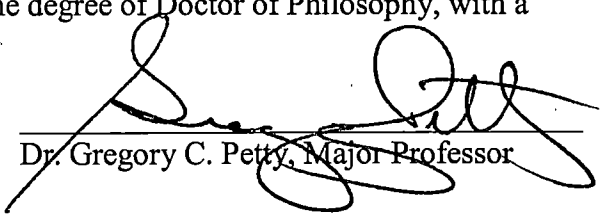


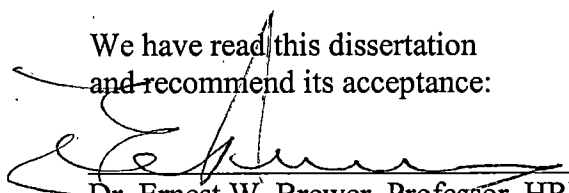
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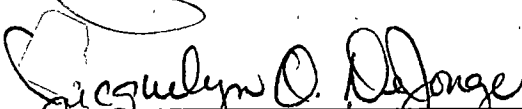
I am submitting herewith a dissertation written by Deborah Hall Joyner entitled "Family Physician's Adoption of Innovations in Distance Learning". I have examined the final paper copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Human Ecology.

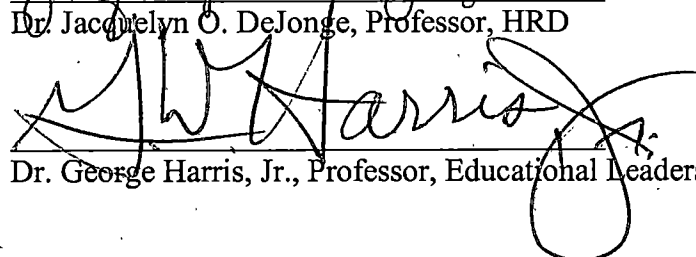


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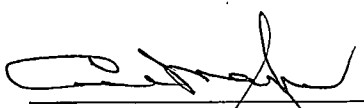


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**Family Physician's Adoption of Innovations
in Distance Learning**

A Dissertation
Presented for the
Doctorate of Philosophy
Degree

The University of Tennessee, Knoxville

Deborah Hall Joyner

December, 2001

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ABSTRACT

The aim of this study was to investigate the use and receptivity of distance education to meet the Continuing Medical Education needs of family physicians in Tennessee. The researcher conducted a survey of the entire population of members of the Tennessee Academy of Family Physicians. She collected a measure of specific outcomes using a Likert scale, along with demographic data. A chi-square analysis was used to determine association and significance. A response rate of 55 % was achieved. Most responding family physicians perceived that CME activities affect their practice of medicine. The data found that the CME activity must be relevant, applicable, and the content and quality important to the learner for participation by distance education. Respondents indicated that the most widely accepted and most utilized modality was audiotapes for distance education for CME. Computer usage via the Internet, CD ROM and email are emerging; they are being used more frequently and have a higher degree of receptivity by family physicians than non-computer generated modalities. The researcher concluded that specialized marketing efforts, additional development of online web-based courses, CD ROMs, and other modes of distance education delivery could change the level of interest in using distance education as a viable option for CME.

TABLE OF CONTENTS

Chapter	Page
I. Introduction	1
Rationale for Study	3
CME Distance Learning Continuous Innovation Model	7
Statement of the Problem	9
Purpose of the Study	10
Research Questions	10
Assumptions, Delimitations and Limitations of the Study	11
Definition of Terms	12
Summary	13
II. Review of Literature	15
Self-Directed Learning	18
Physicians as Adult Learners	19
Need for CME	25
Traditional CME	27
New Paradigm for CME	29
Diffusion of Innovation	31
CME Application of Innovation for Distance Education	33
Summary	37
III. Research Procedures	39
Introduction	39

Research Methodology	39
Research Population	40
Instrumentation	40
Design of Instrument	41
Content Experts	41
Survey Instrument	42
Data and Instrumentation	44
Pilot Study	44
Data Collection	44
Data Analysis	46
Summary	46
IV. Analysis of Data and Results	47
Response Rate	47
Description of Population	47
Respondent Characteristics	47
Statistical Procedure	48
Research Questions	48
Research Question One	48
Research Question Two	50
Research Question Three	57
Research Question Four	57
Research Question Five	58

Research Question Six	62
Summary	65
V. Summary and Conclusions	68
Summary of the Study	68
Purpose of the Study	68
Methods and Procedures	68
Major Findings	69
Conclusions	71
Implications	72
Discussion of Results	73
Recommendations for Future Research	73
Conclusions	74
References	76
Appendices	93
Appendix A Cover Letter to Participants	94
Appendix B Survey Instrument	95
Appendix C Letter of Support from President TAFP	104
Appendix D County and Respondent Distribution	106
Vita	110

LIST OF TABLES

Table	Page
1. Self-Directed Learning Model	20
2. Age of Respondents	49
3. Frequency Table for Receptivity of Distance Education Modalities	51
4. Frequency Table for Use of Distance Education Modalities	53
5. Percentage Distribution Table for Audiotape Use	55
6. Mean Distribution Table for Audiotape Use	58
7. Frequency Table for CME Activity Affect of Practice in General	59
8. Chi Square Test for Factor that Influence CME Participation	60
9. Percentage for Factors that Influence CME Participation	61
10. Frequency Table for CME Activity Affect on Practice	63
11. Percentage for Adaptation of CME Habits	64
12. Percentage and Chi Square for Selected CME Habits	66

LIST OF FIGURES

Figure	Page
1. CME Distance Learning Continuous Innovation Model	8

LIST OF PLATES

Plate

1. Tennessee Academy of Family Physician's Survey

CHAPTER I

Introduction

Physicians have experienced competing and sometimes conflicting demands due to an explosion of new information and emerging technologies that have changed their practice. (Moore, Green, Jay, Leist & Maitland, 1994). In this new environment professional competency is no longer limited to knowledge, skills, and performance. Physicians who formerly functioned in isolated practices, are now required to integrate into medical systems and to be part of teams. These new demands have changed Continuing Medical Education (CME). Increasingly the transition to medical teams and systems integration has placed demands on physician that they have not been prepared to handle. (Rivo, 2000; Queeney, 1997)

For the past two decades, new forces have emerged that have changed the entire CME environment (Moore, et al, 1994; Wentz & Harrison). These new forces included variables such as the limited number of practicing family physicians, the increasing average age of those in family medicine and the distribution of family physician in rural areas (AAFP, 1999). Other complicating considerations included an increased number of physicians in group practices, advanced medical technology, certifying boards, and an emphasis on research as it related to managed care outcomes (Wright, 1993; Wentz & Harrison, 1994). With increased consumer demands for improved patient care many medical units have forced physicians to implement and continue with their medical education, forcing CME providers to evaluate current mechanisms for CME delivery and the development of new ones (Gillette, 1999).

CME is considered to be one way to increase the professional competence of practicing physicians. This goal is advanced through exchanging information so that physicians can remain current with the latest developments in medical and scientific information (Rosof & Felch, 1992; Wentz & Harrison, 1994). Wurman (1990) in *Information Anxiety*, estimated that knowledge doubled every five years. This information explosion challenged CME professionals to provide opportunities for transfer of this new knowledge to physicians in the most effective manner.

The American Academy of Family Physicians (AAFP), the specialty society for family practice, instituted the first system of awarding CME credit hours for educational activities in 1947. Every three years 150 hours are required for relicensure (AAFP, 2000). American Academy of Family Physicians presently has a membership of over 80,000. Quality of care factors, including accountability and professional credibility, placed new pressures on professional organizations to require members to be competent (Rivo, 2000).

Continuing education was an important component in the certification of academy members. "CME for the family physician is emphasized because the responsibility for providing comprehensive and continuing health care to patients carries with it the responsibility to continue learning (AAFP, 2000, p. 2)." Thus, ultimate purpose of CME is to improve the quality of health care. Physicians had the added responsibility of educational requirements necessitated by accreditation bodies, sub-specialty groups, hospitals, managed care organizations, and peer review boards (Manning & Petit, 1987).

Federal and state governmental agencies and consumer groups also influenced mandatory continuing education (Little, 1993).

There were many methods and resources to obtain CME credit, including live lectures from national and regional meetings, journal courses, video and audio programs, Internet courses, CD-ROM, and telemedicine. Many family physicians increased their knowledge by accessing information on the Internet and through computer-based instruction (Garner, et. al, 1999).

In recent years, improvements in offering information via distance education have shown promise for solving the problems busy physicians have to access new information. Curran, Hoekman, Gulliver, Landells, and Hatcher in two volumes published in 2000 (a,b) and Peterson (1999) have identified distance education as an instructional tool capable of exploring, enabling, and linking physicians, curriculum, and new technologies. Thus, distance education has offered new possibilities for the delivery of CME.

Rationale for the Study

The State of Tennessee, which was the geographic boundary for this study, has a significant rural population. The state is comprised of three distinct areas or divisions; the East, Middle and West and it has three major population centers, Knoxville, Nashville and Memphis, respectively. According to the 1990 census, 25 % of the nation's population was classified as rural residents while 39 % (1,907,237) of Tennessee's population (4,877,185) was classified as rural residents. The U.S. Census Bureau (1990) defined a rural population as persons living in places with less than 2,500 residents.

Seventy-six of Tennessee's 95 counties had rural populations of 50 % or higher (Tennessee Department of Health, 1998).

Tennessee has a diversified economy of agricultural, mining, manufacturing and service industries. The state's economy generated an average per capita income below the national average for all states, resulting in high levels of poverty (Tennessee Department of Health, 1998). There is difficulty in recruiting and retaining primary care providers due to a combination of the isolation of some rural communities and the low per capita income of the population.

The federal government developed a measure referred to as the Health Professional Shortage Area (HPSA) to identify communities with underserved populations. Calculation of HPSA status compared the number of primary care providers to the population, and a ratio of 3500 to 1 was the determinant for an underserved area. Within the U.S., 28 % or 1,307 counties are designated as all or partial HPSAs. Most HPSAs are located in rural areas. In 1998, 59 of Tennessee's 95 counties were designated either partially or completely HPSAs. Forty-one of those were designated as rural. (Tennessee Department of Health, 1998).

Despite the increase in the number of physicians practicing in the U.S., from 467,000 in 1982 to over 777,000 in 1999, the ratio of physicians serving urban populations for every one in rural practice is 2.3:1 (American Medical Association, 2000). This maldistribution further contributed to the severity of under-service for medical delivery in these rural communities. The distribution of physicians in Tennessee

indicated that family physicians clustered around the major urban population centers which are identified above as typical of general population trends (AAFP, 1999).

In 1995 the AAFP Congress of Delegates adopted a workforce plan calling for 33.3 family physicians for every 100,000 people, a ratio of one family physician per 3,000 patients. This workforce improvement goal was based on expectation that one-half of all U.S. physicians would be family physicians (AAFP, 1998a). Attaining this goal would be difficult when the aspects of physician's ages and intended specialties upon graduation are considered (AAFP, 1998b).

Location preferences of family physicians and an aging physician population compounded the scarce supply of primary care providers in rural areas (AAFP, 1998c). In 1992, 50% of the 615,000 physicians in the U.S. were 44 years of age or younger (Wentz and Harrison, 1994). In 2000, the distribution for family physicians has changed. Of the almost 50,000 active members of the AAFP a slightly higher percentage indicated that 54.7 % were 44 years of age or younger (AAFP, 1999). Family practice as a specialty is the second most common selection of residency choice among medical students (Pasko & Seidman, 1999). This signified a change from earlier data, indicating that specialty certification plans for graduating medical students in 1996 was that only 20.7% of medical students pursued a family practice residency programs (AAFP, 1998a).

Four family residency programs existed in the state: two public institutions, The University of Tennessee for the Health Sciences, Memphis; East Tennessee State University, Johnson City; and two private institutions, Vanderbilt University and

Meharry Medical College, both located in Nashville. In the year 2000 the total number of statewide resident graduates in Tennessee was 84 (AAFP, 1998b).

In a managed care environment, family physicians and primary providers were the backbone of an ideal health care system (AAFP, 1998a). Availability of primary care providers has remained problematic, particularly in rural areas. Only small numbers of physicians selected rural practice and the retention of those choosing a rural community became a challenge due to the draw of the urban environment. The shortage of physicians and health care workers in rural communities placed high demands on their time. Further, rural physicians faced professional isolation. The number of rural hospitals also has declined compounding the shortage of health professionals (Puskin, 1992). Gruppen, Wolf, Van Voorhees, and Stross's (1987) indicated that primary care physicians use colleagues and "educationally influential" physicians in the community as resources as for sources of information.

Rural health care systems traditionally have been composed of individual physicians in private practice (Puskin, 1992). Comprehensive primary care services were available at the physician's office; and the physician-patient relationship provided a continuous, longitudinal view of the patient and family. However, a shift in this model has occurred due to changes made by managed care systems (MCO). In 1996, 43% of all physicians were employed by MCOs or large group practices as compared to 28% in 1988 (Emmons & Kletke, 1997). The traditional model of health care delivery is being altered with increasing numbers of rural physicians becoming members of managed care networks (Wentz & Harrison, 1994). Managed care systems continued to focus

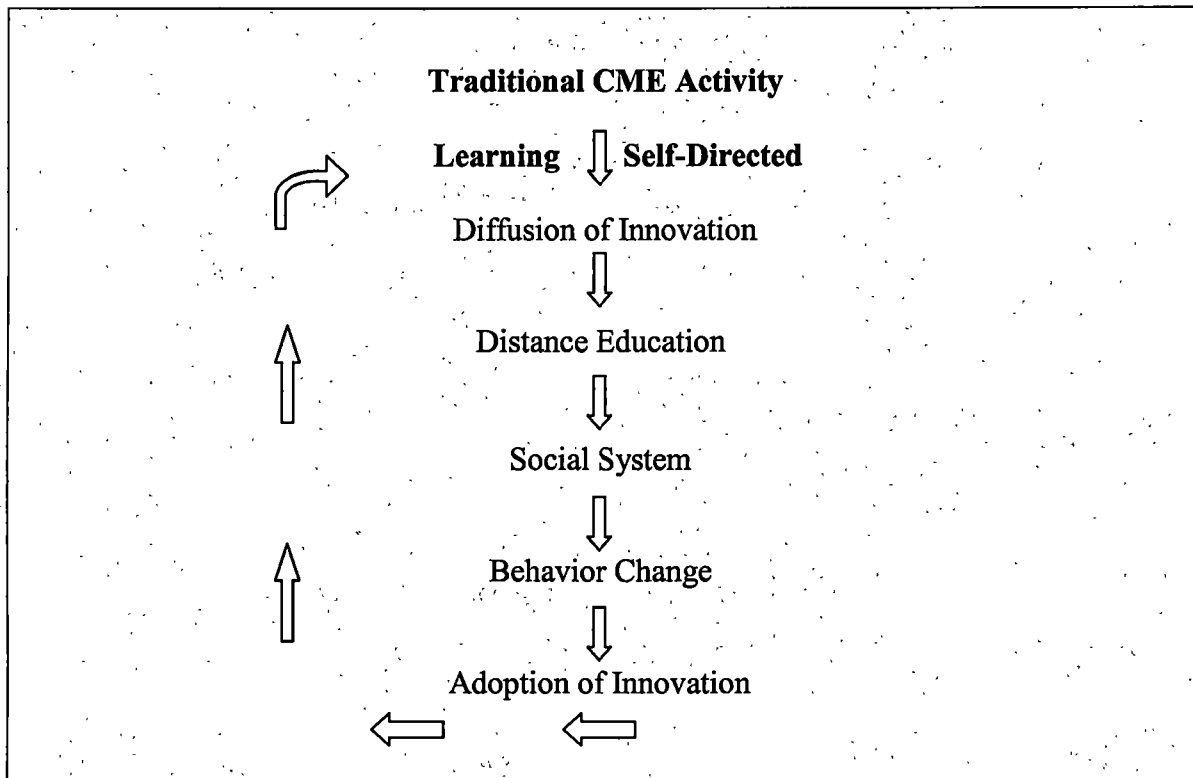
recruitment efforts on the family medicine specialty for both inner-city and rural practice (Seifer, Troupin, & Rubenfeld, 1996; and Miller, Dunn, & Whitcomb, 1997)

Even when affiliated with managed care networks, rural physicians often experienced professional isolation. Rural physicians were dependent upon outside resources and services to complement limited local resources (Lott, 1995). Sources for immediate and continuous information, including CME, were one of the services needed by rural physicians. Combined with changes in the health care system and the need to remain current, rural practitioners faced a daunting challenge. As Lott (1995) noted, rural physicians did not have the same resources available, as did their urban counterparts. They often did not have "readily available access to current research, the latest information on new therapies or practicum experiences with the latest techniques (p. 6)." Distance and time for travel to urban areas to receive CME could require rural physicians to close their practices because of inadequate coverage. This could result in patients not receiving services as well as in a loss of revenue to practitioners (Suggs, Rose, & Mittelmark, 1993).

Distance education can bring the latest information directly into the physician's setting. Telecommunications technologies including interactive video, telemedicine, and computers are promising tools to help address the CME needs of these physicians (Barow, 1993; Manning & Petit, 1987).

CME Distance Learning Continuous Innovation Model

Limited literature has been published in the area of diffusion of innovation relating to the adoption of new knowledge in distance education. Figure 1 illustrates the



Continuing Medical Education Distance Learning Continuous Innovation Model. This model begins with the traditional didactic CME activity and demonstrates a progression through the developmental phase of self-directed learning. Even in the traditional model, elements of self-direction are evident. The diffusion of innovation occurs at the point of need for more self-directed activity and for the adoption of the innovation of distance education. Distance education then is integrated into the social system of the physician, resulting in behavior change. Building on this new knowledge, the model recycles to illustrate new adaptations and skill updating based on the diffusion of new information.

Candy (1995) illustrated that all learning is self-directed and that learners discriminate and select their educational experience. For the purpose of this model, the

focus was on self-directed activity, in which the learner sought, selected and identified the learning format.

Statement of Problem

Distance education has proven to be a tool for increasing participation in continuing education and for providing accessibility to new technology and techniques (National Alliance of Business, 2000). Several factors have converged that have created an ideal time for greater use and assistance from CME. These factors included: (a) demands placed on family physicians to maintain competencies and meet the CME requirements mandated by regulating bodies, (b) isolation experienced by many practitioners, and (c) need for access to knowledge at convenient locations and times. Sufficient information does not exist to determine the current use or acceptance for the use of distance education in the delivery of continuing medical education to family physicians practicing in Tennessee.

This study could be useful to individuals who provided CME and who needed to determine the likelihood that physicians would adopt distance education as a means for acquiring with CME. The study included information relative to the preference of rural physician for specific types of distance education, to the methods of delivery and the previous use and experience rural physicians had with distance learning and with CME. Additionally, results of this study could be important for educational specialists who developed and altered CME methods and delivery. Knowledge of physicians' preferences and of their previous experience and familiarity with distance education may be useful in choosing approaches and delivery systems to introduce distance education. This study

investigated the use of distance education as a medium for family physicians to extend their professional knowledge through CME.

Purpose of the Study

The purpose of this investigation was to determine the receptivity of family physicians to different modalities of distance learning. Family physicians that were active members of the TAFP served as the research group for this study. The study was conducted to ascertain similarities and differences in the attitudes of physicians toward the use of distance education to acquire CME.

Research Questions

The following important questions were developed for this study. These questions were based on the current level of knowledge concerning distance education and continuing medical education for physicians and the prediction for the future direction of distance education for CME by family physicians.

1. How receptive are family physicians to CME provided via distance education modalities?
2. Does the receptivity of family physicians to CME provided via distance education vary in relation to their previous use of established modalities for CME delivery?
3. How do family physicians think CME activities, in general, affect their practice by maintaining or enhancing their skills or knowledge?
4. What factors influence family physician's frequency of participation in CME activities via distance education and has their frequency of participation increased?
5. How do family physicians think CME activities, in particular, provided via distance education affect their practice by maintaining or enhancing their skills or knowledge?
6. Have the factors of location, advancement of managed care systems, family matters, and the time for CME altered the habits of family physicians seeking CME?

Assumptions, Delimitations, and Limitations of the Study

The research made the following assumptions prior to conducting the research:

1. That the physicians being surveyed were knowledgeable in the area of CME and the requirements of the TAFP.
2. That the respondent's interpretations of the survey questions were consistent with the intentions of the research.
3. The researcher assumed that the population was representative of family physicians in Tennessee.

The literature survey for this study was limited to CME in North America. The population for the survey was limited to 1064 physicians holding M.D. (Doctorate of Medicine) or D.O. (Doctorate of Osteopathic Medicine) degrees and maintaining active membership in the TAFP. Requirements for active membership include completing a family medicine residency program (three years), or an American Osteopathic Academy approved residency program and meeting CME requirements of 150 hours of accumulated continuing education hours during the three years immediately preceding the application. One of the following criteria must have been met: (a) Physicians are presently engaged in the practice of family medicine; (b) Physicians applying after December 31, 1988 who are engaged in the practice of emergency medicine; (c) Physicians engaged in full-time teaching of family practice or full-time medical administration (AAFP, 1997).

The dataset used was from the 1999 list of TAFP active members. Survey results could not be generalizable to physicians outside the surveyed population. The data collection was based on the perceptions and estimations of frequency of use of the

various distance education modalities. Thus, the study was limited by the accuracy of the physicians' perceptions and responses.

The literature search with regard to the receptivity to distance learning modalities was an exhaustive review of the literature from online databases including Medline, Bioethicsline, Research and Development Resource Database in Continuing Medical Education, Current Index to Journal in Education (JIE), Educational Research Information Center (ERIC), Dissertation Abstracts International (DAI), as well as documents held by The University of Tennessee, East Tennessee State University and documents obtained through Interlibrary Loan.

Despite the limitations, the study could demonstrate the perceptions of Family Physicians in Tennessee in reference to their use of and receptivity to distance learning.

Definition of Terms

1. *Adoption*: the decision to make full use of an innovation as the best course of action.
2. *Audioconferencing*: interactive audio communications between individuals or groups at three or more locations.
3. *CD ROM*: "acronym for compact disc read-only memory, an optical storage system for computers that allows vast amounts of data, text, and images to be stored and retrieved off a compact disc (National University of Continuing Education Association, 1994, p. 61)."
4. *Computer Conferencing*: a telecommunications system that makes use of a computer as a platform for processing information.
5. *CME*: Continuing Medical Education is the process that provides information and activities designed to maintain and improve the ability of the family physician to provide quality patient care (AAFP, 2000).
6. *Distance Education*: the linking of learners and learning resources separated by time and or distance (Dillion, 1996).

7. *Diffusion*: communication of an innovation, through certain channels and over time, among the members of a social system (Evans, 1982).
8. *Health Professional Shortage Area (HPSA)*: areas designated by the Office of Shortage Designation, Public Health Service, and U.S. Department of Human Services. The designation signifies a shortage of health personnel for primary care. Factors include high poverty rates, high infant mortality rates, underserved Medicaid population, and a physician to patient ratio of greater than 1:3,500.
9. *Innovation*: an idea, practice, or object that is perceived as new by an individual or other social unit for adoption (Rogers, 1995).
10. *Interactive Video*: visual images and audio transmitted to multiple sites for real time interaction.
11. *Managed Care Organization*: an organization that manages the quality and cost of medical care.
12. *Receptivity*: an attitude indicative of the willingness of a person or social unit to adopt an idea, practice or object. (Clark, 1992).
13. *Self-Directed Learning*: a change in behavior that is influenced, determined, or affected by the learner.
14. *Videoconferencing*: interactive video communications between individuals or groups at three or more locations.
15. *Videotape*: a recording of visual images and sound on magnetic tape.

Summary

In this chapter it was discovered that physicians have been in transition due to the overwhelming need to maximize their time, the mounting pressure of managed care, and the need to stay current in an environment exploding with information. This need to adapt could cause a change in behavior and the potential for innovation to occur.

Distance learning has the potential for adoption by physicians by providing information

when and how they want it. The purpose of the study was to investigate the receptivity of family physicians to different modalities of distance learning by using carefully designed research questions.

CHAPTER II

Review of Literature

This chapter reviews literature on physicians' receptivity to distance learning, adoption of innovation, and self-directed learning as it relates to adult learning principles. The research paradigms, findings and conclusions found in these studies are synthesized in this chapter to provide better understanding of the potential receptivity of family physicians to distance learning modalities. The review also explores the role physicians' attitudes in the adoption, implementation and usefulness of distance education in continuing medical education.

The conceptual framework serves as the basis for investigating the utility of distance learning modalities in providing CME for physicians. This literature review focuses on adult learning and more specifically, on physicians as learners. The current delivery methods used in continuing medical education for physician learners, the new paradigm of CME based on adult learning strategies and the application of these strategies to distance learning also was reviewed.

The conceptual basis for this research study is supported in the literature of adult learning principles and of continuing education. This illustrates the relationships between these two constructs. The major theoretical research areas include a review of the concepts of self-directed learning and the diffusion of innovation theory, as they relate to distance learning technology. Until recently, research examining physicians' receptivity to distance education has been limited (Ging, 1986; Hendrick, 1986; Lott, 1995; Paul, 1977). The constant introduction of new technology and medical information in medical

practice required professionals to learn more medical information in less time which created a struggle to keep pace (Rivo, 2000).

To stay abreast of changes, physicians are in constant need of professional development. Their learning is acquired through life experience and through on-going professional training. This professional development or training is referred to as continuing medical education (CME). It attempted to link knowledge and resources to the solution of health care delivery problems of practicing physicians and to incorporate these innovations into practice (Gessinger, Humphry, Hanft, & Keyes, 1993).

In a managed care environment, change and adaptability have been necessary for physicians' survival. The increase in health maintenance organizations and the development of large networks of health systems required a new level of adaptability for physicians (Queeney, 1997). These changes have evolved quickly due to a need to acquire new knowledge and incentives to remain current on the latest medical developments.

Social pressure also has emphasized quality, production, innovation and creativity (Senge, 1990). Wentz and Harrison (1994) illustrated that, "Not only are physicians expected to 'do the thing right,' economic pressures are demanding that they 'do the right thing'" (p. 8). Healthcare systems were becoming highly sophisticated in the monitoring and review of individual and group performance.

The American Academy of Family Physicians (AAFP), founded in 1947, required in its bylaws that a minimum of 150 hours of approved CME be completed to retain membership (AAFP, 1999). The founders of AAFP placed in the bylaws a requirement

emphasizing the importance of lifelong learning for the practitioner by stating that "The family doctor's effectiveness depends on sound, up-to-date continuing education" (p. 205). At the time of its inception, this requirement was unique. However, other specialty groups have made this concept a standard (AAFP, 1996). Managed care organizations as well as the Joint Commission on Accreditation of Healthcare Organizations (2000) have reinforced the need for CME by requiring documentation from hospitals of their CME practices as part of the certification process (Jencks & Wilensky, 1992).

As defined by Maples and Webster (1980), "Learning can be thought of as a process by which behavior changes as a result of experience" (p. 1). This statement encompassed a major theoretical premise: Adults rely on experience to provide a structure for thinking about and for interpreting new concepts. These experiences provided pathways for going from the known to the unknown (Fox, Mazmanian, & Putnam, 1989).

The importance of life-long learning is the premise for continuing professional education and is emphasized in early literature beginning with the Dryer (1962) Report that made recommendations for "lifetime learning for physicians" (p.1). In 1906 Osler recognized the essential nature of lifelong learning. He illustrated the importance of lifelong learning in the medical profession by saying, "The hardest conviction to put into the mind of a beginner is that the education upon which he is engaged is not a college course, not a medical course, but a life course, for which the work of a few years under teachers is but preparation" (p. 1).

Self-Directed Learning

Merriman and Caffarella (1991) concluded that self-directed learning occurred when "adults decide what they want to learn, formulate goals, and then proceed to select learning activities, resources, and ways to evaluate their learning" (p. 210). According to investigations of both Tough (1978, 1982) and Knowles (1980), adults directed and planned their own learning activities. Self-directed learning was the vehicle by which adult practitioners provided for their professional needs (Osler, 1906; Tough, 1971; Schon, 1987). Continuing Medical Education has traditionally been delivered through the formal lecture-dominated format. In Davis, Thomason, Oxman, and Haynes (1992) research found that little evidence existed to support didactic CME instruction as satisfying individual physician's needs or interests.

A number of important elements in self-directed learning related to this study. Self directed learners were self-initiated (Penland, 1979), they accepted responsibility for their learning (Knowles, 1986), and they sought a relationship between the learning experience and the world or personal experience (Candy, 1991).

From a pedagogical viewpoint, teacher-directed learning is most appropriate when the learners needed role models, drill and repetition. Teacher-directed learning is also best when the learner was a novice to the discipline and has much to learn in a short period of time (Barton, 1982).

Conversely, Barton noted that self-directed learning was preferable when learners are intrinsically motivated, responsible, and high achievers. Further, when learners were

from varied backgrounds, with diverse proficiencies, and with focused interests. They were effective self-directed learners.

Candy (1991) described a detailed model of self-directed learning by outlining four distinct phenomena: (a) Personal autonomy (a personal attribute), (b) Self-management (the willingness and capacity to conduct one's own education), (c) Learner control - organizing instruction in formal settings, and (c) Autodidaxy (noninstitutional pursuit of learning opportunities in the natural societal setting) (p. 23).

Candy's (1991) model encompassed two modes of instruction on a continuum between teacher-controlled and to learner-controlled, or independent study. He then extended the model to include assisted autodidaxy (self-instruction) and finally, autodidaxy.

Tough's model (1979), and that of Cyril Houle (1980), as illustrated in Table 1, are similar in the development of the self-directed learner. The learner advances through various steps of planning, implementing, and evaluation of learning activities. In Tough's model the assessment or evaluation of the project is continual.

Physicians as Adult Learners

Adult learning theory was particularly applicable for physicians as it related to three aspects of CME:

1. Adults addressed multifaceted needs through education;
2. Adults were practical learners; and
3. Adults responded to multiple demands in their lives (Merriam & Caffarella, 1991; Slotnick, Pelton, Fuller, & Tabor, 1993).

TABLE 1**Self-directed Learning Models**

Tough's Model	Houle's Model
Decide What to Learn Determine Learning Methods Decide Where to Learn	Identify Learning Need
Set Deadlines and Goals	Analyze Need and Proceed Refine Objectives
Start the Learning Project Set the Learning Pace Self-Assessment Detect Deterrents to Learning	Develop Format
Obtain Resources Secure Finances	Fit Format into Lifestyle
Prepare for Learning	
Schedule the Learning Project Motivation	Put Plan into Effect
	Evaluate

(Lott, 1994, pg. 34)

Physicians as adult learners were "self-directed and experientially oriented", and physicians have a "must see and feel" attitude about their learning experience (Scott, 1994, p. 92). Slotnick, Raszknowski, and Lichtenauer (1995) researched adult learning themes and concluded that physicians wanted to participate in their own instruction and that the multiple demands on physician's lives were in conflict with their decision to attend CME activities. They further noted, "Clearly adult learning theory applies to CME" (p. 15). Other research indicated that the learning experience of physicians is

impacted by the stage of their professional life and by their age (Bennett, 1990), and also by the year in which they completed their education (Savatsky, Haitz, & Sterns, 1981).

To understand and to apply adult learning principles to CME, Knowles (1989) illustrated four assumptions about adult learning: (a) acknowledgement of the role that self-concept plays in learning, (b) previous experience in learning, (c) the adult's readiness to learn, and (d) previous orientation to learning. Knowles further emphasized that adults learned best when they found the learning experience practical and reality-based. Candy (1995) emphasized the concepts that the learner selected and valued from an educational experience were examples of self-directed learning.

Bennett (1990) and Rosof and Felch (1992) researched assumptions of adult learning and their relationship to CME. In Bennett's first principle of adult learning, *Adults of All Ages Have the Ability to Learn*, she agreed with Houle (1961) that active learning continued throughout each physician's practice. Richards and Cohen (1980) found some major expectations physicians gave for participating in learning activities. Learning must be interesting, a change of pace, validating to their previous experiences, clear in its intent, and meaningful to their professional practice. Social contact and exchange while learning was also important to physicians.

A tremendous range of approaches to learning has occurred since 1980 with the evolution of the computer, Internet, and interactive television. These allow learners more choices to aid in their self-directed learning needs (Dillion, 1996). In 1983, Manning noted a lack of attention to self-directed learning activities. He predicted that the future of CME would be both practice-linked and self-directed with technology and computers

as the deliverers of continuing education. Texas Technological University Health Sciences Center (1992) research indicated that use of satellite technology to provide interactive CME to rural participants has reduced the practitioner's sense of professional isolation and increased their confidence in providing quality care.

Slotnick, Raszkowski, Jensen, Wentz, and Kuntz's (1994) research indicated that physicians' CME attendance choices reflected "issues of practicality, multiple demands in their lives, and satisfying multiple needs through education" (p. 173) which were grounded in adult learning philosophy. Fox, Mazmianian, and Putnam, (1989) concluded that by applying adult learning principles, CME professionals could reinforce the quality of the activity and could increase attendance at continuing education activities. In addition, physicians more readily attended activities when they met specific needs that could impact their practice and the quality of health care they delivered (Fox, et al., 1989). Knox (1990) and Slotnick, et al. (1994) both critically reviewed the continuing education participation patterns and influences as well as the motivational factors that were key to physicians' decisions to participate in CME. Citing that relevance and achievement of a level of proficiency were desired outcomes of the CME experience.

Gelula and Sandlow (1998) noted that with so much information available to the physician, programming should be designed to meet the specific needs of individual physicians. They further found that self-directed activities could be used to customize programming to meet their specific needs.

The second of Bennetts' (1992) assumptions, *Adults are Self-directed in Their Learning*, emphasized that physicians were self-directed because of the rigorous

standards required to complete their medical training. This training included examinations and demonstrations that challenged the learners' skills and promoted knowledge. She noted, "As physicians are socialized into medicine, they hear a very active voice demanding continued learning as an integral part of practicing medicine" (p.33). Self-directed learning strengthened inquiry and problem solving skills and enabled learning to be linked with practical experience (Suter, Green, Lawrence, & Walthall, 1981).

In the third assumption, *Experience is a Resource for Learning*, (Bennett, 1992) maintained that physicians typically used experience as valuable resources, whether through collegial exchange, consultation, rounds or in a formal teaching setting. Physicians had a "built-in framework for new learning based on prior experience" (p. 33). Nowlen's (1988) theory of how professionals perform, namely that their performance will be a function of their knowledge and skill as well as of their working environment. That insight provides further credence to the importance of the work site.

Bennett's (1992) fourth assumption, *Participants Look for Practical Learning*, examined physicians' learning needs as being structured to address specific problems. Physicians saw their time as valuable so that learning activities should provide solutions, interventions or protocols to assist them in problem-solving.

In the fifth assumption, *Adults Learn by Choice, Learning is Voluntary* Bennett, (1992), stated that motivation was key to learning and suggested that voluntary learners had higher levels of motivation. Putnam cited in Fox et al., 1989, professional motivation

as a major force for change with the desire for excellence and higher level of competency being the most noted reasons for change.

Bennett's (1992) sixth assumption was: *Learning is More Effective When Physicians are Actively Involved*. Bennett's assumption was in agreement with Stein (1981) who proposed that physicians needed to be actively involved in the learning process to solve problems and to adapt learning to the practice setting. Active learning enabled physicians to evaluate their practice performance.

In the seventh assumption, *Feedback Is a Critical Part of Learning* Bennett (1992) reinforced the point of evaluation as a tool for the assessment process.

Use for Learning Change with Different States in a Career was Bennett's (1992) eighth assumption. This assumption holds that adults had different learning approaches depending upon their career phase. Bennett and Fox, (1989) identified three career phases: (a) Breaking In - integrating into the role of a physician, (b) Fitting In - defining the role and comparing it with expectations (c) Getting Out - reducing involvement in medicine. Gruppen et. al, (1987); and Gruppen (1990) found that the informational needs of physicians depended on their level of motivation and that their motivation was influenced by experience, age, and specialty. Some studies have found that the characteristics of physicians could be associated with the early adoption of innovation. The physicians' age (50 or under), board certification, group versus solo practice, involvement in teaching, writing for medical publication, holding an academic appointment, and having a busy practice were characteristics included in various studies (Freiman, 1985; Schwartz et al., 1991; Weiss, et al., 1990).

The ninth assumption, *People Learn Differently - Differently from One Another, and on Different Occasions*, (Bennett, 1992) means that learners use different learning styles depending upon the learning option presented. Learning styles as defined by Smith (1982) were the "individual's characteristic ways of processing information, feeling, and behaving in learning situations" (p. 24). Delivery methods and resources were important to physicians as adult learners. They directly impact the overall purpose for learning (Fox, et al., 1989). Learning styles differed for each individual (Bennett, 1992).

The tenth assumption, *Learners Are More Apt to Make Changes as a Result of Learning if They Have a Clear Image of What Will Be Achieved* (Bennett, 1992), illustrated that physicians would change if they understand and value or potential impact of the change that could result from the learning experience.

Research identified physicians' learning characteristics as being self-directed, activity oriented, and most CME activities designed specifically for this group was largely didactic and teacher-centered. Several decades ago, Groen discussed a need to implement medical education programming according to specific practice needs designed to improving patient care and outcomes (cited in Shepard, 1960).

Need for Continuing Medical Education

Houle (1967) said, "While continuing education will not cure all the problems of the professions without it no cure is possible" (p. 50). C. Everett Koop (1990) concluded "the era in which we live makes it critical that we embrace the concept of continuous learning. Embrace is the key word" (p. 103). The recognized need for CME has grown to the extent that in 1994 CME was a \$343 million industry (Mazmanian & Duff, 1994).

Over the past four decades, CME also has experienced growth in the number of activities offered and in the number of accredited CME sponsors. Despite this growth, the challenge of linking the physicians' practice with education remained.

Manning and Petit (1987) believed that computers would provide more individualized CME and that they could be better directed to individual needs. Crandall and Coggan (1994) identified a need for CME in the rural setting. They suggested that CME trainers could be enhanced by information technology. These resources could reduce rural primary care physicians' sense of isolation with "access to information needed for clinical training, continuing education, professional growth, and consultation" (p. 209). Physicians, needed to acquire new skills and knowledge affect patient outcomes and to improve the cost effectiveness of health care (Leist & Kristofco, 1990; Smedley, Finestone, Thomas-King, & Sylvester, 1994). With new management strategies, diagnostic advancements and government requirements, the medical profession is in a period of rapid transition intensified by changes in technology. Through the maze of technological advancements and the uncertain climate of health care reform, physicians must find strategies and resources to meet specific practice needs.

Societal and governmental concerns about access to health care, health care cost, and the quality of health care services were driving forces for accountability (Moore, et al.). In this quickly changing environment, maintaining professional competence and the ability to continually evaluate the quality of care were important needs of physicians (Jennett & Swanson, 1994; Moore, et al., 1994). Not only must physicians routinely evaluated their professional competence, but patients, managed care organizations

(MCOs), and regulatory entities, also were assessing the quality of care (Berwick, 1989; Berwick, Godfrey, & Roessner, 1990; Wentz & Harrison, 1994).

Traditional CME

Traditional CME was teacher-centered with lecture-based instruction enhanced with slides and other audiovisuals. The traditional model is thought of as a gathering of physicians who listened to a series of lectures regarding the advancement of medical science. The lecture material presented "may or may not be directly relevant to the practice circumstances of members of the audience and may not be in a form that can be readily applied in practice" (Moore et al., 1994, p. 5). This traditional instructional model allowed for little active-learner participation or feedback and seldom offered the learner problem-solving situations. Perhaps the lecture-based didactic presentation format was appropriate for undergraduate medical education; but practicing physicians were searching for new interventions, protocols, or solutions to problems associated with their physician's practice or patients. The traditional CME program format and instructional design is poorly matched to what was known about physicians' learning needs (Moore et al., 1994).

Moore, Bennett, Knox and Kristofco (1994) evaluated the features of traditional CME as including: 1) lecture-dominated format that is episodic and not reinforcing; 2) little evidence of impact on physician practice or patient outcomes; 3) minimal collaboration between learners and CME provider; lack of timely response to physician learner needs; 4) emphasis on credit; and 5) focus on course production driven by an enrollment economy (p. 5). Professionals agreed that traditional approaches to CME would be

inadequate to keep physicians abreast in the 21st century (Conn, 1992; Golden, 1992; Gunzburger, 1994; Kristofco, 1989; Mayne, 1994).

Miller's (1967, 1975, 1990) research stressed a need for outcome evaluation and for developing new approaches of instructional design for CME. These new approaches based on adult learning principles have been identified since the 1960s. In considering instruction designed for the adult learner, Suter, et al. (1981) noted differences between preparatory and practicing needs of learners. These differences included:

1. Responsibility for the educational activity shifts from the institution in preparatory education to the individual in continuing education.
2. Learning aimed at receiving a degree or qualifying for certification becomes related to practice performance and career development needs.
3. Learning activities, imposed in preparatory education by a finite institutionally-defined curriculum, become open-ended and more vaguely defined in continuing education.
4. Organized and continuous learning becomes individualized and frequently episodic.
5. The health professional begins to rely on independent study or may turn to various sources or institutions for assistance rather than depending on a single institution for all educational experiences.
6. Evaluation of accomplishments required by the institution becomes self-evaluation by the individual.
7. Motivation to learn depends increasingly on internal standards and goals, while outside factors become less effective.
8. Application of new knowledge, skills, and attitudes is the exclusive responsibility of the professional and is no longer supervised by the institution or program (p. 692).

As the literature cited illustrated, practitioners wanted the opportunity to select activities that matched specific needs, and with specific learning formats, that were

relevant to their practice settings. The traditional CME model lacked the application of adult learning principles. Participants missed opportunities in the passive learning setting for interactive learning and opportunities to set their own learning criterion. The goal of CME was to impact or change competencies and/or outcomes (Miller, 1967). In addition, physician learners required easier access to learning and an understanding of the relationship to practice needs. The effectiveness of different methods of CME depended on a complex set of factors, including practice context and perceived importance of the content. When appropriate and systematic evaluation has been applied, studies of CME have shown that participants increased their knowledge and often changed their perceptions and practices (Green et al., 1984). At the simplest level, the objective of CME is to deliver accurate, relevant information to learners. Continuing medical education literature confirmed that journals and lectures simply set a stage for change but rarely were effective as change agents (Davis et al., 1992). Research indicated that didactic instruction, journals, and audiotapes could provide the foundational base of information. However, some literature indicated that the role of interaction and direct feedback, educational influences, and contact with opinion leaders could result in greater changes in attitudes and practices (Davis et al. 1992; Green et al., 1984; Knowles, 1980).

New Paradigm for CME

Continuing Medical Education in the traditional sense has been defined as a process " for the dissemination of new information, which included attendance at courses, readings and discussion with colleagues and activity involved with the review of journals," (Miller 1967, p. 321). The traditional group lecture format has been criticized

as falling short in satisfying individual needs and interests of physicians (Wentz & Harrison, 1990). The new CME paradigm, as described by Moore et al (1994) extended the definition of CME. According to Moore and his colleagues, CME must respond to physicians' demand for immediate access to information and for individualized instruction. This paradigm also emphasizes the importance of accountability and of outcome assessment. Moore et al., (1994) in their publication, *Creating a New Paradigm for CME: Seizing Opportunities Within the Health Care Revolution*, discussed the new paradigm for CME formulated on adult learning principles that were based on the recognition that CME and "modern health care are interrelated parts of a single system" (p. 6). This integrated system focused on health care from the perspectives of cost-effectiveness and of the development of innovative strategies for the delivery of CME that could directly impact patient care outcomes. Their model identified the forces creating change as stemming from government and from private agency efforts, applying quality management to health care, expanding biomedical information, and advancing communication possibilities through new technological applications.

While these forces affected CME and the need for professional development, point four, the Advances in Information and Communication Technology, was particularly pertinent for this discussion. With the enormous explosion of information that provided extensive use of technology access to information became more feasible than ever. Apps (1988) and Wurman (1990) estimated that information doubled every five to seven years. Research conducted by Leist and Kristofco (1990), found that extensive use of technology to convey CME extended from CD-ROM technology to

computer-assisted instruction. They noted that these new modes of instruction were "no longer a passive medical school-based experience" (p. 174). Linkages with rural physicians that provided the ability for consultations and diagnosis are made possible through distance education. These advances have created a capability to bridge time and distance with the rapid movement of information on a global basis. The addition of computers to physicians' practice provided access to databases and electronic consultation networks.

Diffusion of Innovation

Zimmerman (1986) reinforced the need to maintain "currency" in a profession. He illustrated that in present century the rate of change has moved thinking from batch processing to continuous processing, and that educational providers were making the shift to efficiently and effectively accomplish their mission (p. 73). Rogers' (1995) diffusion of innovations model, a goal-centered model, identifies the motivation for change as a desire for a better condition or outcome that provided more satisfaction. Rogers' theory described an innovation as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption (p. 11)." Rogers' (1980) earlier work emphasized that within a population a process occurred that allowed individuals to be identified as innovators, early adapters, late adapters or never changers. This model demonstrated that change could be rationally planned and that successful occurrences could be predicted through the manipulation of specific variables. Characteristic factors of innovation, as described by Rogers, are advantage, compatibility, complexity, trialability and

observability. These characteristics were determinates of how rapidly the rate of adoption would occur.

Rogers' (1995) five stage process is governed by (a) relative advantage the innovation offered over other practices, (b) the compatibility of the innovation with contemporary practices, (c) the complexity of the innovation, (d) the opportunity the individual has to try the innovation prior to full adoption, and (e) the opportunity available to observe others using it. The five-step process included:

1. Knowledge: The individual is exposed to the innovation's existence and gains some understanding of how it functions. Person hears about the innovation.
2. Persuasion: The individual forms a favorable or unfavorable attitude towards the innovation. Is then persuaded to think about the innovation.
3. Decision: The individual engages in activities that lead to a choice to adopt or reject the innovation. A decision to try the change is made.
4. Implementation: The individual puts an innovation into use. Then confirms the change after implementation.
5. Confirmation: The individual seeks reinforcement for an innovation decision already made, but may reverse this decision if exposed to conflicting messages about the innovation. The decision to continue or discontinue use.

Rogers (1995) further extended this concept by discussing reinvention as an important element in the process of adoption. Reinvention was the extent to which an innovation is changed or modified by a user in the process of adoption and implementation. Perception was central to Rogers' theoretical approach, since something long in existence could become an innovation if people saw it and if they treat it as one. Geertsma, Parker and Whitbourne (1982) have a similar model that included a five-step

process: priming, focusing, rationalizing, triggering, and finally evaluating the innovation.

Lockyer (1992) made the point that both Rogers (1995) and Geertsma et al. (1982) have built their theories on the basis of an individual who had a fairly autonomous ability to initiate change. The theories also maintained that an innovation is a simple process and "that model adoption is helpful for changes in which the physician is not dependent on the resources of an organization to facilitate change (p. 34)." Fox (1991) fostered the idea that Rogers' diffusion or stages of change concepts were applicable to CME in that, "If, in a given population of physicians, some are ready to change at different times than others, or some have different but relatively stable orientations to making changes, CME practitioners need to know how to assess these variables", (p 160). A desire for change is identified after innovation occurred as a result of dissatisfaction with methods currently used and/or by the presentation of an innovation (Putnam & Campbell, 1989).

CME Application of Innovation for Distance Education

Lubar (1993) documented the dramatic change information technology has had on society. Computer technology, especially access to the Internet, were segways to rapid access information, a means to communicate medical information in a myriad of formats and access to information to a larger number of practicing physicians (Christensen & Armstrong, 1998). A 1997 study at Georgia Tech indicated that Internet use had risen to 36 million users in the United States by late 1997 (Graphics, Visualization, & Usability Center, 1997) and that in 2004 it is predicted that there will be

90 million households with Internet capability (McGarvey, 2000). Those providing resources to physicians and medical professionals concurred that Internet usage were growing at a phenomenal rate (Eager, 1997). Specialized publications such as *M.D. Computing* (1999) provided resources to connect computing to medicine. The information super highway has opened a door to many CME resources including databases, previously difficult to obtain journal articles, the National Library of Medicine on-line collection and CD- ROMs providing CME information and programming at minimal cost (Crandall & Coggan, 1994).

The compounded growth of the Internet with the addition of one million pages per week (Lawrence & Giles, 1999), along with need for a balance for physicians' time, managed care pressure, and increased accessibility of on-line convenient CME provides a reason for increased use of the Internet by physicians (Erikson, 1999). Peterson (1999) reviewed 205 Internet sites and noted that potential learners needed to beware. He identified that few met the standards of good quality control and suggested that the Internet would benefit by using applications learned through traditional CME. Starr (1997) asserts that the Internet is an important resource for instructional delivery because of the flexibility it provided.

Greer's (1988) work suggested that medical technologies arrived in a community through individual innovators. These local innovators, known as idea champions, often were the first to see the possibilities of new technologies, and they transferred viable ideas and maintained ties with other similarly inclined physicians, who were external to the community. As the characteristics of the technologies and their results become

observable, local opinion leaders examined and assessed the innovation, sometimes over a protracted period of time. Other physicians begin to adopt the innovation as consensus built in the community that the innovation was acceptable practice.

Gagon and Goulet (1995) surveyed 1500 family physicians in 1990 and again in 1995 to compare usages of individual CME activities. They found that a significant increase in usage was identified with distance learning activities in of video, audio recording and computers.

Lott's (1995) research found similar results to these from Gagon and Goulet's 1990 (1995) work, which determined that the physicians in the research group demonstrated symptoms of distance impairment. They defined distance impairment as "the real or imagined condition of geographic isolation experienced by the learner" (p.203). Lott noted that physicians displayed an unwillingness to utilize self-directed learning opportunities.

Dillion (1996) indicated, "Current definitions of distance education ignore the fact that the integration of telecommunications technology in the learning environment is blurring the boundaries between 'self-directed' and 'institutional-directed' learning". Her definition continued "as the linkage of learners and learning resources separated by time and or distance" p. 6. Autunano (1993) defined distance education as "learning situations in which the instructor and the learner(s) are separated by geographical location or in time and consequently have to rely on communications technology, computer technology, and/or printed materials for instructional delivery" (p. 876). This educational medium was not new to medicine, since in 1955 the concept of telemedicine existed in various

formats (Brick & Schreiber, 1993; Peredina, 1995). In the early radio years, broadcasts on CME topics were available. Development has continued in telemedicine and has expanded in the related communications technologies to facilitate and deliver medical and patient care information. Teleconferencing likewise has been an effective method of conducting instruction via audiographic workstations to "create, transmit, and receive graphic and video images" between various hospitals for consultation (Peredina, 1995, p. 14). The types of media and mode of transmission varied, based on the instructional objectives and the production costs. The types of media available for the delivery of distance education include: (a) audio: audiotapes audio discs, radio, (b) still visual: transparencies, slides, computer generated presentations, (c) motion visual: videotape, instructional television, (d) computer technology: computer based/aided instruction, simulators, electronic mail, (e) optical disc technology: compact disc-read only memory (CD-ROM), computer-based interactive video disc, digital video interactive, compact disc interactive, hypermedia, (f) teleconferencing: video conferencing (one-way), (one-way video with two-way interactive audio), compressed digital videoconferencing (two-way video, two-way audio), audio conferencing (two-way voice only), audiographic (two-way data, graphics, and still images), computer conferencing (two-way text only) (Antunano, 1993).

Computer capacity and speed have advanced to levels unimagined two decades ago. Multimedia and compression capabilities permitted the integrated transmission of data, voice and images. Delivery systems that use fiberoptic or regular phone lines made

use of technologies that have revolutionized distance learning and that directly impact on future delivery of CME (Moore et al., 1994).

According to David Erikson, in 1998, 27% of the physicians he surveyed earned CME hours via distance learning modalities. Of those using such modalities, one-fifth of the 56 average number of hours accumulated per year was accessed by through the Internet and CD ROM (Erikson, 1998). Information and communication technologies have increased capacity to transmit information and data contributing to the movement away from traditional CME. Crawford (2000) suggested that, as Web-based activities increased there would be a shift but that the traditional delivery would continue. He noted that introduction of new media did not mean that the old media would be displaced. Web-based technologies provided new opportunities for the delivery of CME and were rapidly being incorporated into the design of distance education programs. Distance education had the potential to become the predominant educational change agent because it had the capacity to be responsive to the professional development needs of health care providers and because it links practitioners to educational institutions and to others resources (Moore, et al., 1994).

Summary

The purpose of this literature review has been to focus and present relevant information found in various studies to better understand the potential receptivity of family physicians to distance learning as required to meet their CME needs. There has been a tremendous increase in the time-demand placed upon CME delivery and the variety of delivery options and required to present the explosion of information needed to

practice medicine has been revolutionized due to the computer and computer-assisted learning devices.

CHAPTER III

Research Procedure

Introduction

In this chapter the researcher presents the rationale for the development of the survey instrument based on the research questions and the procedure that was utilized to conduct the research. This section also addresses the pilot study, procedures for data collection, and the analysis of the data.

Research Methodology

This study is designed to ascertain and to identify the modalities that family physicians are using currently and their future distance learning interests as a means for CME credit. The researcher developed the instrument using current literature and an expert panel of consultants to study the various distance learning modalities. The assessment was conducted using a researcher-developed questionnaire survey. A survey questionnaire was used by the researcher because it was complete, quick and focused on the research objectives. Also, various needs of the survey population such as time limitations and motivation that physicians would have to complete such activities required using a survey questionnaire. Alreck and Settle (1995), noted that utilization of surveys provided an accurate, quick and inexpensive method of data collection, particularly, if the survey was designed well and if adequate follow-up procedure were used (Salant & Dillman, 1994). Further, the questionnaire was designed to acquire both demographic data and preference for CME learning via distance learning modalities from the physician. Based upon the purposes of this study a standard statistical technique was

used for analysis. From analysis of this data, both quantitative and descriptive evaluations of the demographic and CME distance learning preferences for physician are presented (Hintz, 2000).

Research Population

The research population, which consisted of 1,064 active family physicians holding membership, as of November 1999, in the TAFP and having completed either a Doctorate of Medicine or a Doctorate of Osteopathic Medicine with a Family Practice Residency Program were surveyed for this study (TAFP, 1998). Active membership required that a physician complete a family medicine residency program (three years), or an American Osteopathic Academy approved residency program; also these physicians must complete CME requirements of 150 hours of accumulated continuing education hours during the three years immediately preceding the application. Further, members also were required to meet one of the following criteria: (a) engaged in the practice of family medicine; (b) engaged in the practice of emergency medicine after December 31, 1998; and (c) engaged in full-time teaching of family practice or full-time medical administration (AAFP, 1997). The research population was defined, therefore, as physicians who met the above requirements. This population was manageable from a numbers point-of-view. Therefore, to provide the best number of responses the entire population was selected.

Instrumentation

The method used to conduct this study was to survey the entire population of family physicians holding active status in the TAFP and practicing in the State of

Tennessee. After review of the literature, no appropriate instrument was found for this study. The instrument (Appendix A) designed to measure the current use and potential receptivity to distance learning modalities from the research population. Also, it was to solicit information about their CME practices as it related to distance learning was included in the instrument.

Design of Instrument

The researcher developed the survey instrument used in the data collection, with the assistance of her major advisor (Salant & Dillman, 1994; Sudman, Bradburn, & Schwartz, 1996). Survey items were comprised from information extracted from the review of literature about various distance learning modalities, learning styles and continuing education trends and requirements. A modified Dillman's (1978) procedure using two questionnaire mailings was used to facilitate an optimal return rate.

Content Experts

Five expert judges were selected to determine content validity of the survey instrument. The judges were selected on the basis of their expertise and knowledge of the CME process and of the target population of family physicians. The panel included (a) three physicians (M.D.s), (one in private practice and two in academic medicine), and (b) two professors (Ph.D.s) of medical education and CME.

The panel of judges was instructed to complete the survey form as if they were participants in the study and then to provide written feedback on the form. Each of the judges independently reviewed the survey instrument and procedures providing feedback to the researcher. It was suggested that the questionnaire be designed in a booklet format

and tested to ensure that the survey could be completed within four minutes. The researcher found that several comments were documented on the survey form but that most of the judges preferred to discuss the changes verbally. The researcher re-evaluated and restructured the instrument based upon this feedback and information generated by the panel.

Survey Instrument

The survey questions were designed to determine the types and perceived usefulness of distance learning modalities. The survey consisted of three parts: (a) an introductory letter that explained the purpose of the study and gave directions for completion (See Appendix A); (b) a 16 item, five-point Likert-scale close-ended, multiple-choice and fill-in-the-blank question (See Appendix B); (c) a demographic section that provided information about the respondent and his or her practice (See Appendix C).

The survey consisted of 16 questions. The first two questions related to the use and receptivity of CME via distance education. The first question was designed to measure the use of distance education modalities for CME during the last 12 months. Seven modalities were listed for this question, with categories for ranking ranging from never to always. The modalities selected to measure current use included: CD ROM instruction, interactive video, videotape, audiotape, video conferencing, Internet, and E-mail. The second question was designed to measure respondent's receptivity to CME via distance education. The same modalities that were surveyed were the same as for

question one. However, the response categories were on a scale from low to high receptivity.

The third question was designed to investigate the influence of respondent's participation in CME activities. The following 12 factors are used: perceived quality, content, applicability to practice, convenience, only way to get information, location, cost of CME activity, distance away from practice, the influence of relevant content, and time away from family. Respondents were asked to rate each factor from very weak to very strong.

Two survey questions (fourth and fifth) concerned access to the Internet and computer ownership. Responses were either yes or no for these two items.

Questions six and seven were intended to measure the opinion of each respondent to whether or not CME activities, via distance education improved knowledge and skills and in general, affect his or her practice at all. The scale was low to high.

The eighth question concerned the adaptation of CME habits over the past four years as a result of practice location, managed care, family changes, and computer access. Ranking categories ranged from no change to a great deal.

Questions nine to sixteen were designed to provide demographic characteristics of respondents, including community type, county in which they practice, years in practice, type of practice, whether or not they held board certification, gender, birth year, and medical school graduation year. These questions were either fill-in-the-blank or multiple choice.

Data and Instrumentation

Pilot Study

To test the validity of the survey instrument, a pilot test was completed using 11 family physicians in current practice. The test group served on the faculty of the James H. Quillen College of Medicine, East Tennessee State University, Johnson City, Tennessee and were selected on the basis of interest and knowledge of CME. The survey instrument was administered to the test group at one time and place. The researcher provided both verbal and written instructions. Respondents were asked to write their comments relative to clarification of points in the survey instrument on the survey forms.

To complete the survey instrument, the researcher solicited feedback from test group members. Several comments resulted in changes, such as eliminating telemedicine as a modality selection because the test group indicated that this terminology was confusing. The test group also recommended the inclusion of questions concerning computer and Internet access because some of the population might not have computer access. In the demographic portion, the group suggested that the year of graduation from medical school could be of interest, since trends indicated that the average age of medical school entry has increased over the last 25 years. These suggestions and others were incorporated in the revised of the survey instrument, resulting in its present form (Appendix B).

Data Collection

The researcher conducted the data collection using the processed described by Dillman (1978). After making appropriate modifications to the survey instrument, the

survey packet was mailed to each member of the identified population. The survey packet included: 1) a memorandum of support from the president of TAFP, 2) a brief cover letter from the researcher, 3) a survey booklet, and 4) a return self-addressed stamped envelope. A second survey instrument was mailed to all nonrespondents one month after the first mailing.

The TAFP approved use of two sets of mailing labels for this research project specifically for use on the first mailing and the follow-up mailings only. Mailing labels with addresses were provided to the researcher on envelopes supplied by the TAFP along with a name-only correlating membership list. The TAFP has a policy of not releasing address lists to anyone outside their organization. Therefore, providing address labels on envelopes allowed for the use of their list.

The researcher assured confidentiality to the subjects in the cover letter included in the survey instrument. Participant names were not requested in the survey instrument. However, follow-up mailings were needed for non-respondents. A code number located on the last page of the survey instruments identified these questionnaires. Code numbers were stamped in red and were very visible to respondents. The cover letter indicated that a follow-up mailing would be conducted for non-respondents. Respondents were tracked as the surveys were received. Tennessee Academy of Family Physicians provided follow-up labeled envelopes for non-respondents, and a follow-up packet was mailed exactly one month later including a second survey, a second letter of introduction and a reminder note requesting his or her response. A return time of one month was determined as acceptable.

This entire process was completed within four months after the initial mailing. All data were collated and prepared for analysis.

Data Analysis

The survey instrument developed by the researcher entitled, TAFPS was used to collect the data. The statistical package the Number Cruncher Statistical System 2000 (Hintze, 2000) was used for the statistical analysis of the data. The statistical analysis calculated the deviation of the observed frequency distribution and compares it to the expected frequency distribution.

Summary

This chapter entailed the methods and procedures used to conduct the research study. The development of the survey instrument based upon the research questions, the data analysis procedures and the validation of the survey instrument by an expert panel of judges was described. A pilot test of the survey instrument was described and the follow-up procedures that were used for the maximum return of the survey instrument.

Categorical data was generated from the survey instrument. The statistical analysis was described as summary data was used to examine the receptivity and use of distance learning modalities by family physicians in Tennessee.

CHAPTER IV

Analysis of Data and Results

In this chapter the researcher describes the respondent characteristics, statistical procedures and survey results based on the two mailing methods, and she addresses the research questions. Through statistical analysis of the data chi-square analysis was used to determine the level of significance. A p value of less than or equal to .05 level of significance was used to determine significance of each hypothesis.

Response Rate

The researcher mailed the survey instrument (TAFPS) to the entire population of 1064 active TAFP members; all survey instruments that were returned (585) were included in the statistical analysis. Some potential respondents (44) moved from the state, left their practices, or had no forwarding address between mailing one and mailing two. Six new members were added to the membership between mailing one and mailing two, and this group also is reflected in the total number mailed. Two changes of address were noted, and mailing corrections were made to provide these individuals an opportunity to respond. A total of 585 surveys were returned as requested. From the total population of 1064, there were 441 non-respondents. Including the modifications noted above, the return rate of qualified respondents was 55 %.

Description of Population

Respondent Characteristics

This section outlines the self reported professional and demographic characteristics of the TAFP respondents as indicated by their response to the

demographic section of the survey. The largest numbers of physicians responding to the survey participated in group practices with a significant number of the respondents being between the ages of 40 and 49 (40.2%). Table 2 illustrates the distribution of age for the respondents. Slightly more than one-half (50.9%) indicated that they had been in practice for 14 years or less, and 23.6 %were in the lower quartile of five years of practice or less. Most of the respondents (90.6%) who were board certified at the time of the survey.

Males responded to the survey by a ratio of four to one to females; of the 585 respondents, 459 were males, 117 were females, and 9 did not identify.

Statistical Procedure

Computer usage is prevalent among 93.7 % of the respondents. They stated they had computers and 88.9 % reported that they had access to the Internet.

Eighty-one of the 95 counties in the State of Tennessee were represented in the study, providing a representative distribution statewide (Appendix C). The major response groups were clustered around the five major population centers of the state including Nashville, Memphis, Chattanooga, Knoxville, and the Tri-Cities.

Research Questions

Research Question One

How receptive are family physicians to CME provided via distance education modalities?

The survey item providing the data to answer research question one said, "Please indicate your receptivity for the different formats to receive CME by distance education

TABLE 2

Age of Respondents

Category	Age	Frequency (%)
1	29 - 39	150 (26.6)
2	40 - 49	235 (40.2)
3	50 - 59	121 (20.7)
4	60 - 69	43 (7.3)
5	70 - 89	24 (2.1)

Frequency missing = 12

modalities.” Respondents were asked to rate their receptivity from low to high. Table 3 indicates that the respondents were most receptive to the use of the Internet and to audiotape. A total of 32.6 % indicated a preference for both modalities when the categories of moderately high and high are combined to determine more than a moderate level of interest.

Using the evaluation at the moderate level, it can be seen that the order of interest according to respective modalities was videotape, CD ROM, Internet, audiotape, interactive video, email, videoconference. The frequency rate for the category of moderate for the videotape modality was 34.9 % and CD ROM was 30.8 % indicating that the response group had at best a moderate interest in distance education using these modalities.

In general, the survey indicates that the computer based, CD ROM, email and Internet are the modes of acceptance for distance education in CME. As a whole, the population is not receptive to the use of distance education modalities for CME because most respondents indicate receptivity to CME via distance education modalities in the low or moderately low categories

Research Question Two

Does the current receptivity of family physicians to CME provided via distance education vary in relation to previous use of distance education modalities?

To address this question the researcher compared the use of distance education modalities to that of receptivity, using a chi-square with a p value of .05 level of

TABLE 3**Frequency Table for Receptivity of Distance Education Modalities**

Modalities	Low (%)	Moderately Low (%)	Moderate (%)	Moderately High (%)	High (%)	Missing (%)
CD ROM	147 (25.1)	73 (12.5)	180 (30.8)	122 (20.9)	46 (7.9)	17 (2.9)
Interactive Video	213 (36.4)	155 (27.0)	118 (20.2)	53 (9.1)	19 (3.3)	27 (4.6)
Videotape	138 (23.6)	121 (20.7)	204 (34.9)	79 (14)	29 (5.0)	14 (2.4)
Audiotape	129 (22.1)	113 (19.3)	141 (24.1)	120 (21.0)	68 (11.6)	14 (2.4)
Video Conference	217 (37.1)	162 (27.7)	121 (20.7)	51 (8.7)	12 (2.0)	22 (3.8)
Internet	142 (24.3)	77 (13.2)	157 (26.8)	130 (22.2)	61 (10.4)	18 (3.0)
Email	202 (34.5)	117 (20.0)	119 (20.3)	87 (14.9)	36 (6.1)	24 (4.1)
Total Respondents = 585						

significance. The results, as shown in Table 4, indicate a general trend for low frequency in all modes for distance education. In the midrange, (sometimes used) ranking, the following was seen: audiotape, CD ROM, Videoconference, email, interactive video. Nearly an inverse of these modalities was shown in the ranging of never used: interactive video, email, videoconference, CD ROM, videotape, Internet, audiotape. The Chi-square analysis revealed a significant level of association for each of the distance education modalities: CD ROM instruction, interactive video, videotape, audiotape, video conferencing, Internet, and email. This relationship is caused by the low use of the modalities and by the low receptivity of interest in using the modalities, resulting in few or no responses in some categories. Respondents did acknowledge greater acceptance of distance education than they reflected in their current use. Responses identify that the Internet has the highest level of relationship. Overall, respondents indicate that they do not currently use distance education modalities for CME and that they are not interested in using this method. This was indicated in the frequencies in Tables 3 and 4 illustrating low receptivity and low use for each of the modalities. The exception with slightly higher use was audiotape, with $p < .00001$ and a chi-square value of 517.65, indicating a statistical association. The audiotape modality also offered the highest frequency of use and receptivity. However, the researcher expected that the p values could be low because of the possible association of use and receptivity. However, it appears that if the modality were never used it had low receptivity and as one would expect, if the modality were sometimes or greater used, it had better receptivity, (e.g. audiotape and email versus interactive video).

TABLE 4**Frequency Table for Use of Distance Education Modalities**

Modality	Never (%)	Seldom (%)	Sometimes (%)	Often (%)	Always (%)	Missing (%)
CD ROM	342 (58.5)	142 (24.3)	68 (11.6)	12 (2.1)	3 (.5)	18 (3.1)
Interactive Video	431 (73.7)	102 (17.4)	26 (4.4)	6 (1.0)	1 (.2)	19 (3.3)
Videotape	270 (46.2)	178 (30.4)	100 (17.0)	16 (2.7)	3 (.5)	18 (3.1)
Audiotape	182 (31.1)	140 (23.9)	148 (25.3)	79 (13.5)	25 (4.3)	11 (1.9)
Video Conference	370 (63.3)	114 (19.5)	57 (9.7)	12 (2.0)	2 (.3)	30 (5.1)
Internet	261 (44.6)	124 (21.2)	127 (21.7)	47 (8.0)	8 (1.4)	18 (3.0)
Email	385 (65.8)	84 (14.4)	62 (10.6)	19 (3.3)	9 (1.5)	26 (4.4)
Total Respondents = 585						

A diagonal strand running from the never-used category to the always-used category is depicted in Table 4. This is a to expected result due to the high indication for non-use of distance education and to its modalities. Respondents indicated a higher use of audiotape then other modalities. Therefore, to better understand this data, the researcher used the audiotape modality as a case study. She found that respondents were most likely to use, and also, most likely to be receptive to using the audiotape modality. Therefore, she compared audiotape use with the following demographic characteristics: community type, type of practice, certification, and gender (See Table 5). A percentage for each of the previously listed demographic characteristics was used for each of the audiotape categories denoting level of use progressing from never to always. The chi-square calculation was significant, identifying no significant relation between size of community, audiotape use and type of practice. The category of board certification was significant ($p = .046$) with the highest percentage (20.8%) of respondents that were not certified indicating that they always used audiotape for CME. Further, most respondents answering in the always use category for audiotape were males (84 %) with a 87.0 % for often.

The demographic characteristics of years in practice, year of graduation, and age are shown in Table 6. The number of years in practice for those respondents who always used the audiotape method was 21.25, and their mean age was 52.3 years. The year of graduation from medical school for this group was 1975. From the case study of the audiotape modalities the data suggests that age related to use of audiotape was an

TABLE 5**Percentage Distribution Table for Audiotape Use**

Categories	Never	Seldom	Sometimes	Often	Always
Community Type					
Less Than 2500	1.7	2.2	4.1	6.5	4.0
2500-9999	24.4	23.0	24.0	19.5	12.0
10000-99999	48.3	40.3	45.9	42.9	40.0
100,000 or more	25.6	34.5	26.0	31.2	44.0
N	180	139	146	77	25
Chi-Square = 12.80, $p = 0.3841$					
Type of Practice					
Solo	24.3	21.2	7.4	31.2	25.0
Group	62.1	66.4	65.3	54.5	54.2
Hospital	7.3	3.6	8.3	11.7	12.5
Academic	6.2	8.8	9.0	2.6	8.3
N	177	137	144	77	24
Chi Square = 15.33, $p = 0.2238$					
Board Certification					
Yes	95.6	92.8	93.0	94.7	79.2
No	4.4	7.2	7.0	5.3	20.8
N	181	139	142	76	24
Chi Square = 9.656, $p = .0466$					
Gender					
Male	77.9	77.7	79.6	87.0	84.0
Female	22.1	22.3	20.4	13.0	16.0
N	181	139	147	77	25
Chi Square = 3.547, $p = .4707$					

TABLE 6**Mean Distribution Table for Audiotape Use**

Categories	Never	Seldom	Sometimes	Often	Always
Years in Practice					
Mean	14.0	14.0	15.2	17.0	21.25
Standard Deviation	10.6	10.6	12.1	11.4	9.2
N	181	138	147	76	24
Year of Graduation					
Mean	1982	1982	1981	1980	1975
Standard Deviation	10.2	10.4	11.7	10.3	8.9
N	175	136	140	69	25
Age					
Mean	45.4	45.3	47.1	48.7	52.3
Standard Deviation	9.9	10.2	11.4	10.6	9.0
N	181	137	146	77	25

important relational factor. Also data showed that older physicians utilized audiotapes more than their younger colleagues.

Research Question Three

How do family physicians think CME activities in general affect their practice by maintaining or enhancing their skills or knowledge?

Respondents indicated that CME activities, in general, affected their practice, presumably by maintaining or enhancing their skills (Table 7). The data indicated that 372 physicians (63.3%) responding to the moderately high and high categories. Thus, CME affected or assisted in maintain skills and knowledge in general. These data illustrate that well over one-half of this group believed that their skills and knowledge are influenced by CME activities.

A total of 30.2 % indicated that CME activities only moderately enhanced their knowledge and skills. Table 7 also shows that fewer than 5 % were of the opinion that CME had a low or moderately low affect on their practice. High use indicates that there is likelihood that there will also be a high level of receptivity.

Research Question Four

What factors influence family physicians' participation in CME activities provided via distance education?

Many factors could influence respondents' decisions to utilize distance education modes. However, in the survey instrument, respondents were asked to indicate the strength of influence for specific factors as to their participation in CME via distance education. These factors, as identified in the literature, include relevant content,

TABLE 7**Frequency Table for CME Activity Affect on Practice in General**

	Low (%)	Moderately Low (%)	Moderate (%)	Moderately High (%)	High (%)	Missing (%)
In General	2 (.3)	24 (4.1)	177 (30.2)	291 (49.7)	81 (13.6)	10 (1.7)

applicability of information to practice, perceived quality, content, reliable source of information, convenience, time away from practice, time away from family, distance to CME activity, location, cost of CME activity and only way to get CME.

To investigate this question, chi-square tests for association between each of the 12 factors and modalities were required (listed in Table 3 and 4). Only those associations that were correlated significantly ($p < 0.05$) are discussed. There is a high degree of correlation between convenience, distance to CME activity or only way to get CME and the modality of audiotape use (Table 8). Further, there is a significant correlation between time away from practice and use of the Internet. Interactive video and cost of CME also are positively correlated.

The percentages for factors that influence CME participation are outlined in Table 9. Categories are combined for very weak and weak; average; and strong and very strong. Most respondents (>60%) indicate that CME participation by distance education was relevant, applicable and of good quality. Also, most respondents (>50%) concluded that most of the logical factors are important and that most influence their participation in CME education by distance education. The "only way to get CME" responses indicate a low (18.5 %). This can be explained by the reluctance of respondents to use distance education for their CME needs.

Research Question Five

How do family physicians think CME activities provided via distance education could or do affect their practice by maintaining or enhancing their skills or knowledge? This question has similar elements to question number three. However, this question

TABLE 8**Chi Square Test for Factors that Influence CME Participation via Distance Education**

	Audiotape	Internet	Interactive Video
Convenience Chi Square 33.14	$p = .007$		
Time Away from Practice Chi Square 35.49		$p = .0034$	
Distance Chi Square 33.28	$p = .0067$		
Only Way to Get CME Chi Square 35.08	$p = .0038$		
Cost of CME Chi Square 37.49			$p = .0015$

TABLE 9**Percentages for Factors that influence CME Participation via Distance Education***

Factors	Very Weak Weak*	Average	Very Strong Strong	% Missing
Intellectual				
Relevant	3.6	20.0	70.4	6.0
Applicability	5.3	22.2	67.8	5.6
Perceived Quality	6.1	27.9	60.0	6.0
Logical				
Content	4.0	22.7	59.5	5.6
Reliable Source	7.7	28.9	56.4	7.0
Convenience	5.5	23.1	62.0	9.4
Time Away from Practice	8.2	28.4	57.4	6.0
Time Away from Family	11.6	26.1	56.2	6.0
Distance	10.3	32.0	53.5	6.3
Location	12.0	28.0	53.0	7.2
Cost	8.4	35.4	50.4	6.2
Only Way to Get CME	35.4	38.1	18.5	7.7

Total Respondents = 585

* Categories of Strong and Very Strong, Weak, Average and Very Weak combined

asked specifically whether or not the respondents thought CME provided by distance education could or would affect their practices. For the three categories of moderate, moderately high and high 41.9 % report that CME via distance education affects their practice. Table 10 outlines the frequency for CME activity affect on practice via distance education. This data reveals that most respondents fall into the moderate to moderately high categories, indicating that they are somewhat positive that CME via distance education could or would affect their practice.

Research Question Six

Have the CME habits of family physicians changed related to the factors of location, managed care, family changes and time commitment?

The researcher used the TAFPS to ascertain the habits of the respondents and their perceived association with the various modalities. To determine the self-reported changes, respondents were asked to rank their adaptation from no change to a great deal of change (Table 11). Many have adapted their CME habits over the past four years as a result of the factors of practice location, managed care, family change, and computer access. A percentage table was used, and it identifies that time is the most defined area of change with 35.7 % responding to the somewhat category and 19.7% to the a great deal category. Practice location receives the highest percentage in the no change category. To identify any relations between age, gender, practice type, community type, or year of graduation from medical school with the question asking, "How much have you adapted your CME habits over the past four years as a result of the factors of practice location, managed care, family change, time factors, and computer access?" was tested. Two

TABLE 10**Frequency Table for CME Activity Affect on Practice via Distance Education**

	Low	Moderately	Moderate	Moderately	High	Missing
	(%)	Low	(%)	High	(%)	(%)
	(%)	(%)	(%)	(%)	(%)	(%)
Via Distance Education	42 (1.2)	67 (11.5)	245 (41.9)	179 (30.6)	39 (6.7)	13 (2.2)

TABLE 11**Percentage for Adaptation of CME Habits Over the Past Four Years**

Factors	No Change	Very Little	Little	Somewhat	A Great Deal	(%) N
Practice Location	40.0	16.8	17.1	16.4	7.5	2.2
Managed Care	34.0	27.1	19.3	12.7	4.3	2.6
Family Change	29.7	17.8	20.3	20.5	9.2	2.4
Time Factors	16.4	11.1	14.9	35.7	9.7	2.4
Computer Access	32.0	17.6	15.2	23.7	8.9	2.6

significant findings between the variables gender and time factors, and between gender and practice location were observed (Table 12). Females indicate that for time Factors" a 71.5 % for combined categories of somewhat and a great deal" compared to 53.1 % for males for the same combined categories ($p = .0025$). Females again expressed a somewhat higher percentage of change in the practice location category indicating a 37.5 combined rate for the somewhat and a great deal categories for males in the category of practice location state that they have experienced some change in this area at a 21.4 % for the combined categories of somewhat and a great deal ($p = .0039$).

Summary

This chapter presents and analyzes the research outcomes of the study. The research indicates that a minimal number of family physicians currently use distance education as a vehicle for obtaining CME. Additionally, there is a higher receptivity for future use of distance education, particularly in the areas of computer based CME such as instruction over the Internet, email and CD ROM. The use of audiotape is the most widely accepted and the most used distance education modality. It was found that older physicians tended to use the audiotape modality to meet their CME needs.

Respondents indicated to a high degree that CME activities both in general and via distance education affect their practice of medicine by maintaining or enhancing knowledge or skills. This group of family physicians also indicated that their CME habits changed the most in relation to time factors.

TABLE 12**Percentage and Chi Square for Selected CME Habits**

Factors	No Change (%)	Very Little Little (%)	Somewhat A Great Deal (%)
Practice Location			
Males	51.6	27.0	21.4
Females	33.9	28.6	37.5
<i>(p=.0039)</i>			
Time Factors			
Males	17.6	29.3	53.1
Females	12.5	16.0	71.5
<i>(p=.0025)</i>			

The data illustrated that family physicians have not yet entered into a structured self-directed learning model as illustrated by Houle (1972) and Tough (1979) due to the low receptivity of distance learning modalities.

CHAPTER V

Summary and Conclusions

This chapter summarizes the research data and results and discusses the use and receptivity of family physicians to distance learning modalities. There are five sections contained in this chapter: Summary of the Study, Major Findings, Conclusions, Implications for Further Research and Recommendations.

Summary of the Study

Purpose of the Study

The purpose of this study was to investigate the use and receptivity of distance education to meet the CME needs of family physicians in Tennessee. Family physicians in Tennessee must deal with an ever-mounting challenge of keeping up with medical information, mandatory continuing education requirement and managed care pressures. This study investigated the level of interest and the types of learning modalities used by physicians to keep current with their medical information needs and to meet their continuing education requirements to remain active in TAFP.

Methods and Procedures

A statewide survey of all 1064 active members of the TAFP was conducted. The data collection process used a 16-question survey that was mailed to each potential respondent. Non-respondents were sent a second questionnaire. These were 585 respondents for a 55 % return rate with a respondent distribution representing 81 of 95 counties in Tennessee.

The gender breakdown for the total population was 77.1% (820) males and 22.9% (244) females (TAFP, 2000). Of the total number of respondents there were 77.6% (454) males, 19.1% (112) females and 3.2% (19) unknown. The return rate for males was representative of the total population with female respondents slightly less than the represented population.

A statistical analysis was performed on all data resulting in a quantitative description of the results; thus, significant comparisons for CME distance education modalities could be obtained. The following major findings resulted from the data analysis.

Major Findings

1. Most Tennessee Family Physicians responding perceived that CME activities affect their practice of medicine.
2. CME is relevant, applicable, and the content and quality influence CME participation by distance education.
3. Computer usage via the Internet, CD ROM and email are being used more frequently and have a higher degree of receptivity by Family Physicians.

As a whole, the researcher concluded that most family physicians accept CME as a method for improving their practice of medicine and becoming apprised of the most scientific and technological information. However, modern modalities of compute-based education are not the major source for this educational need. The receptivity to the use of distance education modalities i.e. computer-based technology was slightly more positive than was the current level of use. Most family physicians have and use computers and as

computer integration becomes apart of current medical practice these physicians will integrate educational modalities as part of their learning environment but presently, they are somewhat receptive to considering it as an option.

Certainly, age was a predominate component of the study, as one would predict higher usage of the audiotape modality was preferred by older physicians; whereas, younger or recent graduates accepted computer-based education. As another researcher (Gruppen, 1990) noted, the informational needs of physicians differ according to age, preference and motivation.

Therefore, these results, although they cannot be generalized to all family physicians, indicate that as CME planners develop future programs they should include distance education modalities.

Some limitations of the survey instrument were noted. It could be revised to clarify whether or not these physicians personally use the Internet/computer for self-teaching purposes. Also, barriers for computer/Internet use were not addressed, such as access speed to an Internet provider. This could have had some impact on responses, since some of the information provided via the Internet required a large bandwidth or speed for the computers to perform the functions. Since little current use of distance education modalities by these physicians was determined, it could have been helpful to investigate what activities these physicians were attending and where they received of their CME.

To assist in clarification, definitions the distance education terminology on the survey instrument could have assisted respondents in better understanding the specific

use of the modalities. Terminology that could be redefined as a result of the development of new delivery systems and emerging technologies could certainly make this category challenging to characterize in a brief survey format.

Conclusions

As other CME colleagues have illustrated, the process of understanding physician participation and receptivity to new learning is complicated (Fox et. al, 1989; Moore, et al., 1994). The challenge of the CME planner is to meet the learning needs of the individual practitioners and to provide CME resources appropriate for physicians' preferred learning format. Diffusion of new information is an evolutionary, slow-moving process. The conclusion of this study embraces the above premises and confirms that family physicians in Tennessee are receptive to CME provided via distance education but are not currently using these distance education modalities. This research could give practical answers to those planning CME educational strategies to assist them in understanding the rate of acquisition for the distance education learning formats.

The data generated provided little demographic data to support that the CME needs of rural practitioners were any different from those of physicians practicing in more populated settings. The same observation could be made of gender and of practice location. The factors that influenced participation of these physicians in CME were most strong in the areas of applicability, content and quality. These physicians indicated that their CME habit changes most readily as it relates to time. A predominate number of these physicians indicated that they believed that CME activities could affect their practice by maintaining or enhancing their knowledge and skills. A more conservative

number indicated that they believed that CME activities via distance education could affect their practice by maintaining or enhancing their knowledge and skills.

At the time of this survey, limited numbers of TAFP physicians were using CME via distance education but, a slightly greater number were receptive to the use of distance education modalities. There could be other possible explanations for the limited use of distance education. For example, there were a number of other ways or opportunities available for these physicians to meet their CME needs. These could include the traditional didactic formats of seminars and of grand rounds lectures that could be offered at their practice locations or at hospitals. Also, the TAFP offers a statewide conference each year that provides CME hours.

Implications

This is the first study to analyze CME practices by Tennessee family physicians related to CME habits and modalities of distance education. This study recognizes that the process of integrating the distance education innovations as part of the family physicians' educational continuum has not yet occurred. With indication of slight use and an identification of even more receptivity by these physicians, there is opportunity for adoption on a larger scale given the time and resources necessary for distance education to develop as another innovative tool for CME. As technology continues to advance and as physicians begin to integrate computer usage into their practices adaptation of computer-based CME learning will increase more rapidly. Although limited, there is an implication in this data from the audiotape case study indicating that younger physicians are moving away from audiotape and toward computer-driven modes.

It is interesting that these physicians seemed to acknowledge that CME could affect their practice by increasing skills and knowledge both in general and via distance education modalities but yet indicated low use and receptivity.

Discussion of Results

Many researchers (Connelly, Rich, Curley, & Kelly, 1990; Gruppen, 1990) have reviewed the barriers and determinants for the choices made by physicians to meet their CME needs; and this study concurs that there are differences in the preferences and motivation for these physicians. These differences could be based upon age, type of practice or size of their community. This research confirmed that the findings of age and type of practice identified specific preferences, particularly for the audiotape distance education modality. Gruppen (1990) also found that applicability and relevance were important factors for usefulness, which is echoed by the research found here.

Recommendations for Future Research

A longitudinal study of the association of age and changes in the use of distance education modalities could provide on-going needs assessment for CME planners. Also related are the age and generation issues associated with acceptance, utilization of distance education and the overall usage as the baby boomer generation increases in age. Other opportunities exist for research relative to a variety of other comparisons such as (a) distance education verses traditional CME and the evaluation of its effectiveness; (b) the cost benefit for the use of distance education, and (c) user satisfaction such studies could potentially be vehicles for program improvement. Further, some of these recommendations could be structured to provide direct patient outcomes research.

Additionally, a comparison of virtual instruction or distance education to a hands-on learning environment would be an appropriate follow-up to this study.

Based upon the review of literature, distance learning and its many modalities have a tremendous potential to change CME. Providing educational resources when and where physicians require access is central to the lifelong learning commitment of the medical professional. As the new generation of physicians appears, their use of technology is expected to be more directly integrated into practice and diffusion of innovation is expected to evolve. For example, consultation with other colleagues by computers and on-line could become more common, rather than discussions in the hallways of a conference facility. The predominate concern found in the research, was family physicians in Tennessee that they were not using distance education to meet their CME needs and were not receptive at this time. From this study, the researcher concludes that family physicians in Tennessee are currently using distance education modalities in small numbers to meet their CME needs and that they are increasing receptive for using distance education in the future. Over time, greater exposure, access and familiarity with distance education modalities family physicians in Tennessee will provide opportunity to embrace this method as part of their lifelong learning experiences.

Conclusions

As the use of the Internet becomes more prevalent and integrated into the work-lives of physicians, distance learning options will also become apart of their CME by distance learning. Crawford (2000) identified reasons for possible integration:

1. Patient's use of the Internet will further increasing pressure for physicians to stay current.

2. More physicians becoming skilled in utilizing the Internet and finding it a straightforward method of to obtain CME.
3. The sprouting of well-financed companies ready to invest in "e" commerce willing to support CME activities, more CME courses developed specifically for the Web.
4. The increased offering of live presentations as part of Web-based CME.
5. The continued integration of computer-based technology into the medical school environment.

It will be the challenges of CME professionals to help physicians adopt learning modes that fit with their time and lifestyle demands. Perhaps the variety of computer-based distance learning options will gain momentum and provide the array of options needed by physicians.

The concept of diffusion of innovation forms a base of understanding for the potential for new application. As the use of distance learning increases and as physicians include distance learning as part of their professional development plans it will potentially lead them to a multitude of learning options. For CME planners it will be as essential to stay cognizant the of needs of their learners and sensitive to the political, social, and organizational content (Caffarella, 1994; Cervero & Wilson, 1994). The practitioner's experience with distance education is closely linked to the use and future interest in distance learning modalities. As time concerns escalate physicians will gravitate to new options of educational opportunity. To continue as leaders in medical education, CME planners must recognize these changes and must be aware of the developing technologies for distance learning via computer-based technologies.

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APPENDICES

APPENDIX A
Cover Letter to Participants

THE UNIVERSITY OF TENNESSEE
KNOXVILLE



Department of Human Resource Development
Knoxville, Tennessee 37996-2755
(865) 974-2574
FAX (865) 974-2048
HRD@UTKVX.UTK.EDU

April 21, 2000

Dear Doctor:

Enclosed with this survey, you will find a memorandum for Dr. John Qutlan, the President of the Tennessee Academy for Family Physicians. The TAFP has agreed to work in conjunction with the University of Tennessee to investigate professional development needs of family physicians in Tennessee. The purpose of the enclosed survey is to determine the prior use, receptivity, and potential use of distance learning as it relates to your need for Continuing Medical Education (CME). The survey will take approximately 4 minutes to complete. A postage paid envelope is provided for the return of the survey.

Data collection is being done in cooperation with the University of Tennessee and the results will be provided to the TAFP for use in future planning. Your response will remain confidential. The survey is numbered to aid in follow-up efforts, but individual responses will not be released to anyone. Responses of all the participants will be combined for reporting in aggregate form.

It is our goal to have the input of a representative cross-section of your membership, and your individual response is important.

Thank you for your participation.

Sincerely,

Deborah D. Hall, M.A.
Associate Dean for CME,
James H. Quillen College of Medicine and
Director, CME Distance Learning Project
The University of Tennessee

APPENDIX B

Survey Instrument

Tennessee Academy of Family Physician's Survey



This survey will take approximately four minutes to complete.

**Please return to:
Deborah D. Hall
P.O. Box 758
Mountain Home, TN 37684**

A postage paid envelope has been provided for your convenience

1. Please indicate the approximate frequency of your use of the listed modalities for Continuing Medical Education over the past 12 months.

For each question, check () the one most appropriate response.

Modalities	1 Never	2 Seldom	3 Sometime	4 Often	5 Always
CD ROM Instruction					
Interactive Video					
Videotape					
Audiotape					
Video Conferencing					
World Wide Web					
Telemedicine					
Email					

2. Please indicate your receptivity for the different formats to receive CME by distance education modalities.

For each question, check () the one most appropriate response.

Modalities	1 Low	2 Moderately Low	3 Moderate	4 Moderately High	5 High
CD ROM Instruction					
Interactive Video					
Videotape					
Audiotape					
Video Conferencing					
World Wide Web					
Telemedicine					
Email					

3. Please indicate the strength of influence on your participation in CME activities via Distance Education.

For each question, check () the one most appropriate response.

Factors of Influence	1 Very Weak	2 Weak	3 Average	4 Strong	5 Very Strong
Perceived Quality					
Content					
Applicability of information to practice					
Convenience					
Only way to get information needed					
Reliable source of information					
Location					
Cost of CME Activity					
Time away from practice					
Distance to CME activity					
Relevant Content					
Time away from family					

Please check the appropriate response.

4. Do you have a computer? Yes _____ No _____

5. Are you connected to the Internet? Yes _____ No _____

Please go to the next page

6. To what extent do you think CME activities delivered via distance education could affect or do affect your practice by maintaining or enhancing your knowledge or skills?

Low Moderately Low Moderate Moderately High High

7. To what extent do you think that your CME activities in general affect your practice by maintaining or enhancing your knowledge or skills?

Low Moderately Low Moderate Moderately High High

8. How much have you adapted your CME habits over the past four years as a result of each of these factors:

Factors	1 No Change	2 Very Little	3 Little	4 Somewhat	5 A Great Deal
1. Practice location					
2. Managed care					
3. Family change					
4. Time factors					

Background Information:

Please answer the following questions to provide demographic information about yourself and your CME needs.

For each question, check () the one most appropriate response.

9. Community Type

In what size community do you practice?

Population less than 2500

Population 2500-9999

Population 10,000-99,999

Population 100,000 or more

10. In which county is your practice located? _____

11. How long have you been in practice? _____ Years

12. Would you describe your practice as:

Solo Practice

Group Practice: Number of Physicians

Hospital Based

Academic

13. Board Certified Yes _____ No _____

14. Gender Male _____ Female _____

15. Birth Year: _____

16. Medical School Graduation Year: _____

Thank You for your assistance.

Please return the survey in the

postage paid envelope to

Deborah D. Hall

Director, CME Distance Learning Project

P.O. Box 758

Mt. Home, TN 37784

Thank you for your contribution to this project.

APPENDIX C

Letter of Support from the President from the
Tennessee Academy for Family Physicians



TENNESSEE ACADEMY OF FAMILY PHYSICIANS

4721 Trousdale Drive, Suite 202

Nashville, Tennessee 37220

Phone: (615) 833-5522 • Toll Free: 1-800-897-5949 • Fax (615) 833-2677

April 2000

To: Active Members of the Tennessee Academy of Family Physicians

RE: CME ASSESSMENT SURVEY

As President of the Tennessee Academy of Family Physicians, I request your assistance in completing the enclosed short two-page survey concerning the assessment of continuing medical education needs for our members.

Although this data is being collected in cooperation with the University of Tennessee, the results will be provided to the TAFP for our use in future planning of CME. Our objective is to obtain a needs assessment to ensure that our CME programs not only provide quality but also meet your needs for CME.

I encourage you to take the time to complete and return this survey as soon as your schedule allows. Thank you in advance for your consideration.

Sincerely,

John E. Outlan, M.D.
President

enclosure

JEO:cjd

APPENDIX D

Tennessee County and Respondent Distribution

Tennessee County and Respondent Distribution

County Distribution	Number of Respondents
Anderson	9
Bedford	2
Benton	0
Bledsoe	1
Blount	11
Bradley	2
Campbell	5
Cannon	2
Carroll	10
Carter	5
Cheatham	2
Chester	1
Claiborne	1
Clay	0
Cocke	5
Coffee	6
Crockett	2
Cumberland	7
Davidson	32
Decatur	0
Dekalb	2
Dickson	4
Dyer	1
Fayette	3
Fentress	1
Franklin	4
Gibson	10
Giles	3
Grainger	1
Greene	11
Grundy	1
Hamblen	3
Hamilton	29
Hancock	2
Hardeman	1
Hardin	4
Hawkins	5
Haywood	0
Henderson	4

Tennessee County and Respondent Distribution
Continued

County Distribution	Number of Respondents
Henry	1
Hickman	1
Houston	0
Humphreys	1
Jackson	0
Jefferson	8
Johnson	2
Knox	56
Lake	1
Lauderdale	2
Lawrence	0
Lewis	1
Lincoln	5
Loudon	3
Macon	5
Madison	14
Marion	2
Marshall	1
Maury	11
McMinn	5
McNairy	6
Meigs	1
Monroe	4
Montgomery	3
Moore	0
Morgan	1
Obion	6
Overton	3
Perry	0
Pickett	0
Polk	0
Putnam	4
Roane	6
Robertson	3
Rutherford	11
Scott	5

Tennessee County and Respondent Distribution
Continued

County Distribution	Number of Respondents
Sequatchie	0
Sevier	5
Shelby	47
Smith	1
Stewart	20
Sullivan	41
Sumner	16
Tipton	5
Trousdale	0
Unicoi	1
Union	1
Van Buren	0
Washington	24
Wayne	4
Weakley	3
White	3
Williamson	11
Wilson	3
Total	557
Missing Data	28

VITA

Deborah Hall Joyner was born on September 21, 1954 in Waco, Texas. She attended East Tennessee State University, earning a Bachelor of Science degree in Sociology and Psychology in 1976, and a Masters of Arts degree in Sociology and Anthropology in 1979.

For past 20 years she had been employed by East Tennessee State University in various capacities working with adult students as an admissions counselor, as Director of Professional Development providing continuing educational opportunities to professionals, Associate Dean for Professional Development and Continuing Medical Education. Most recently, she has been employed as a university liaison for a continuing education facility, the Adelpia Centre at Millennium Park, as Director of Market Development for Professional Continuing Education.

Ms. Joyner has taken an active role in her community and has served on numerous committees and boards particularly to further university visibility, her interest in workforce development and training in her region.

Ms. Joyner is married to Dr. William L. Joyner; they have two children, Andrew and Evan.

Tennessee Academy of Family Physician's Survey



This survey will take approximately four minutes to complete.

Please return to:
Deborah D. Hall
P.O. Box 758
Mountain Home, TN 37684

A postage paid envelope has been provided for your convenience

Plate Number 1
Deborah Hall Joyner
12/15/01

THE UNIVERSITY OF TENNESSEE
KNOXVILLE



Department of Human Resource Development
Knoxville, Tennessee 37996-2755
(865) 974-2574

FAX (865) 974-2048

HRD@UTKVX.UTK.EDU

April 21, 2000

Dear Doctor:

Enclosed with this survey, you will find a memorandum from Dr. John Outlan, the President of the Tennessee Academy for Family Physicians. The TAFP has agreed to work in conjunction with the University of Tennessee to investigate professional development needs of family physicians in Tennessee. The purpose of the enclosed survey is to determine the prior use, receptivity, and potential use of distance learning as it relates to your need for Continuing Medical Education (CME). The survey will take approximately 4 minutes to complete. A postage paid envelope is provided for the return of the survey.

Data collection is being done in cooperation with the University of Tennessee and the results will be provided to the TAFP for use in future planning. Your response will remain confidential. The survey is numbered to aid in follow-up efforts, but individual responses will not be released to anyone. Responses of all the participants will be combined for reporting in aggregate form.

It is our goal to have the input of a representative cross-section of your membership, and your individual response is important.

Thank you for your participation.

Sincerely,

A handwritten signature in cursive script, appearing to read "Deborah D. Hall".

Deborah D. Hall, M.A.
Associate Dean for CME,
James H. Quillen College of Medicine and
Director, CME Distance Learning Project
The University of Tennessee

Please return the survey in the
postage paid return envelope to

Deborah D. Hall
Director, CME Distance Learning Project
P.O. Box 758
Mt. Home, TN 37784

Thank you for your contribution to this project.

1. Please indicate the approximate frequency of your use of the listed modalities for Continuing Medical Education over the past 12 months.

For each question, check (✓) the one most appropriate response.

Modalities	1 Never	2 Seldom	3 Sometime	4 Often	5 Always
CD ROM Instruction					
Interactive Video					
Videotape					
Audiotape					
Video Conferencing					
Internet					
Email					

2. Please indicate your receptivity for the different formats to receive CME by distance education modalities.

For each question, check (✓) the one most appropriate response.

Modalities	1 Low	2 Moderately Low	3 Moderate	4 Moderately High	5 High
CD ROM Instruction					
Interactive Video					
Videotape					
Audiotape					
Video Conferencing					
Internet					
Email					

Background Information:

Please answer the following questions to provide demographic information about yourself and your CME needs.

For each question, check (✓) the one most appropriate response.

9. Community Type

In what size community do you practice?

- ☐ Population less than 2500
☐ Population 2500-9999
☐ Population 10,000-99,999
☐ Population 100,000 or more

10. In which county is your practice located? _____

11. How long have you been in practice? _____ Years

12. Would you describe your practice as:

- ☐ Solo Practice
☐ Group Practice: Number of Physicians _____
☐ Hospital Based
☐ Academic

13. Board Certified Yes _____ No _____

14. Gender Male _____ Female _____

15. Birth Year: _____

16. Medical School Graduation Year: _____

3. Please indicate the strength of influence on your participation in CME activities via Distance Education.

For each question, check (✓) the one most appropriate response.

Factors of Influence Perceived Quality Content	1 Very Weak	2 Weak	3 Average	4 Strong	5 Very Strong
Applicability of information To practice Convenience					
Only way to Get information needed					
Reliable source of information					
Location					
Cost of CME Activity					
Time away From practice					
Distance to CME activity					
Relevant Content					
Time away From family					

Please check the appropriate response.

4. Do you have a computer? Yes _____ No _____
5. Are you connected to the Internet? Yes _____ No _____

Please go to the next page

6. To what extent do you think CME activities delivered via distance education could affect or do affect your practice by maintaining or enhancing your knowledge or skills? (Circle one response)

Low Moderately Low Moderate Moderately High High

7. To what extent do you think that your CME activities in general affect your practice by maintaining or enhancing your knowledge or skills? (Circle one response)

Low Moderately Low Moderate Moderately High High

8. How much have you adapted your CME habits over the past four years as a result of each of these factors: (Check (✓) the one most appropriate response)

Factors	1 No Change	2 Very Little	3 Little	4 Somewhat	5 A Great Deal
1. Practice Location					
2. Managed Care					
3. Family Change					
4. Time factors					
5. Computer Access					

Please go to the next page