terms of the amount of time and energy spent in each.

5) Do you set aside a time for learning? How much time? When? What type of things do you learn during this time?

6) Do you find that this amount of time just keeps you caught up or are you able to pursue areas of interest?

7) What are these areas of interest? Lately what have you pursued?

8) What motivates you to pursue learning in these areas?

APPENDIX F

POST-INTERVIEW FIELD NOTES

Post-Interview Field Notes

Dr. lll
1:15 May 22, 1984

Dr. lll was most cooperative and was willing to give as much time as the interview required. The interview lasted for about an hour and a half although there were several telephone interruptions.

What struck me the most about Dr. lll was his patient oriented learning activities. In the evenings Dr. lll investigates the various cases he encounters during the day. This usually involves textbook reading. He also encourages his residents and medical students to do this as well. Dr. lll believes this is important even if you have read the information before.

Dr. lll finds the conferences that he conducts to be quite educational in that he does prepare for them by reading and investigating up-to-date information. To do this, he uses the library frequently.

While studying (local hospital) as an educational organization prior to this study, I had the opportunity to observe Dr. lll in one of his group conferences. He indeed was both a learner and a teacher.

APPENDIX G

TRANSCRIPTION FORMAT

Transcription Format
(example)

Dr. 111: I can only guess that it was used about a year ago, soon after it was released. There was the one single patient--just the worse ulcers that wouldn't even get better, proven ulcers that were refractory to Tagamet. So even the Tagamet wasn't getting this lady's ulcers better. I gave her the Zantac and she seemed a little better--it seemed to help. We were kind of happy, and she certainly wasn't having any side effects with Tagamet, and Zantac didn't give her any side effects either. She couldn't tell too much difference but she seemed a little better.

Interv: So you learned about it two to three years ago, and then a year--a little over a year ago, it was released.

Dr. 111: Soon after its release I tried it on one patient.

Interv: You didn't have access to it before that?

Dr. 111: No access to it before that. So soon after its release it got used

Interv: What influenced your decision the most to adopt the change?

Dr. 111: To use that was the hope that it might be free--have fewer side effects; that was the primary thing. More than anything else, the hope--I will not say that I believe it's proven yet.

Interv: So there are no authority figures or endorsing organization or anything like that, that influenced you?

Dr. 111: No, nothing of that sort. No

Interv: Or colleagues?

Dr. 111: No. No, it wasn't colleagues, it was--oh, I take that back. I turned to my gastroenterology associates who specialize in GI and I did discuss with two gastroenterologists.

Interv: Before you used it?

Dr. 111: Before I used it, to make sure that they felt it was legitimate, safe, because this is not my field, and they did. They said that they seemed to know as much as I knew, which was that the literature said that it's supposed to be safer. They were as skeptical as I was.

Interv: Since you've started using it, what have you done in terms of continuing your education about it?

Dr. 111: Well, okay. Once again, when I see articles I may actually sit down and read the article, you know, if there should be one. The definitive article has not been written. In other words, the first year's experience throughout the nation--somebody's going to have to write that article, and say, "Now we've learned this; now that a million people have taken it we've learned this."

Interv: You're going to be looking for this article?

Dr. 111: I'm watching for such an article. When it's written, I won't skim it--I'll read it, just because I'm using the medicine, so I wonder, is it really effective, does it really have fewer side effects?

APPENDIX H

THANK YOU LETTER

Thank You Letter

(date)

(name)
(address)
(csz)

Dear Dr. (name)

I would like to thank you for your participation in the adult learning research project. Data from our (date) interview has been coded to assure your anonymity and I am now in the final stages of data collection. The next step of the project will be to compare and contrast the various responses.

Through your cooperation I have been able to gain insight into how and why physicians acquire new information and go about making changes in their practice.

I appreciate the many demands you have on your time and again thank you for your willingness to be interviewed. I hope that you were able to also find value in your introspective look at learning activities associated with your practice.

Sincerely,

(name)
Ph.D. Candidate
Adult and Continuing
Education, (school)

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