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ETSU Medical Residents' Clinical Information Behaviors, Skills, Training, and Resource Use

A dissertation
presented to the
faculty of the Department of Educational Leadership and Policy Analysis
East Tennessee State University

In partial fulfillment
of the requirements for the degree
Doctor of Education in Educational Leadership and Policy Analysis

by
Richard L. Wallace
May, 2007

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Dr. Kathy Franklin
Dr. Jasmine Renner
Dr. Fred Tudiver

Keywords: Internship and Residency, Information Dissemination, Libraries, Diffusion of
Innovation, Knowledge, Evidence-Based Medicine

ABSTRACT

ETSU Medical Residents' Clinical Information Behaviors, Skills, Training, and Resource Use

by

Richard L. Wallace

Information is a powerful tool for enabling physicians to provide quality healthcare for their patients. Information use in the clinic is a skill that must be learned. If medical residency programs fail to impart this skill, then patients will suffer.

The residents of the ETSU Quillen College of Medicine were surveyed as to their use of clinical information. Of the 217 residents of the 2005-2006 class who were surveyed, 105 returned the survey for a return rate of 48%. The clinical faculty was also surveyed in order to measure the responses of the residents against that of their instructors.

ETSU residents frequently had a new information need in the clinic. The majority of the time they did not seek an answer, but when they did they were often successful in finding an answer. Therapy information was the most frequently sought after type of information. Most residents used the Quillen College of Medicine Library, but not at a desirable rate. Residents stated that information obtained from the library was helpful in caring for their patients. The most frequent source of information used by residents was electronic resources and the greatest barrier to the use of information was time. The majority of residents were PDA users, with Palm devices being the primary platform. The residents rated their PDA skills and evidence-based medicine skills as

above average. Few were LoansomeDoc users. The majority of residents received information training from clinical faculty and from librarians and rated it highly. Residents indicated a desire for more training and the majority indicated that they would like a clinical medical librarian for their program. They rated the library service of the Quillen College of Medicine and the area teaching hospitals highly. Residents used Google and the Web frequently. PubMed was rated as a valuable resource. Online journals and the UpToDate database were important electronic resources for the residents.

ETSU residents have many excellent resources and training opportunities in place. However, for ETSU residents to go out into community practice as true “Infomasters” an upgrading of their information training should be undertaken.

DEDICATION

This dissertation is dedicated to all those who have made my journey as a medical librarian such a rich experience and have shaped my career. Susan Selig you are the best there is. Thank-you Richard Nolan for being so patient. Janet Fisher, you gave me my start, for which I will ever be grateful. Suresh Ponnappa, you are the kindest human on this planet, a great director for whom to work and a wonderful friend.

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CHAPTER 1

INTRODUCTION

The purpose of this study was to analyze the information behaviors, skills, training, and resource use of East Tennessee State University (ETSU) medical residents in order to redesign the policies of the Quillen College of Medicine Library (QCOML) to fit the needs of residents in a better way. The introduction highlights that inadequate information for physicians is a public health concern, physicians are not keeping current with new discoveries in medicine, current information delivery systems for physicians are not adequate, inaccurate information in the hands of physicians equals sub-standard medical practice, ineffective purchase of information resources for residents is poor policy, and that these observations should be considered in the design of residency education because excellence in education is a stated goal of ETSU. Furthermore, this chapter states the problem that was researched, the purpose of the research, the significance of the research, the research questions related to the study, the definitions of the study, delimitations, limitations, and an overview of the research.

Physician Error: A Major Public Health Concern

Because the privilege of practicing medicine is granted based on the mastery of a body of knowledge, information is essential to the practice of medicine. The need to acquire new knowledge continues throughout a physician's career. Gaps in physicians' knowledge can cause medical errors, which are a serious public health issue according to the Institute of Medicine (IOM) (Kohn, Corrigan, & Donaldson, 2000):

When extrapolated to the over 33.6 million admissions to U.S. hospitals in 1997, the results of these two studies imply that at least 44,000 and perhaps as many as 98,000 Americans die in hospitals each year as a result of medical errors. Even when using the lower estimate, deaths in hospitals due to preventable adverse events exceed the number attributable to the 8th-leading cause of death ... motor vehicle accidents. (p.26)

Physicians Are Not Keeping Current with New Discoveries in Medicine

Green and Ruff (2005) illustrated the poor state of usage of information by physicians in general and medical residents, in particular:

Evidence-based practice has emerged as a national priority in efforts to improve health care quality. Physicians are encouraged to identify, appraise, and apply the best evidence in their decision-making for individual patients. *However, this ideal remains far from realization.* [italics added] Physicians leave the majority of their clinical questions unanswered, witness their medical knowledge deteriorate after their training, and demonstrate wide practice variations for clinical maneuvers with established efficacy. Similarly, residents pursue only 28% of their clinical questions, often consulting non-evidence based information resources. (p. 176)

Fineberg (1987) found that only 2 of 28 landmark trials were implemented within two years following their publication. This means that new discoveries in medicine were not being quickly translated into better treatment for patients. A landmark trial was a discovery by researchers that significantly changed the way clinical medicine was practiced. An example of a landmark trial was the discovery of thrombolytic therapy for myocardial infarction, which simply means giving heart attack patients aspirin in the emergency room. This practice resulted in saving many lives; however, this therapeutic intervention was known in research many years before it was widely practiced in the clinic.

It is, therefore, important that physicians are better trained as information users. Smith (1996) emphasized the importance of information for physicians:

Medicine, in modern jargon, is a knowledge based business, and experienced doctors

use about two million pieces of information to manage their patients. About a third of doctors' time is spent recording and synthesizing information, and a third of the costs of a hospital are spent on personal and professional communication. Unfortunately, some of the information in doctors' heads is out of date and wrong, new information may not have penetrated, and the information may not be there to deal with patients with uncommon problems. These deficiencies have become more serious as the rate of change in medical knowledge has accelerated: the doubling time of the biomedical knowledge base is currently about 19 years, meaning the medical knowledge *will increase fourfold during a professional lifetime* [italics added]. (p. 1062)

The difficulty of keeping up with the deluge of new information was overwhelming for clinicians. Ebell and Shaughnessy (2003) discovered:

A study of 85 prominent clinically oriented medical research journals identified over 8,085 articles in a 6-month period. Even if a physician spent only 3 minutes per article, *it would still take over 800 hours over the course of a year to keep up to date* [italics added]. Furthermore, most physicians devote relatively little time to reading to keep up to date. A survey of Norwegian primary care physicians found that *they spend less than 3 hours per week on all medical reading* [italics added]. (p. S57)

The difficulty of keeping current was also shown by Craig, Irwig, and Stockler (2001):

In a survey of 625 office-based primary-care physicians and 100 physician opinion leaders in the United States, nearly two-thirds reported that the current volume of scientific information was unmanageable. When the researchers asked about the physicians' knowledge of important recent medical advances, *they found deficiencies that would adversely affect patient care* [italics added]. (p. 248)

Not only was there an overwhelming amount of new clinical information for physicians to digest, but also some physicians did not have the critical appraisal skills to interpret that information. Huth (1989) asserted:

There is a heavy cost in time for searching journal literature and retrieving papers. Much of the retrieved literature is likely not to be directly relevant to the problem being considered. Too much time is needed to digest and synthesize what is relevant, valid and worth further attention. Physicians without special training in critical analysis find judging the validity of articles difficult. (p. 99)

Current Information Delivery Systems Are Not Adequate

Sackett and Straus (1998) “found that evidence made available within seconds during rounds *altered the clinical approach of at least 1 team member 48% of the time* [italics added], but when evidence was not readily available, the clinicians rarely searched for it” (p. 1338). This statement implied that physicians underused new information because the systems for delivering information to them were faulty. The task of the medical library profession is to build information systems to serve its clientele. Gorman and Hefland (1995) agreed stating, “Physicians may be much more willing to pursue new information than has been recognized, when they believe that their efforts will be rewarded with direct and immediate answers to their clinical questions” (p.117).

Connelly, Rich, Curley, and Kelly (1990) suggested changes that, if implemented, might improve the use of information by physicians. These suggestions, however, were directed at information providers, such as librarians, and not towards physicians.

For those developing new knowledge resources, *the resource must be close to the clinical action if use is to be fostered* [italics added]. ... The content of the knowledge must be clinically relevant and presented in a clear manner that is easily applied to the clinical task. (p. 359)

Inaccurate Information Equals Substandard Medical Practice

Information can be therapy. Best-evidence information could result in optimum outcomes for patients; whereas, less than best-evidence information could result in sub-optimum outcomes. The inadequacy of some physicians in staying current with new information often had negative patient care ramifications. Marshall (1992) reported that 29% of clinicians who consulted the

medical literature made changes in their diagnosis. Fifty-one percent changed their choices of tests and, in 19% of the cases, the patient experienced a reduced length of stay because of the information the clinician found in the literature. Also, 72% of the clinicians who consulted the literature reported changes in the advice they offered their patients.

According to Lucas et al. (2004), experienced physicians changed their treatment of a patient 18% of the time after a literature search was made available to them. They reported:

This suggests that routinely searching the literature for relevant evidence (even after physicians have committed to a specific treatment plan) may improve the treatment of many medical inpatients. For example, in our hospital, where 15,000 patients are admitted annually to the medical service, 2,700 patients per year (95% CI, 1,800 to 3,600) might benefit from this practice. (p. 406)

Physician knowledge might deteriorate over time unless steps were taken to train physicians to keep up-to-date. Shin, Haynes, and Johnston (1993) found significant differences in how physicians treated patients with hypertension based on when the physicians completed their training. The physicians who finished residency many years in the past were significantly less likely to follow gold standard treatment practices than recent trainees. There was a negative correlation between when they completed their training and how closely they conformed to the gold standard for treating hypertension. Covell, Uman, and Manning (1985) also reported a connection between good information skills and good patient care;

Answers to questions raised at the time of the patient visit were found only 30% of the time; *in a typical half day of office practice, four management decisions might have been altered* [italics added] if needed information had been available at the time of the patient visit. (pp. 589-9)

In addition, they stated that physicians had “about 2 questions for every three patients seen” (p. 596). These statements revealed that physicians frequently had unanswered questions and that if the answers were obtained, patient care could improve.

Chambliss and Conley (1996) stated, “Physicians are increasingly being urged to provide evidence-based, cost-efficient care. We believe answering their clinical questions effectively is an important step in reaching that goal” (p. 144). If residents were not finding effective answers to their clinical questions because of poor information training, they might become community physicians who practiced below the best standards. It could be considered medical education malpractice to send physicians out into communities without the skills necessary to access best-evidence information, critically appraise that information, and apply it to their individual patients. Lee (2005) stated, “Although physicians cannot be all-knowing, they can still be all-caring. Such physicians may not immediately know the best approach to a patient’s condition, but they will not rest until they have found it. There is real dignity in that” (p. 1068). Osheroff, Forsythe, Buchanan, Bankowitz, and Blumenfeld (1991) added:

Patient care often requires the collection and management of voluminous patient data. Clinicians must relate patient data to a rapidly growing body of general medical knowledge. Thus, a physician’s ability to deliver optimal patient care is compromised when there are difficulties in management of clinical information (p. 576).

Ineffective Purchase of Information Resources Is Poor Stewardship

Information resources provided by QCOML were expensive (see Table 1). Just one full-text journal collection (Elsevier) licensed by QCOML cost \$270,000 in 2005. Making sure that

this significant amount of money was used effectively demonstrated wise leadership and good policy.

The following table gives the cost of some clinical information resources licensed to QCOML.

Table 1

Cost of Selected ETSU Medical Library Electronic Information Resources – 2004/2005

| NAME OF RESOURCE | TYPE OF RESOURCE | PRIMARY | SECONDARY | COST |
|------------------|---|---------|-----------|-----------|
| Science Direct | Collection of full-text journals | X | | \$270,000 |
| John Wiley | Collection of full-text journals | X | | \$59,000 |
| MD Consult | Collection of full-text textbooks and journals | X | | \$29,000 |
| InfoRetriever | Collection of best-evidence information summaries for commonly seen clinical problems | | X | \$5,700 |
| StatRef | Collection of full-text textbooks | X | | \$2,800 |
| Cochrane | Systematic reviews of randomized controlled trials | | X | \$300 |
| UptoDate | Topical summarized information from the journal literature for clinical use | | X | \$3,200 |

A primary source was literature such as the 15 million abstracts indexed in the PubMed database. This literature had not been systematically filtered for reliability, validity, or clinical

relevance. A secondary source was a summary of the most reliable and valid studies from the primary literature. The secondary literature developed as a result of clinicians' needs to find reliable answers quickly.

The problem of escalating costs of information resources became such a significant problem in academia that Knight (2003) reported Cornell University in 2003 cancelled "its subscriptions to several hundred scientific journals published by Elsevier, in response to spiraling subscription costs" (p. 217). Even if money were not an issue, it still would be inappropriate to spend it on resources that were not used by the residents. Forrest and Robb (2000) expressed the same sentiment in a United Kingdom study of residents and information, as follows:

We believe it is important that MADEL funds should be put to optimum use by providing library and information services that are appropriate, relevant and needed by doctors-in training grades. *Rather than supply a service based on our estimation of their needs, we wanted to find out the doctors' own perceptions of their information needs and their requirements for the effective delivery of that information* [italics added].(p. 129)

Finding ETSU resident physicians' own perceptions of their information needs and their requirements for the effective delivery of that information as well as redesigning library policies to conform to their needs and requirements were the goals of this project.

Best Opportunity for Physicians to Develop Information Skills Is During Residency

Staying current with professional medical knowledge required information retrieval skills and access to adequate information resources. Residency, the apex of physician training provided the logical place to acquire those skills and experience using these resources. Residency is the term given the period of training undergone by physicians, usually immediately after 4 years of

medical school. The average period of residency was 3 years but some programs were longer and medical specialties might require 7 or more years of post-doctoral training.

Residency provided a critical time for physicians to form good information skills and to reverse the national trend of poor use of information by physicians because the period was designed as a training experience. In contrast, medical students were consumed with memorizing new facts and passing examinations, while community physicians were pressed to see as many patients as possible. Green, Ciampi, and Ellis (2000) studied the information use of primary care residents at Yale University and found the residents had two information needs for every three patients seen. They discovered that:

The residents thought that 70% of their questions would change patient management [italics added], 34% might involve harming the patient if not answered, and 24% were urgent. We subsequently contacted the residents about 277 (99%) of their 280 new questions. Of these, the residents pursued 80 (29%) [italics added]. Reasons for not pursuing the remaining questions included lack of time (60%), forgetting the question (29%), lack of interest (4%), lack of urgency (3%), and a perception of inadequate resources (2%). (p. 220)

The findings that 70% of the questions might have changed patient management and only 29% of those questions were answered suggested that medical educators did a poor job training their residents to become expert users of information. Gorman and Helfand (1995) declared, “The many unanswered questions of primary care physicians represent an important missed opportunity to educate physicians and improve medical practices” (pp. 118-19). This missed opportunity to educate physicians and improve medical practices should be rectified by changes in pedagogy (andragogy) during residency training.

It was important to introduce the highest quality information resources to residents. What they used in residency influenced what they used in private practice. Thompson (1997) reported:

The most desired characteristics of information resources for primary care physicians are availability, familiarity, and low cost. Resources that are readily at hand are used most often. Resources that the doctor knows well are often easier to use due to familiarity (p. 188).

It was also important to introduce residents to evidence-based medicine (EBM). According to Ross and Verdieck (2003), “One credible goal of residency education should be to endow our residents with a practical working knowledge of EBM, so we can graduate competent, confident life-long learners who provide first-class patient care according to the best evidence available” (p. 412).

Abromitis, Saghafi, and Folb (2003) concluded that there has not been enough research conducted on the information issues of residents. “A search of the literature conducted in preparation for this article revealed that very few library surveys have focused on the needs of medical residents and fellows” (Abromitis et al., p. 101). This study addressed the value of investing in an analysis of the information-seeking behaviors, information skills and training and resources for ETSU medical residents based on the scarcity of research and summarized by the following:

Investigators of the clinical problem-solving process have repeatedly shown the strong problem-specific performance of clinical problem solvers. Knowledge, not problem-solving strategy, is what differentiates expert from nonexpert performance. Medical educators have recognized the challenge posed by the magnitude, continued growth, and evolution of medical knowledge. During their preclinical education, students cannot assimilate all of the scientific knowledge that they will need in practice. Much of what is learned will be outmoded by new scientific knowledge before their training is completed. By promoting the development of skills for continuous and independent learning, medical educators will be preparing students for the essential role of the physician as a lifelong learner. Such learners must have authoritative knowledge resources linked to the practice environment. (Connelly et al., 1990, p. 353).

Although the previous statement referred to medical students, it was even more apropos for medical residents. The statement underlined what was needed at ETSU in the training of resident physicians – development of skills for continuous and independent learning so that they could become lifelong learners who always had authoritative knowledge resources linked to their practice environments.

Excellence in Education Is a Stated Goal for ETSU

It could be deduced that the goal of the College of Medicine was to have the best trained residents possible because of ETSU's overall goal to be the best regional university in the United States. A study like this one was necessary to discover if residents were failing to learn the use of best-evidence resources during residency and not receiving adequate information training for preparation to enter private practice. Failure in these areas would not be representative of a best university.

A best university should build its educational programs on the best learning theories. According to Green (2000), for residents, this is adult learning theory. “As adult learners, residents should thrive in curricula informed by adult learning theory or andragogy” (p. 130). The gold standard for information use by physicians was termed evidence-based medicine (EBM) or EBM's more advanced form, Information Mastery (IM). EBM and IM were andragogical concepts, meaning that their philosophical premises were built on teaching learners to teach themselves. Sackett, Rosenberg, Gray, Haynes, and Richardson (1996) defined evidence-based medicine (EBM) as, “the conscientious, explicit and judicious use of current best

evidence in making decisions about the care of individual patients” (p. 71). Information Mastery was defined by Shaughnessy and Slawson (2004) as:

... finding the most valid and relevant information in the least amount of time. Information is valid if it is based on sound clinical science. Information is relevant if it demonstrates that what we do for patients helps them to live long, functional, symptom-free lives (pp. 1-2).

Implicit in these definitions was that learners would find their own information and have the discernment to know what was the best evidence. The antithesis of this was being told what to do by experts (expert-based medicine), which was a pedagogical concept. Even as far back as 1989, Kitchens and Pfeifer pointed out “the Association of American Medical Colleges has encouraged a shift in medical educational emphasis from rote memorization to the development of independent learning skills. These skills include the ability to assess critically new medical information” (p. 384).

Statement of the Problem

The problem brought to light here was the lack of effectiveness in the use of clinical information by physicians and the ramifications of this for public health. Because of the importance of information to clinical practice and public health, there was a need to analyze the information-seeking behaviors of ETSU residents, the information skills of ETSU residents, the information training provided for ETSU residents, and the information resources provided for ETSU residents. According to Gorman and Hefland (1995), “Improved understanding of how physicians obtain and use information is needed in order to develop effective strategies for meeting their information needs” (p. 113).

Significance of the Problem

Physicians were not keeping current with new discoveries in medicine as a result of inadequate information delivery systems. This could lead to sub-standard medical practices. The best opportunity to change physician behaviors was during residency. If QCOML were making ineffective purchases of information resources, that indicated poor stewardship. Therefore, because excellence in education was a stated goal for ETSU, this became an important study. Data retrieved through this analysis might be helpful in uncovering shortcomings in resident education at the ETSU College of Medicine that, if changed, would contribute to educational excellence. New information garnered from this project could lead to changes in medical practices that could save the lives of patients.

Research Questions Relative to the Study

Research Question #1

What are the information-seeking behaviors of current ETSU medical residents?

Research Question #2

What level of skill and knowledge as clinical information users do ETSU medical residents have?

Research Question #3

Is adequate information training provided for ETSU residents?

Research Question #4

Are information resources – citation databases, full-text electronic books and journals, and library programs and services – provided for ETSU residents adequate and do respondents' rating of the information resources correspond to the cost of those resources?

Definitions of the Study

1. Andragogy – According to Herod (2002), andragogy is an educational approach characterized by learner-centeredness (i.e., the student's needs and wants are central to the process of teaching), self-directed learning (i.e., students are responsible for and involved in their learning to a much greater degree than traditional education), and a humanist philosophy (i.e., personal development is the key focus of education). Related concepts include: facilitated learning, self-directed learning, humanism, critical thinking, experiential learning, and transformational learning. Andragogy is a technical term for adult education as opposed to pedagogy, the education of children. (<http://www.nald.ca/adultlearningcourse/glossary.htm>.)
2. Clinical Information Usage – The use of information by clinicians (physicians, nurses, allied health personnel) in the patient care setting as a tool to manage the patient's care. This is a different process from information use in an academic setting for research, writing, and publication.
3. Evidence-Based Medicine (EBM) – “[T]he conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients” (Sackett et al., 1996, p. 71).

4. Information- “[T]he requirement for new medical knowledge that emerges in the care of a patient or group of patients. That definition does not include the need for additional patient data, logistical information or nonmedical facts” (Green et al., 2000, p. 220).
5. Information-Seeking Behaviors – Hayden (n.d.) defined information seeking behaviors as, “in a given environment or event ... the user will perceive an information need ... [t]he perceived need will lead the user to search for information, making demands upon a variety of information sources. These information sources include information systems; human resources and other resources... Information seeking behavior may lead to either a success or a failure (<http://www.ucalgary.ca/~ahayden/seeking.html>). “In the general study of information-seeking behaviors, information seeking is defined as purposively acquiring information from selected information carriers” (Casebeer, Bennett, Kristofco, Carillo, and Centor, 2002, p. 35). Human beings are information-seeking creatures. (*Homo sapiens- sapiens* from *sabere* meaning “to know”). Information scientists, sociologists, psychologists, and other social scientists study the behaviors undertaken by individual people and groups of people to acquire new information to satisfy an information need.
6. Information Mastery (IM) – “Involves finding the most valid and relevant information in the least amount of time” (Shaughnessy & Slawson, 2004, pp. 1-2).
7. Information Technology – Hardware and software, such as desktop computers, handheld computers, email, the Internet, the Web and electronic databases, used to access information.
8. Primary Literature – Literature such as the 15 million abstracts indexed in the PubMed database. This literature was not systematically filtered for reliability, validity, or clinical relevance.

9. Resident – A physician who is in a structured program to learn a medical specialty. Residency usually occurs immediately after medical school. Residency programs may be 3 to 5 years.

Fellowships may extend training to 7 or more years.

10. Secondary Literature – Summaries of the most reliable and valid studies from the primary literature. The secondary literature developed as a result of clinicians' needs to find reliable answers quickly.

Delimitations

This study was limited to the information-seeking behaviors, information skills, training and resources of medical residents at the East Tennessee State University Quillen College of Medicine in 2005-2006. Because the study was limited to ETSU medical residents, it might not be generalizable to other residents or residency programs.

Limitations

1. The author's work as a medical librarian at ETSU who works with medical residents might have generated biases as to how information should be delivered to residents. These biases might have influenced the results.

2. The data are the opinion of the respondents, who might have rated themselves inaccurately.

3. The surveys returned by the respondents were less than 100% of the population. Therefore, the results might not have accurately reflected the results that would have occurred with a 100% response.

Overview of the Study

Chapter 1 served as an introduction to the study and included definitions and limitations. Chapter 2 was a review of the literature. Chapter 3 outlined the methodological approach used in this dissertation. Chapter 4 was an analysis of the research findings. Chapter 5 summarized the findings and listed recommendations derived from the findings.

CHAPTER 2

LITERATURE REVIEW

Introduction

There was an abundance of literature describing how physicians used information. This literature review examined some of those studies. It was organized along the major themes of the paper, which included the information-seeking behaviors of physicians, information skills needed by physicians, information training needed in the medical education of residents, and information resources for physicians. In the section on information skills, specific focus was given to evidence-based medicine and personal digital assistants (PDAs). The section on information training focused on clinical medical library (CML) programs.

Information-Seeking Behaviors of Physicians

The concept of information-seeking behavior dealt with how human beings sought information to satisfy a gap in their knowledge in order to remove uncertainty. Hayden (n.d.) explained information-seeking behavior:

The model suggests that the user perceives a need in the context of the user's environment. That is, in a given environment or event ... the user will perceive an information need ... The perceived need will lead the user to search for information, making demands upon a variety of information sources. These information sources include information systems (university libraries and public libraries); human resources (experts, professors, colleagues); and other resources (personal library, media). Information seeking behavior may lead to either a success or a failure. If successful, information is located which will be used. This may result in the satisfaction or non-satisfaction of the original perceived need. Satisfaction occurs when the located information has been analyzed and satisfies the original need. Non-satisfaction occurs when the information does not satisfy the original need. With non-satisfaction, the information seeking process may be repeated until satisfaction

occurs. A failure to find information may result in the process of information seeking being continued. (<http://www.ucalgary.ca/~ahayden/seeking.html>)

In this study, information behaviors analyzed included the frequency of information needs of residents; how frequently they sought an answer for those needs; the most common type of information need experienced (therapy, diagnosis, prognosis, etiology); how frequently they found an answer for those needs; the source of information residents selected to meet those needs; their use of QCOML to meet their information needs; the clinical value of information obtained from QCOML; the barriers they experienced in meeting those needs; their experiences of frustration with the use of information; and the use of PDAs. In a systematic review of information-seeking behavior of physicians, Dawes and Sampson (2003) identified:

... 19 studies that described information-seeking behavior in a number of different settings using different methodologies Convenience of access, habit, reliability, high quality, speed of use, and applicability makes information-seeking likely to be successful and to occur. The lack of time to search, the huge amount of material, forgetfulness, the belief that there is likely to be no answer, and the lack of urgency all hinder the process of answering questions. (p. 9)

According to Casebeer et al. (2002), “In the general study of information-seeking behaviors, information seeking is defined as purposively acquiring information from selected information carriers” (p. 35).

Reports from the literature indicated that physicians often had questions in the clinic; however, the majority of those questions went unanswered. For example, Ely et al. (1999) found:

With the exception of questions about drug prescribing, doctors in this study did not pursue answers to most of their questions. This result is consistent with a study of Oregon doctors in which an answer was pursued when the problem was perceived as urgent and when a definitive answer was thought to exist. In that study, and in ours, *doctors pursued only a minority of their questions but found answers to about 80% of those pursued* [italics added]. (p. 360)

Smith (1996) likewise reported:

Most of the questions generated in consultations go unanswered. We do not know from any of these studies whether answering the questions would lead to better patient outcomes or better doctors, but surely it would. We do know that many surveys of how much doctors know about important developments show severe deficiencies. (p.1066)

The fact that questions go unanswered was not because the answers did not exist. Smith (1996) offered, “Most of the questions generated by doctors can be answered, usually from electronic sources, but it is time consuming and expensive to do so- and demands information skills that many doctors do not have” (p.1066). Factors, such as lack of time and lack of skills rather than the unavailability of answers in the literature, might explain why physicians allowed clinical questions to go unanswered.

When asked their input about what type of resource would best meet their information needs, physicians described to Chambliss and Conley (1996), “[T]he ideal information source as one that would be rapidly accessible, require very little work, and provide a succinct, specific answer” (p. 143). Traditionally, medical libraries focused on delivering journal articles to physicians from the primary literature, which did not meet their specified criteria above.

Connelly et al. (1990) determined:

Clinicians rated research articles lowest of all resources in terms of clinical applicability and understandability. Research articles were second only to pharmaceutical industry representatives in terms of low credibility, a not altogether unwarranted view. Practicing physicians view the literature primarily as a vehicle for researchers to communicate to other researchers, and find the practical content of research articles wanting. (p. 358)

Connelly et al. (1990) reported that physicians choose resources based on familiarity rather than quality. “Familiarity with a resource has been shown to be an influential factor”

(p. 358). They also commented that cost was another factor that determined physicians' use of a resource. "Factors of resource cost related to accessibility and applicability appear to be much more influential in the decision to use a resource than are characteristics of the resource's knowledge quality" (p. 358). Physicians' attitudes towards the use of information resources were summarized by Smith (1996). "Doctors seem to be overwhelmed by the information provided for them. The amount of information is enormous and disorganised, and it is hard to find the answers to questions that arise in consultations" (p. 1066). More recently, this same sentiment was reflected by Lee (2005).

The flood of new information and the demands of simply getting through the day have become so overwhelming that many physicians no longer find the time for "lifelong learning" ... These changes contribute to the malaise felt by many physicians in the face of modern medicine. Once they were the experts. Today they cannot even stay a step ahead of patients. (p. 1068)

It was not only essential that physicians used information in the care of their patients, but also that the information was based on the best evidence. Yet, according to Montori, Tabini and Ebbert (2002), residents preferred expert-based medicine information resources over evidence-based medicine information resources.

Our residents' reliance on expert sources is also a characteristic of physicians in practice. Furthermore, satisfactory answers are obtained from experts four times more often than when computer-based resources are consulted. Experts are a quick and easy-to-use resource who provide guidance and support. The residents "borrow expertise" from these expert sources, expecting them to be evidence-based, but the literature suggests they usually are not. (pp. 117-118)

The result of physicians not exhibiting proper information-seeking behaviors could be substandard patient care. Gorman and Hefland (1995) asserted:

Faced with the enormous quantity of biomedical literature published annually, practicing physicians find it increasingly difficult to stay abreast of advances in medical science. This difficulty with information management is often reflected in

medical knowledge *and clinical practices that are not in keeping with published research and recommendations* [italics added]. (p. 113)

Since Gorman and Hefland's studies on the information seeking behaviors of physicians, the literature consistently reported similar findings. One such example was Schwartz et al. (2003) that noted, "Family physicians generate a substantial number of clinical questions while caring for their patients, yet often leave their questions unanswered for lack of accessible, easy-to-find answers and difficulty managing the overwhelming quantity of medical information available" (p. 251).

In summary, the literature on physician information-seeking behavior indicated clinicians frequently had new information needs, that answers to clinical questions existed in the literature, but the literature is consulted infrequently. Even when information was sought, it was often the wrong resource (expert-based instead of evidence-based). Other barriers to information-seeking success were time and cost. The resources that held the most promise (computer-based resources) were poorly used because of some physicians' poor technology skills.

Issues Related to Information Skills Needed by Physicians

The second area of inquiry involved the information management skills needed by medical residents. The concepts of evidence-based medicine (EBM) and Information Mastery (IM) outlined the philosophy of information and information management skills residents needed to acquire. EBM was more of a hard science or philosophy and IM equaled an applied science or skill (Slawson & Shaugnessy, 2005). Residents also needed to have training in using computers, especially handheld computers or PDAs.

Evidence-Based Medicine Skills

A physician who practiced at the highest skill level of information used in medicine would be practicing “evidence-based medicine” (EBM). Slawson and Shaughnessy (2005) commented:

In the past ten years, two major changes have occurred in the processing of information in medicine: the widespread and easy availability of the medical research literature to both clinicians and their patients, and a push to move away from expert-led medicine to practice directed by patient-oriented, outcomes-based research. *Evidence-based medicine (EBM) has become the approach developed to help clinicians manage this information...* [italics added]. (p. 685)

All information was not created equal. General information was not necessarily the best-evidence or “evidence-based” information. Sackett et al. (1996) defined evidence-based medicine as:

the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research. (p. 71)

To highlight the difference between evidence-based and non-evidence-based information, one could imagine the following scenario. In caring for a hypertensive patient, a physician might find a journal article written by a leading cardiologist and in the same search find a systematic review of 50 large randomized controlled trials (RCTs) with data from tens of thousands of patients. The systematic review and the expert might give conflicting answers on how to treat hypertensive patients. If so, the best answer to the question the physician had about the care of the hypertensive patient would come from the systematic review because of its rigorous methodology and comprehensive scope. RCTs eliminated bias when done well; whereas, the article by the expert could contain bias. It was important that physicians learned to distinguish between evidence-based and non-evidence-based information to answer their clinical questions.

Even if physicians did know to choose an evidence-based answer, they still might have difficulty finding one because of the tremendous amount of healthcare research published. Over 16 million bibliographic references are indexed in the U.S. National Library of Medicine's (NLM) PubMed database as of 2007 (NCBI, n.d.). Many physicians did not have the research skills to find a best-evidence answer to their clinical question from so much information (Alper, Stevermer, White, & Ewigman, 2001). Their searches yielded too much information because they did not know how to use limits when searching PubMed, which, in turn, created frustration. They were not aware that in most cases PubMed should not be their starting point. Frustration could eventually extinguish information-seeking for patient care problems (Gorman & Hefland, 1995).

The use of evidence-based medicine was composed of many particular skills. One was the ability to formulate good clinical questions (Dawes et al., 1999). An acronym, PICO, which stands for Patient/Population, Intervention, Comparative intervention (if any), and Outcome desired was used to assist in clinical question building. A PICO question about hypertension might be written: In elderly patients with hypertension (Patient/Population) does the use of drug A (Intervention) or drug B (Comparative Intervention) result in the greatest reduction of morbidity and mortality (Outcome desired by physician and patient)?" (http://www.cebm.net/levels_of_evidence.asp#levels).

Clearly formulated clinical questions assisted finding information. According to Dagli, Morse, Dalton, Owen, and Hayden (2003), "The process of formulating effective clinical questions during community preceptorships can simultaneously *enhance clinical care* [italics added] and physician/student learning in several ways" (p. 621). Other benefits of good question formulation were found by Bergus and Emerson (2005), "Well-formulated questions help us as

physicians, to focus our learning time on learning needs that are directly relevant to our patients' clinical needs, and well-formulated questions help us communicate more clearly with our colleagues" (p. 486). Cabell, Schardt, Sanders, Corey, and Keitz (2001) noted a relationship between good clinical question building and increased use of the literature by residents:

We examined the effect of an educational intervention that emphasized question building on the use of MEDLINE by medical residents. We have shown a 2-fold increase in residents' access to MEDLINE as well as a 3-fold increase in measures that reflect their on-line activity. Residents in the intervention group were on the system longer, generated more queries, and viewed more abstracts and full-text articles. (p. 843)

A second skill needed to practice EBM was the ability to search the literature. This entailed knowing the proper database to use and how to use it. Alper et al. (2001) reported that many physicians lacked searching skills. They said, "Many physicians do not have the searching skills or access to the range of knowledge resources that librarians use" (pp. 960-961). A third skill needed by physicians to practice EBM was the ability to appraise the medical literature critically. Lancaster and Weingarten (2001) defined critical appraisal as, "the ability to read original research, to make a judgment on its scientific value, and to consider how its results can be applied in practice" (p. 38).

Physicians trained in critical appraisal would question what they read with queries such as: 1) Were the correct statistical tests used?; 2) Were all the participants accounted for in the final results?; 3) Was the study randomized and blinded if a therapy study?; 4) Was a large enough sample used?; 5) Were the study and control groups similar?; or 6) Does it have other potential sources of bias? (Guyatt, Sackett, and Cook, 1993). Some of these critical appraisal questions implied a basic understanding of biostatistics, in which physicians often lacked skill. According to Kitchens and Pfeifer (1989), "Despite general agreement on the need to teach

critical appraisal and clinical epidemiology, it has proven a difficult and often unpopular task” (p. 384).

There was disagreement among those who preferred the EBM position and those who hold the Information Mastery (IM) position on whether physicians needed to know critical appraisal techniques. The IM proponents argued that only a few experts in each medical specialty needed to have those skills in order to build databases that critically appraised the literature of a specific discipline. They stated that to expect physicians to apply critical appraisal skills in the real world of clinical medicine was unrealistic (Slawson & Shaugnessey, 2005).

A fourth skill that a physician needed to practice EBM was the proper use of different types of studies in the literature (Sackett, 2000). For example, the randomized controlled trial (RCT) had the highest clinical value for information on therapeutic topics, according to Rosser (2004a), who commented, “The strongest study design for the evaluation of therapy is the randomized controlled trial (RCT)” (p. 106). Dawson and Trapp (2001) added, “The randomized clinical trial is the epitome of all research design because it provides the strongest evidence for concluding causation; it provides the best insurance that the result was due to the intervention” (p. 15).

RCTs were carefully designed. They were blinded or double-blinded, so that participants and administrators did not know who was getting the experimental treatment and who was in the control group. They were randomized so that everyone who was in the population being studied had an equal chance of being chosen to be in the experimental group or control group. The purpose of residents knowing how to use the right type of study in the literature to answer their

clinical question was not merely an academic exercise. Cabell et al. (2001) pointed out that using the right kind of study could improve patient outcomes.

In the current health care environment, it is expected that individual patient decisions will be made using clinical judgment, expertise and information from well-designed trials. *There is evidence that caring for patients using information from valid clinical trials can improve patient outcomes* [italics added]. (p. 838)

When multiple RCTs on the same topic were statistically combined, they resulted in a systematic review. A systematic review of RCTs was considered the best evidence on a therapeutic topic.

Other major types of studies found in the medical literature were cohort studies, case control studies, and case studies or case-series studies. Dawson and Trapp (2001) defined a cohort study as, “an observational study that begins with a set of subjects who have a risk factor (or have been exposed to an agent) and a second set of subjects who do not have the risk factor or exposure” (p. 335). An example of a cohort study was the famous Framingham study, (Kannel, 2000) which has gathered health data from participating citizens of Framingham, Massachusetts since 1948. These data were used to make several important discoveries on the treatment of heart disease.

According to Dawson and Trapp, (2001), a case control study is “an observational study that begins with patient cases who have the outcome or disease being investigated and control subjects who do not have the outcome or disease. It then looks backward to identify possible precursors or risk factors” (p. 334). Data for case-control studies were often obtained from medical records. A case-series study was defined as, “a simple descriptive account of interesting or intriguing characteristics observed in a group of subjects” (Dawson & Trapp, p. 334).

A case study involved one case, usually one that was unique. As previously mentioned, RCTs, or systematic reviews of them, were the best types of information to answer therapy questions and also to answer etiology questions. Prognosis questions were best answered by cohort studies. Questions on diagnostic issues were answered by cohort studies that compared the new diagnosis against the “gold” standard (Sackett, 2000).

Guidelines provided another source for evidence-based information. However, not all guidelines were evidence-based. Some guidelines were expert-based. The newer trend is for guidelines to support their recommendations with evidence. These recommendations within guidelines were rated on an “A”, “B”, “C”, “D” scale. Rosser (2004b) reported:

an ‘A’ recommendation suggest that there is good evidence including more than one well-conducted RCT or a meta-analysis clearly demonstrating benefit for patients for conducting the preventive procedure. A ‘B’ recommendation finds no or only poor quality RCTs but enough evidence from other sources to support recommending the procedure with caution. A ‘C’ recommendation suggests that there is little or no evidence supporting using or not using the preventive procedure in practice. (p. 120)

Data sources were available for physicians that were composed of only the most clinically valuable studies. These data sources were referred to as secondary journals or secondary literature. According to McKibbin, Wilczynski, and Haynes (2004),

Another approach to staying current may be to subscribe to one or more secondary journals that highlight important clinical advances. These secondary publications have not only selected the most appropriate studies for clinical consideration, they highlight important aspects of methodology and implementation. This assessment of studies before application can be time-consuming and difficult for many clinicians, and involves a certain amount of training and practice to become proficient. Many examples of secondary publications exist in various disciplines. (p. 12)

The secondary literature was described by Alper et al. (2004) as:

Current models and recommendations for practicing EBM or information mastery recommend using sources of pre-appraised evidence to facilitate information

retrieval in practice. Physicians are encouraged to rely on others to do many of the labor-intensive steps (comprehensive searching, evaluating full-text articles, and condensing reports into easily digestible formats), so that clinicians can practice with the ability to find the current best evidence in a reasonable amount of time. (p. 430)

These databases were composed exclusively of “high-level” evidence. Systems were designed to rank evidence on a “1” to “5” scale, where a “1-a” was a systematic review of RCTs, a “1-b” was a systematic review of heterogeneous RCTs, a “2” was a cohort study, a “3” was a case-control study, a “4” was a case study and a “5” offered expert opinion (http://www.cebm.net/levels_of_evidence.asp#levels). In a homogeneous systematic review the different studies were on similar population groups, and in a heterogeneous systematic review the different studies were on dissimilar population groups. A physician should be taught to put more trust in a “1-a” study than a “5” study. The point was that physicians needed to understand that not all articles in the medical literature had the same clinical significance.

The skills involved in formulating a good clinical question; finding the right information resource, including locating the right type of literature needed for the problem; properly searching the information data source; critically appraising the information retrieved; applying the information to a unique patient; and evaluating the process constituted the practice of EBM. Ghali et al. (2000) stated, “To practice evidence-based medicine (EBM) clinicians need to develop skills in problem formulation, literature searching and critical appraisal, as well as practical experience in applying information from the literature to patient care questions” (p. 18).

A goal of this dissertation research was to study the attitudes of ETSU residents toward EBM. Evans (2001) found that, “Several major factors influence the uptake of the practice of evidence-based medicine in primary care, including time constraints and the volume of clinical

literature” (p. a11). What was needed, Evans offered was, “an innovative, educational intervention that will help primary-care practitioners to become evidence-based knowledge managers as they move to community practice” (p. a11).

More and more residency programs were implementing formal EBM programs to train residents to be best-evidence information users and lifelong learners. Green et al. (2000) reported on the state of EBM training for medical residents, that:

As of 1998, only a minority of (residency) programs maintained a real-time evidence-based medicine infrastructure, including faculty development, clinician-friendly resources such as *Best Evidence* and the *Cochrane Library*, on-site electronic information retrieval, and schemes to track resident’s information-seeking behaviors. (p. 222)

This number certainly increased in the United States since 1998, as reported by McGinn, Selz, and Korenstein (2002):

The implementation of EBM has had a great impact on the teaching, practice, and study of medicine. In a survey of internal medicine residency programs, over 35% of respondents participated in freestanding EBM programs, and more than 80% of the programs were in the process of integrating EBM into traditional education venues (e.g. morning report and medical attending rounds.) (p. 1150)

EBM programs could help residents provide better patient care and increase the residents’ knowledge. According to McGinn et al. (2002), “The preliminary data from this pilot study suggest that implementing a structured EBM approach *can affect the care of the actual patient and the management of future similar patients* [italics added], and facilitate knowledge of the disease process” (p. 1151). Librarians should be considered an integral part of any medical school EBM program because their normal responsibilities included the purchase of database licenses and training patrons to use databases. McGinn et al. asserted, “It is difficult to implement an EBM strategy if team members do not have some knowledge of and skill in EBM

and search strategies” (p. 1151). Therefore, to be most effective librarians should be trained in EBM principles.

McGinn et al. reported, “Research that systematically studies questions relating to the impact of EBM on physicians’ behaviors and patients’ outcomes needs to be undertaken” (p. 1152). The reason the EBM skills of ETSU residents were examined was because of their importance to clinical outcomes. Green (2000) underscored why residents should be taught EBM skills:

The current advocacy of EBM derives from the growing evidence base supporting many clinical maneuvers and the *recognition of physicians’ unmet information needs, poor information retrieval skills, deterioration of up-to-date knowledge after training, and practice variations for interventions with established efficacy* [italics added]. (p. 129)

Ozuah, Orbe, and Sharif (2002) described a program used in pediatrics ambulatory rounds. Residents employed a standardized form to gather questions from the clinic. The questions were gathered by faculty, who selected several questions from the material covered during the previous week and used them in a weekly instructional meeting to train residents to find best-evidence answers. Residents rated the program highly and stated they had improved in their information skills.

One driver for residency programs to have EBM training was external accreditation. Dellavalle et al. (2003) explained:

The Accreditation Council for Graduate Medical Education and the Association of American Medical Colleges have recently called for the increased integration of epidemiology, biostatistics, critical appraisal, and medical informatics into the curriculum of both medical schools and graduate medical education programs to increase clinician information skills. Increased training in evidence-based medicine (EBM) ... may begin to answer this call. (p. 369)

Dellavalle et al. (2003) offered that residency programs should increase instruction in EBM.

They stated, “To this end, all residency programs should consider increasing emphasis on formal evidence-based training” (p. 372). In a survey conducted on EBM programs, they discovered:

Internal medicine programs held an average of 24 EBM sessions per year. Sessions averaged 1.5 hours long and were led primarily by faculty (52%). Of session leaders, 58% received training in EBM. Nearly 9 annual EBM sessions focused on epidemiology, 10.3 on biostatistics, and 9.2 on informatics. (p. 371)

EBM was practical in all specialties of medicine, not just primary care. After a section explaining the importance of EBM, Bhandari et al. (2003) reported the following about the use of evidence-based medicine instruction with surgical residents:

This evolution toward evidence-based surgical practice can advance rapidly only if surgical trainees adopt it early in their training. While previous reports emphasized the needs for "hands-on" clinical experience surgical training, recent reports have advocated "critical appraisal" as part of the core surgical training curriculum. The extent to which surgical trainees can adopt and practice EBM depends on the challenges in implementing and adopting evidence in the day-to-day care of surgical patients. No studies have examined the perceptions of surgical trainees regarding the challenges of the practice of EBM during their residency. (pp. 1183-4)

However, the implementation of formalized EBM training for surgical residents did not come without problems according to Bhandari et al. (2003):

The surgical residents in our study identified a general lack of EBM education, time constraints, lack of priority, and disapproval from staff surgeons as important factors that challenged their ability to incorporate EBM into daily practice. Curriculum reform, increased exposure to EBM, and training environments prioritizing the importance of EBM as an important skill among residents and surgical staff may help overcome these barriers. (p. 1189)

Haines and Nicholas (2003) asserted that these obstacles could be overcome. “Current technology makes it possible to practice EBM even in a busy surgical subspecialty” (p. 287).

Additionally, Craig, Irwig, and Stockler (2001) articulated the need for EBM training and well-chosen information resources.

In a recent survey, Australasian physicians identified insufficient time (74%), limited search skills (41%) and limited access to evidence (43%) as impediments to making better use of research data. The survey showed that, to realize the full potential of EBM to improve care, two things are needed: *education in EBM, and systems that quickly deliver high-quality evidence at the point of clinical decision making* [italics added]. (p. 248)

Medical libraries were the ones that bought information systems for medical colleges; thus, it was imperative that decision-makers in the library understood EBM. Duke University Medical School successfully trained residents in EBM (Crowley et al., 2003). Librarians at Duke took the forefront of this training to teach residents to ask good clinical questions and to find best-evidence answers from the literature.

The database that we have described above allows our residents to record their CQs (clinical questions) with links to selected Medline citations and to report the perceived impact of the medical literature on patient care. *Residents reported that useful literature collected to answer CQs changed patient management in almost 50% of cases* [italics added]. (Crowley et al., 2003, p. 273)

This study, like many that were cited in the literature review, demonstrated the strong connection between the skillful use of information by physicians and better outcomes in patients. Crowley et al. (2003) added, “Duke residents also reported changes in medication and diagnostic test choices and, in addition, confirmed the influence of their literature findings on the prognosis communicated to the patient” (p. 272).

Librarians should contribute to the EBM process by being trainers of residents in EBM skills. According to Bradley, Rana, Martin, and Schumacher (2002),

The purpose of this study was to determine if real-time searching and EBM instruction would impact searching skills of residents in the NICU and, more significantly, if they

would retain the skill sets to which they were introduced during the intervention phase. Residents receiving instruction clearly improved searching skills and maintained those skills six-months after completion of the study. (p. 200)

The training in this study was conducted by librarians.

Del Mar et al. (2001) demonstrated that medical librarians could help physicians practice in an evidence-based manner by becoming competent EBM searchers themselves. When they performed mediated searching for physicians, they provided the doctors with best-evidence answers and had a positive influence on patient care. Del Mar et al. (2001) reported,

We found that it was feasible to provide an evidence-based literature search service for GPs (General Practitioners). The service was used by GPs in clinical practice, who found it useful. Subjectively at least, GPs found *that it influenced their clinical decisions* [italics added]. (p.136)

If the EBM model of information management was followed by a medical residency program, there could be ramifications for how librarians practiced and the information services they provided. The library might have to re-think the way it traditionally provided services. This was elucidated by Reilly and Lemon (1997):

Finally, our emphasis on evidence-based inquiry also creates a costly demand for accessible electronic library resources. *Ideally, at least in our setting, these should be available on or near the patient care areas at all hours every day* [italics added]. The required involvement extends far beyond the cost of equipment and software; residents must be trained, not only to search efficiently, but also to interpret the literature carefully. (p. 425)

Librarians had to reverse their way of thinking from expecting users to come to the library building to pushing information out to users in their clinical environment. Librarians had to concur that the effective use of information for patient care was one of the core clinical skills needed by resident physicians. This idea was brought forth by Ghali et al. (2000): “An ultimate objective in teaching EBM is for medical trainees to view literature searching and critical

appraisal as fundamental skills (i.e. very similar to history-taking and physical examination) required for effective medical practice” (p. 22).

Because it was difficult for medical residents to learn critical appraisal skills to determine the clinical relevance and validity of information, a new type of literature, termed secondary literature, emerged. Secondary literature databases consisted of pre-appraised and pre-validated information, making the information in the database highly reliable. It was important for medical librarians to purchase these databases and train residents in their use. Grad, Macaulay, and Warner (2001) reported this shift:

Despite many barriers and challenges to the implementation of evidence into primary care practice, family practice training programs have long recognized the importance to patient care of teaching residents basic skills in using the medical literature. *As a result, over time, the curriculum for family practice residents has shifted from a focus on understanding research methodology to learning how to find brief synopses of the most relevant literature* [italics added]. (p. 602)

Grad (2001) illustrated why there was a need for training residents to use electronic databases that were composed of the secondary literature:

In this paper, first-year family practice residents have reported increased skill at searching for answers to clinical questions using electronic tools to support their health care decisions. Post-course, residents in this study have *also reported that secondary sources of information are becoming more important to them for solving clinical problems and, if this is true, they have started to become evidence users* [italics added]. These findings support our attempts to teach modified EBM techniques that focus on a more time-efficient strategy for the family practice setting. (p. 605)

Green (2000) maintained, “Clinicians will not fully embrace EBM unless it allows them to ask and answer most of their questions at the time that they emerge in the flow of patient care” (p. 132). The development of the secondary literature was an important step in making this a

reality. Ramos, Linscheid, and Schafer (2003) summarized the argument of why the secondary literature was necessary as:

Resident and faculty family physicians have many clinical questions but rarely use evidence-based information sources to answer these questions. EBM curricula should acknowledge the time limitations of the clinical setting, help physicians become familiar with convenient and available evidence-based sources that yield speedy answers, and explore systematic methods of resolving unanswered questions. (p. 260)

One criticism of EBM was that it was hypocritical in the sense that it did not meet its own criteria for proven effectiveness based on solid evidence. For example, Shaneyfelt et al. (2006), quoting Hatala and Guyatt (2002) in an article in the *Journal of the American Medical Association (JAMA)* noted that “ironically, if one were to develop guidelines for how to teach [evidence-based medicine] based on these results, they would be based on the lowest level of evidence’ (p. 1116). However, by 2006, the validation instruments for EBM interventions existed. In the same article in *JAMA*, Shaneyfelt et al. stated, “Instruments with reasonable validity are available for evaluating some domains of EBP and may be targeted to different evaluation needs” (p. 1116). Because EBM was a fairly new field, it took time to develop these evaluation instruments.

Personal Digital Assistants

One area of inquiry in this dissertation was the use of personal digital assistants (PDAs) by ETSU residents. EBM experts, Shaugnessy and Slawson (n.d.), suggested that the PDA would become the stethoscope of the future. Barrett, Strayer, and Schubart (2003) listed several ways PDAs were being used by physicians:

PDAs are used for: (1) medical references (e.g., *Five Minute Clinical Consult*, InfoRetriever) (2) pharmaceutical information (such as ePocrates) and (3) professional organization (calendar, address book) First, residents in all seven

of our surveyed practices use PDAs and most surveyed residents use them on a daily basis; we conclude that PDAs are being widely used across the spectrum of generalist to specialty practices, regardless of whether a residency program specifically encourages PDA usage. (p. 784)

McLeod, Ebbert, and Lymp (2003) added:

Handheld computers, often referred to as personal digital assistants (PDAs), have ushered in a new era in information management. Device portability and useful software allow application of current medical knowledge at the point of care. Recent literature reports have highlighted the prominent PDA use among physicians and the wide variety of medical applications for this technology. (p. 605)

PDA mastery by medical residents might benefit patients because evidence-based databases on a PDA platform offered a physician the ability to find high quality answers while with the patient.

Ray et al. (2006) “found that the majority of the residents already used PDAs” (p. 571).

PDAs could significantly reduce the time needed by physicians to find information.

McLeod et al. (2003) stated, “Handheld computers ... have ushered in a new era in information management. Device portability and useful software allow application of current medical knowledge at the point of care” (p. 605); therefore, saving physicians the time needed to go to the library. Gorman, Ash, and Wykoff (1994) iterated that lack of time created a significant barrier for physicians’ use of information:

It seems reasonable to expect then, that if substantial time, effort, and cost of doing searches can be reduced, the benefit of searching will increasingly be seen to outweigh the cost. The result, the authors hope, will be increasingly frequent use of the journal literature to answer clinical questions in primary care to the benefit of practitioners and their patients. (p. 145)

Librarians could help reduce the time pressures residents had in their work. According to Forrest and Robb (2000), “Doctors in training are under considerable time pressures, both in their clinical work and in their need for study time. The library service should reflect these

circumstances” (pp.129-130). De Groote and Doranski (2004) noted, “All librarians in information services departments at health sciences libraries need to be able to provide consistent and knowledgeable PDA support” (p. 346).

Residents often asked what PDA platform they should use. PDAs used either the Palm or Pocket PC operating system. McLeod et al. (2003) stated, “A clear preference for Palm OS devices over Pocket PC devices was noted among physician PDA users at our institution and has been similarly shown in other investigations” (p. 607). QCOML assisted users with both platforms.

The *Wall Street Journal* (2005) reported a testimonial about a physician’s PDA use:

Ken Kray, an allergy specialist who practices in Houston, has come to depend on an unlikely clinical tool: a Palm Pilot. Dr. Kray says his patients often have ‘problems with a multitude of medications,’ which he must take into account when prescribing treatments. His Palm Inc. gadget lets him consult a database of drugs from Epocrates Inc., as well as check their interactions, while his patients are still in the examining room. ‘It would take hours without it,’ he says. The Palm has become such an essential piece of equipment that he once drove 32 miles at lunchtime to retrieve it when he left it at home. ‘I felt so insecure,’ Dr Kray says. ‘I can borrow a stethoscope. But I can’t borrow a Palm.’ (p. R5).

In a study done with medical students in Hong Kong using PDAs with InfoRetriever, Leung et al. (2003) found, “The handheld computer improved participants’ educational experience with evidence based medicine the most, with significant improvements in all outcome scores” (p. 1090).

Bennett, Casebeer, Kristofco, and Collins (2005) emphasized why ETSU residents needed to be properly trained to use PDAs:

The use of hand held computers for referencing clinical practice guidelines and drug questions by half of the family physicians surveyed indicates that hand held computers are becoming more rapidly integrated into the clinical encounter and *provide one step in addressing patient safety issues* [italics added]. (p. 4)

Tamblyn et al. (2003) reported that, “Computer-based access to complete drug profiles and alerts about potential prescribing problems reduces the rate of initiation of potentially inappropriate prescriptions but has a more selective effect on the discontinuation of such prescriptions” (p. 549).

Librarians could train residents in PDA skills. Rios (2004) stated, “With the convergence between our profession and other information technology professions, librarians have a choice to be involved with PDAs or be bypassed” (p. 17). In a study by Grasso, Yen, and Mintz (2006) of medical students, they found that “the greatest reported limitation of handheld computing was the lack of institutional support. ... In the long run, however, there needs to be a strong institutional commitment for the technology to thrive” (p. 200). The library provided the perfect place for this support. In a program, reported by Scollin, Callahan, Mehta, and Garcia (2006), “The libraries were the point of access for borrowing a PDA” (p. 212) and providing technical support. McAlearney, Schweikhart and Medow (2004) stated that, “Organisations could promote devices by providing training, user support, and advice to build confidence in the technology and its capabilities” (p. 1166).

Grad et al. (2005) conducted a controlled trial with an intervention group receiving PDAs with the database InfoRetriever and the control group receiving nothing. A test was developed to measure the baseline knowledge of both groups before the intervention. No difference was detected post-intervention. Grad et al. (2005) reported, “This finding challenges the assumption that simply providing PDA software to residents will enhance their knowledge of common problems seen in primary care” (p. 739). Perhaps, one of the reasons the intervention failed to

show an effect was that the residents had poor searching skills. Teaching good searching skills had long been a focus of librarians. More controlled trials needed to be done on the use of PDAs in medicine. Carroll and Christakis (2004) commented, “Without well-designed trials we cannot tell if the use of any information technology carries actual benefits or even harms” (p. 241). Testing the usefulness of PDAs in medicine was becoming a reality, however. Ray et al. (2006) developed “a scale to measure attitudes toward handheld decision support tools. We found that our scale had acceptable psychometric properties including measures of reliability, validity and responsiveness” (p. 571).

Database Searching Skills

Residents needed skills in database searching. According to Erickson and Warner (1998), “Organizing searching skills is therefore a worthwhile goal. As a first step, many medical schools introduce students to on-line databases, most notably MEDLINE. Residency is an ideal time to continue this training” (p. 269). However, finding time to train residents was often difficult because of their hectic schedules. Erickson and Warner (1998) found, “A recognized obstacle to providing residents with formal MEDLINE instruction is time constraint” (p. 269). Many medical school libraries conducted classes on rudimentary MEDLINE searching and on the basics of searching other databases. However, residents needed to know more than the basics. According to Erickson and Warner (1998), “While many studies about MEDLINE education and use have focused on such novice searchers, less work concentrates on advanced MEDLINE training. Residency seems to be a logical time to provide this” (p. 271). Along with teaching PubMed, information training programs should include secondary information database training

and PDA training. Similar classes might have to be offered as well to attending physicians, who might have never mastered online searching.

Loansome Doc Skills

Because many past ETSU residents went into private practice (Wilson & Ferguson, 2003) where no medical library existed, another skill that residents needed was the ability to use Loansome Doc. Loansome Doc was a tool within the PubMed database that allowed physicians, once they found a citation in PubMed, to order the full-text of the article(s) from a participating medical library. Paden, Batson, and Wallace stated (2001):

Loansome Doc expands the capacity of DOCLINE by adding a document delivery component aimed at health care professionals. With Loansome Doc, health care professionals have the ability to electronically order articles found on NLM databases from their designated library in a timely and cost-effective manner. (p. 264)

Issues Related to Training Medical Residents to Use Clinical Information

Medical educators needed to train residents to have the motivation and skill to keep up with published research and recommendations. The preceding discussion of information skills needed by residents could also be viewed as a training issues discussion. This section developed more issues related to training, including the environment and training, training techniques, training philosophy, the failure of current training strategies, and clinical medical librarianship as a training strategy.

Role of Environment in Training

There was variation in medical practice that might occur even in the same geographical region. Chung, Chung, Shah, and Meltzer (2003) found, “Physicians in similar settings often adopt different practice styles, sometimes resulting in large differences in resource utilization or

outcomes. This practice variation has been recognized as an important issue in medical education, quality improvement, and cost containment” (p. 166). Chung et al. (2003) proposed this theory to explain the variation in residents’ clinical practices:

Social learning theories, well validated outside medical education, suggest one explanation for the development of practice variations. Bandura described a 3-way interaction among learner, practice, and environment, in which the learner’s adoption of a practice is often influenced by interactions with others in the local environment, and the learner in turn may influence the practices of others in the environment. Thus, learner and environment may sometimes engage in a positive feedback loop, each reinforcing the other, *resulting in local community practice preferences that are based more on affective ties and interpersonal persuasion than on best evidence* [italics added] or larger community norms. (p. 166)

According to the above statement by Bandura, variation was inevitable. Librarians could have a role in reducing variation by promoting EBM. According to Aguayo (1991), Edwards Deming, the father of Total Quality Management (TQM), taught that reducing variation was the main pathway to quality. However, if the evidence-based culture could be made stronger than the social culture, then variations would decrease and patient care would improve.

Training Techniques

Residents needed to be taught the best EBM resources to improve their use of information. Ramos, Linscheid, et al. (2003) stated:

[I]f our goal is to induce physicians to use evidence-based sources during clinical sessions, we must continue to identify and introduce them to sources that are rapidly accessible, brief and as ubiquitous as the pocket references carried by nearly all residents and faculty physicians. (p. 259)

Instruction had to be modeled in an interpersonal way. According to Chung et al. (2003), “It may be that in all these different contexts of learning, the most effective methods of changing behavior will combine presentation of: best evidence with role modeling, self-efficacy and other

affective, interpersonal persuasion strategies” (p. 171). Librarians should, therefore, know EBM well in order to work with medical residents and should personalize their training.

Andragogy as a Philosophy of Training

Green and Ellis (1997) pronounced that the principles of andragogy must be implemented in training residents because residency can last for 7 or more years following 4 years of graduate medical school. In teaching residents information skills at Yale University, Green and Ellis (1997) implemented the following andragogical principles:

In conceiving an education strategy, we committed ourselves to satisfying the assumptions that underlie adult learning theory or ‘andragogy’.

1. Adult learners need to know why they need to learn something before undertaking to learn it.
2. Adults prefer responsibility for their decisions and desire to be viewed as capable of self-direction.
3. Adults accumulate a greater volume of experience, which represents a rich resource for learning and necessitates individualization of learning strategies.
4. Adults become ready to learn things when they need to know them in order to cope effectively with real life situations.
5. In contrast to children’s subject-centered orientation to learning, adults are life-centered (or task-centered).
6. While adults are responsive to some external motivators, their most potent motivators are internal. (p. 743)

Librarians should make use of these principles when working with residents. Librarians should put more focus on the “why” before they get to the “how.” Librarians should cater training as much as possible to the level of the individual resident. Librarians should try to teach residents in the residents’ work environment in order to solve real life clinical situations.

Current Training Strategies Not Effective

The failure to train residents as information experts was reported by Green et al. (2000) in a study of Yale University primary care residents. They found:

that internal medicine residents in their continuity clinics encounter new clinical

questions - not including those answered by discussions with preceptors- at a rate of 2 questions for every 3 patients Therapy and diagnosis were the two most common clinical tasks represented in the questions. *The residents pursued only 29% of their questions*, [italics added] referring most frequently to textbooks, original articles, and attending physicians. A belief that the patient expected the answer and a perceived malpractice exposure were associated with an increased likelihood of pursuing a question. (p. 220)

The fact that the residents answered only 29% of their questions “represent[ed] important missed opportunities for self-directed learning” (p. 222). Another reason training residents in information skills was important was to produce better practice habits in physicians, which, in turn, could save money for the healthcare industry. Durenberger (2003) held that, “If all physicians in the United States practiced as effectively as the top ten percent, we would save enough money to add a drug benefit to Medicare and have funds to spare” (pp. 67-68).

Value of a Clinical Medical Librarian for Residents

If the physician would not come to the library, then the library should go to the physician both to provide library services and to train physicians in information skills. Librarians referred to as clinical medical librarians (CML), “informationists” or “information specialists in context,” (ISIC) were part of the patient care team as described by Florance, Guise, and Ketchell (2002) at Vanderbilt Medical Center. Vanderbilt CMLs were trained in pharmacology, physiology, and biostatistics and were active participants in medical rounds. The CMLs gathered information for clinicians, which they summarized, appraised, and offered commentary on for the patient care team. A report on one of the first generation CMLs by Greenberg, Battison, Kolisch, and Leredu (1978) stated, “The presence of a CML (clinical medical librarian) in a clinical setting enables the CML to obtain a more comprehensive view of clinical information needs and thus enhances the accuracy of the literature provided” (p. 320).

Schwing and Coldsmith (2005) highlighted the benefits of a CML program:

In regards to librarian attendance at Morning Report, 75% said that attendance at Morning Report influenced their opinions about librarians, 85% said that this improved accessibility, and 100% said that the librarian at Morning Report had a positive effect on learning. (p. 38)

A CML program could be implemented in several ways. For example, one librarian could spend a brief time with multiple residency programs. Greenberg et al., (1978) realized, “Not all clinicians within the hospital community can be served, because of staff limitations, but to offer such a program, even on a limited basis, is better than not to offer it at all” (p. 324). An individual librarian could be permanently attached to visit a single residency program regularly.

Greenburg et al. (1978) found:

The benefits of the service to the clinicians are multidimensional. The time-saving factor, one of the original objectives of the service has been demonstrated by the fact that the clinicians’ time has been less taxed as a result of obtaining information via the CML. There is also a hidden monetary savings because the physicians’ time is spent more effectively when it is not necessary for them to obtain this information themselves. (p. 324)

Marshall and Neufeld (1981), also a part of the first generation of CMLs, described a CML as:

The role of the clinical librarian developed in the early 1970s as an attempt to deal more effectively with the information problems of practicing health professionals and the perceived poor relationship between health professionals and librarians. Clinical librarians participate directly in patient care activities and offer a variety of bibliographic services and library orientation sessions that relate directly to the daily patient management problems encountered by health professionals. (p. 409)

They noted a positive response from the program:

Sixty-seven percent of the study group respondents stated that their pattern of information-seeking had changed since the clinical librarian joined the team, [italics added] and comments from the study group showed that in many cases a new awareness of the biomedical literature for patient care was developed. (Marshall and Neufeld, 1981, p. 415).

They further summarized the value of a CML:

The major findings of this study are that part-time clinical librarians serving health professionals, patients, and families can be successful in settings that are randomly chosen and that there are significant changes in information-seeking patterns among health professionals who receive the services of a clinical librarian. (Marshall and Neufeld, 1981, p. 416)

Marshall and Neufeld (1981) wrote as first generation CMLs. Some programs from that era collapsed because of a lack of funding or poor leadership; however, some were still in existence. The concept re-emerged recently because of the EBM school of thought. There was discussion about creating a new profession that would be a hybrid librarian-clinician, termed an informationist. The informationist would work in the clinical areas of a hospital to insure that best-evidence information was used in the care of patients. Davidoff and Florance (2000) commented:

We believe it is unacceptable in this “information age” for medical information retrieval to remain in its current neglected and disorderly state, a poor relation in the family of biomedical research and clinical practice. The concept of the informationist is an idea whose time has come. (p. 998)

Stevermer, Chambliss, and Hoekzema (1999) used the technique of “academic detailing” with resident physicians. There were aspects of clinical medical librarianship similar to “detailing”, a technique used by pharmaceutical representatives to update physicians about their products. Pharmaceutical representatives visited clinics to instruct the clinician about the benefits of their product (Stevermer, Chambliss, and Hoekzema, 1999). Analogous to being in the clinical setting, the CML could advise in the clinic on the management of information resources.

Stevermer et al. (1999) concluded that, “[r]esidents who received the intervention substantially

increased their awareness and knowledge of current, important articles in the medical literature. They did not report spending more time reading articles” (p. 71).

King (1987), another early CML investigator, reported that when information from a clinical medical librarian was used, “Nearly three-quarters of the medical health professionals stated that some aspect of case management would definitely or probably change and more than one-fifth asserted that they had or would definitely handle their cases differently” (King, 1987, p. 298). Holtum (1999) made this argument for clinical medical librarianship:

When health professionals request lab work, they turn to medical technologists. If an X-ray is needed, they direct the patient to a radiographic technician. The reason is simple: Even though the clinician is certainly capable of learning and performing these tasks (though at considerable time and expense), higher quality and greater cost-effectiveness are obtained by using the skills of specialists instead. Can the same not be said of the expertise and experience that librarians bring to the health care enterprise. (p. 406)

Holtum (1999) asserted that information technologies created to make information access easier actually made retrieval more difficult:

Computers, the Internet, the Web, CD-ROMs and the myriad of other technological wonders that librarians continue to embrace with good reason, create new avenues for accessing information. They make finding information faster, more efficient, timely and accurate. They do not, however, always make it easier. In fact, the opposite is often true. In spite of the important innovations in search engines ... searching efficiently through this growing maze of electronic resources requires more not less, knowledge, skill and practice. Information retrieval continues to be an art, and mastering it is no trivial matter. (p. 406)

Brown (2004) reported about her over 30 years as a CML:

At this time of continuing exponential amounts of literature, large case-loads, and more complex disease states, a public services librarian with excellence in online searching, a working knowledge of informatics and the subject areas is key. Departments that realize the crucial need for an informationist or information specialist in context to listen to patient presentations, to see the patients, and to bring the evidence-based literature directly to the point of care or need in a timely manner will be well ahead of the game. Information has been proved to improve the quality of patient health care.

(p. 48)

To summarize these training issues, medical educators had to 1) make sure that evidence, not environment, was the major training influence on residents' practice habits; 2) build information training programs on an andragogical philosophy; 3) use the right training techniques and philosophy; 4) address the failure in current training strategies, and 5) use the CML as a viable training strategy.

Information Resources Provided for ETSU Residents

QCOML subscribed to several electronic clinical information databases. In 2006, these included electronic journal collections from vendors such as Elsevier and John Wiley and Sons. It also included electronic databases such as MD Consult; UpToDate; InfoRetriever; CINAHL; StatRef; the Cochrane Databases: Cochrane Database of Systematic Reviews (CDSR), Database of Reviews of Effectiveness (DARE), and Cochrane Controlled Trials Registry (CCTR); ACP Journal Club; and PsychInfo. QCOML users also heavily used the free databases, PubMed, and the National Guideline Clearinghouse (NGC) (Quillen Medical Library Portal, n.d.). Some clinical databases to which the library did not subscribe included Clinical Evidence, First Consult, Skolar MD, and DynaMed.

The focus of this study was primarily on the use of electronic information resources. It was not meant to negate the value of print resources. Print resources and colleagues are reported by some as the information resources most frequently used by physicians. Coumou and Meijman (2006) reported:

Primary care physicians only try to answer a limited number of their clinical questions, and when they do, they first consult colleagues and paper sources. This

practice has not really changed through the years, despite the greater availability of and better access to electronic sources of information. (p. 58)

However, Perry and Kronenfeld (2005) stated, “The electronic journal is now the preferred medium for knowledge exchange” (p. 2) and the Association of American Medical Colleges (AAMC) reported (1998) that “the biomedical knowledge and clinical information about patients are essentially unmanageable by traditional paper methods” (p. 3).

Therefore, presuppositions of this study were that the EBM-IM model was the best way to practice information management in the clinic and that electronic resources would become the predominant platform through which EBM information was accessed. Therefore, the analysis of electronic ETSU library clinical information resources was the major focus. Respondents were given an opportunity on the survey instrument to rank their preferred information platform.

A source of systematic reviews was the Cochrane Database of Systematic Reviews (CDSR), which was part of a group of databases produced by the Cochrane Collaboration, based in Oxford, England (Cochrane Collaboration, 2004). The Cochrane database group also included DARE (Database of Abstracts of Reviews of Effectiveness), which, unlike the CDSR, covered topics other than therapy, (such as etiology, prognosis, diagnosis, and economics). In addition, Cochrane included the Cochrane Controlled Trials Registry (CCTR), which contained about one third million validated RCTs. QCOML subscribed to the Cochrane databases. White (2002) described Cochrane as:

The international Cochrane Collaboration, initiated by Archie Cochrane in the United Kingdom and formally announced in 1993, produces information for people who make health care decisions. Through its Database of Systematic Reviews, the collaboration provides opportunities for consumers to access, as well as organize, high-quality health information. The Cochrane Database of Systematic Reviews, publicly available since 1995, is a growing set of high-quality literature reviews Randomized controlled trials are a major emphasis of the database. The data

from these trials are sometimes combined, using a statistical technique known as meta-analysis, to confirm and amplify the power of the findings. The full text of the reviews requires a subscription The Cochrane Database of Systematic Reviews is part of the Cochrane Library. The library includes four other sections: Database of Abstracts of Reviews of Effectiveness, The Cochrane Controlled Trials Register, the Cochrane Review Methodology Database, and the National Health Service (NHS) Economic Evaluation Database. These sections help to support the material included in the Database of Systematic Reviews. The Cochrane Library is published four times per year. Material published in the library is cumulative, rather than sequential. (p. 219)

A comprehensive evidence-based practice database that included abstracts from the Cochrane Database of Systematic Reviews could be purchased as an individual subscription or as a license for a group. It was named InfoRetriever and could be loaded on a desktop computer or a PDA. A subscription to InfoRetriever allowed access to the following: 1) Cochrane systematic reviews; 2) practice guidelines; 3) summaries of clinically important journal articles, called POEMs, an acronym for Patient-Oriented Evidence that Matters; 4) *Griffith's Five Minute Clinical Consult*; 5) ICD-9 and CPT code tools and; 6) over 500 clinical calculators. QCOML subscribed to InfoRetriever.

Slawson and Shaughnessy (2005) argued that a database like InfoRetriever was a premier information tool because it “enable[s] clinicians to remain up to date with new valid information that is relevant to patient care and *is accessible while taking care of patients* [italics added]” (p. 687). Kennedy (2004) described the InfoRetriever database, as follows: “InfoRetriever was founded by family practitioners with the idea of delivering medical information based on the best available clinical evidence to the primary care provider at the point of care” (p. 381). Weinfeld and Finkelstein (2005) reported, “InfoPOEMs ... provides quick keyword look-up of evidence from journal articles, practice guidelines, Cochrane database

abstracts, clinical decision rules, the complete *Griffith's 5-Minute Clinical Consult* textbook and other sources of information (p. 40). Alper, the creator of DynaMed, listed Clinical Evidence, DynaMed, InfoRetriever, PDxMD (renamed First Consult), and UpToDate as excellent clinical databases, particularly for generalists (Alper, 2003). Alper et al. (2001) also conducted a trial with Stat!Ref, MDConsult, DynaMed, MAXX, MDChoice.com, *American Family Physician*, SUMSearch, Medical Matrix, Primary Care Clinical Practice Guidelines, Medscape, WebDoctor, Virtual Hospital, CliniWeb, and TRIP to determine which database answered the highest percentage of clinical questions. They found “the combination of Stat!Ref and MDConsult could answer 85% of our set of 20 questions” (p. 963). This was the highest percentage of questions answered by any combination of databases. QCOML subscribed to Stat!Ref and MDConsult.

Weinfeld and Finkelstein (2005) divided clinical questions into background and foreground questions. They recommended textbooks (such as *Harrison's Principles of Internal Medicine*), *American Family Physician* (journal), ePocrates (drug database), and UpToDate for background questions and PubMed Clinical Queries, InfoRetriever, and *ACP Journal Club* for foreground questions. “Background questions generally ask, ‘who, what, when, why, where or how’ about a single disease, drug, intervention or concept. ... Foreground questions always compare two things: two drugs or treatments, the prognosis of two groups, two diagnostic tests or the harms or benefits of two approaches” (Weinfeld & Finkelstein, 2005, p. 38).

According to Fox and Moawad (2003), “UpToDate is a clinically useful, searchable database of medical information updated every 4 months and available on CD, online and for souped-up Pocket PC palmtop devices” (p. 710). There was concern that UpToDate was not an EBM resource. However, in an interview, Denise Basow, MD, Vice President and Executive

Editor of UpToDate reported that, “UpToDate has been an evidence-based tool since before EBM was a term that most people understand” (Connor, 2005, p. 85). The controversy over UpToDate being an EBM resource revolved around UpToDate not listing levels of evidence and not being transparent on how section authors filtered the literature they used to write the section. QCOML subscribed to UpToDate.

Peterson, Rowat, Kreiter, and Mandel (2004):

monitored second-year medical students’ use of a unique digital textbook, UpToDate, as they transitioned from preclinical years at the University of Iowa Medical students rapidly adopted UpToDate as a clinical resource during their clinical clerkship as evidenced by a rapid growth in the electronic textbook’s use. One hundred sixteen of a possible 154 students (75%) responded to the survey. More than 85% of respondents identified electronic sources as their primary resource (UpToDate 53%, MDConsult 33%; $p < .001$ when compared to paper resources) This study clearly demonstrates that medical students embrace and use electronic information resources much more than has been reported among practicing clinicians. (p. 89)

The authors determined that a digital divide had occurred in which younger trainees, such as medical students and residents, were using electronic information resources that they were comfortable with and older trainers were using the print resources that they were taught to use. Because of findings like these, this study focused on medical residents’ use of electronic resources.

UpToDate, Cochrane Database of Systematic Reviews, and HealthGate Clinical Guidelines were used by Koonce, Giuse, and Todd (2004) to determine if secondary databases were adequate to answer general management questions and complex clinical questions. They discovered that secondary literature databases were often not adequate to provide full answers to both complex clinical questions (answered 20%) and general care management questions (answered 47.5%).

In 2005, physicians' use of Google was discussed in the literature. A *BMJ* article by Giustini (2005) stated:

With all of this technology and freely available digital information, what will happen to physical libraries? Google's mission is to provide access to the world's information—but this is librarians' mission too. Will they be needed in the new information age. (p. 1487).

Google produced the same kind of stress in physicians that it caused librarians. Using an anecdote from Greenwald (2005), Giustini further stated:

In a recent letter in the *New England Journal of Medicine*, a New York rheumatologist describes a scene at rounds where a professor asked the presenting fellow to explain how he arrived at his diagnosis. Matter of factly, the reply came: 'I entered the salient features into Google, and [the diagnosis] popped right up.' The attending doctor was taken aback by the Google diagnosis. 'Are we physicians no longer needed?' (p. 1487)

Other prominent publications echoed this theme of major changes in the information world as a result of Google. For example, in the best-selling book *The World is Flat*, author Thomas L. Friedman wrote:

Said Google cofounder Russian-born Sergey Brin, 'If someone has broadband, dial-up, or access to an Internet café all have the same basic access to overall research information that anyone has. My best access was some library, and it did not have all that much stuff.' (p. 152)

The Google debate caused much unwarranted confusion and panic for information professionals that could be eliminated. There should be a taxonomy developed to clear up the confusion over Internet information resources. A taxonomy would clearly demarcate information types so that the discussion would not compare apples and oranges. The telephone book was a different information type than the *New England Journal of Medicine*. Google could be considered similar to the telephone book in that it was a conduit to, not replacement for, other

information types. Google was helpful in speeding up the search process for information, but was not the information itself. Therefore, there would be a continued role for libraries.

For years medical libraries were guided in collection development by selection tools, such as the *Brandon/Hill Selected List of Print Books and Journals for the Small Medical Library* (Hill & Stickell, 2001). When information resources began shifting to a digital format, there was no standard collection tool to guide the collection of electronic resources. Because of this, studies, such as this dissertation, were needed to use limited QCOML financial resources wisely so as to obtain the information products that would best satisfy residents' information needs at the lowest cost.

Summary

The medical library profession needed to do a better job of building information systems that were responsive to the needs of the 21st century physician. Information systems should be sensitive to the learning needs of physicians; be highly relevant and valid; be quickly and easily accessible; make the best use of technology without requiring users to be technology experts; be available in the clinical setting; and answer commonly seen clinical questions. Ebell and Shaughnessy (2003) stated:

Learning occurs best in adults when they have a high need for the information being presented to them and when they have control over the type of information they are receiving. It makes the most sense, then, to provide new information in a manner that can be rapidly assimilated and at a time when it can be used immediately. (p. s60-61)

This presented a challenge for the medical librarian.

Yet, no matter how much technology changed the role of the medical librarian, the need to provide old-fashioned personal service still existed. Technology would increase, not decrease, this need. Smith (1996) stated:

The need for information is often much more than a question about medical knowledge. Doctors are looking for guidance, psychological support, affirmation, commiseration, sympathy, judgment and feedback. This “information need” is particularly poorly explored, and yet it may well be the most important need and the biggest stumbling block to a technical solution. (p. 1066)

Providing doctors who were looking for medical knowledge guidance, psychological support, affirmation, commiseration, sympathy, judgment and feedback was what medical librarians traditionally offered. This dissertation investigated how well QCOML librarians were meeting this particularly poorly explored information need among the population of ETSU medical residents. Assessments by information providers like QCOML should be made regularly to ensure quality of service because of the constantly changing face of clinical information and its importance to physicians and their patients. The reason there was a need for assessment of library users such as in this project was given by Abromitis et al. (2003): “The availability of remote access to electronic library resources and services has affected the interactions between library users and librarians, reducing librarians’ knowledge of users’ information retrieval skills and training needs” (p. 101). Therefore, an assessment such as this one was especially important.

CHAPTER 3

METHODS AND PROCEDURES

Introduction

Chapter 3 contains a description of the 1.) research design; 2.) instrument development, including a.) survey instrument one, b.) survey instrument two, c.) goal of survey instruments, d.) validation of survey instruments, e.) survey sampling coverage and non-response error, f.) choice of survey instrument questions, and g.) pilot testing and surveying technique; 3.) population; 4.) quantitative data analysis and; 5.) summary.

Research Design

The focus of this study was the information-seeking behaviors, information skills, training and resources of ETSU resident physicians. The goal of this study was to acquire quantitative information pertaining to the four foci of the study through survey instruments. The quantitative survey questions were submitted to the ETSU IRB.

Population

The population for the study was all of the East Tennessee State University Quillen College of Medicine residents who were enrolled in a residency program in the spring of 2006 and their attending physicians. ETSU had nine residency programs: Bristol Family Medicine, Johnson City Family Medicine, Kingsport Family Medicine, Internal Medicine, Obstetrics and Gynecology, Pathology, Pediatrics, Psychiatry and Surgery. There were approximately 236

medical residents at ETSU in 2005-2006 according to the *ETSU Fact Book*. The 19 fellows were not included in the study for a total population of 217.

Instrument Development

Data were obtained by the use of two survey instruments (See Appendices A, B, and C).

Survey Instrument One

The first survey asked residents questions about the four major sections of the study. These four areas were discussed in the literature in Chapter 2. The survey instrument was derived from relevant topics in the literature regarding residents and their use of clinical information. An almost identical survey was administered to full-time ETSU attending physicians. The purpose for surveying attending physicians was: 1) to compare how the residents evaluated themselves with how the attending physicians evaluated the residents in order to determine if the attending physicians were operating under false assumptions about the residents' information skills and 2) to determine the information behaviors, skills, training preferences, and electronic resource ratings of attending physicians, because they were the primary teachers of and curriculum designers for the residents' training. It was assumed that poor information habits in attending physicians would be replicated in residents.

Survey Instrument Two

The second survey was administered to ETSU residents and attending physicians. This survey listed databases found on the QCOML Web Portal (<http://com.etsu.edu/medlib/links.asp?CatId=65>). The respondents were asked to rate the clinical

value of the databases on a “1” - “7” Likert-type rating scale. The purpose of the survey was for QCOML to obtain feedback regarding the electronic information resources it purchased. The survey did not ask for evaluations of the electronic information resources provided by the three teaching hospital systems in which the residents worked.

Goal of Survey Instruments

The goal of the two survey instruments was to discover information that would lead to better user satisfaction with QCOML information resources and services, thus, measuring QCOML quality. Miller (2004) stated, “If satisfaction is a measure of how well the experience of the library service equates to the client’s needs then satisfaction can be a measure of quality” (p. 126). One aspect of satisfaction and quality was gaining a better understanding of the clients’ information-seeking behaviors. Carr (2006) underscored this idea: “It is more than ever necessary to understand what library users say they want; and the research that entails should be an integral part of a professional approach to library service planning”.

(<http://www.ariadne.ac.uk/issue46/carr/intro.html>)

Validation of Survey Instruments

The survey instruments were evaluated by an educational methodology expert and a medical information expert. The medical expert was an M.D. researcher who had profound knowledge of the literature regarding physicians and the use of information. The educational methodology expert was used to determine content validity, which Creswell defined as, “items measure[ing] the content they were intended to measure” (p. 157). The educational methodology expert was an Ed.D. with professional experience in survey research.

Sampling, Coverage and Non-response Error

Dillman (2000) warned of sampling, coverage, measurement, and nonresponse errors. Even though surveys were sent to the entire population of residents and attending physicians, there was less than a 100% response. Efforts were undertaken to insure that the responses were representative. Coverage error is “not allowing all members of the survey population to have an equal or known nonzero chance of being sampled for participation in the survey” (Dillman, 2000, p. 11). This was addressed by distributing the survey in multiple ways, such as by campus mail, personal contact, email, and telephone. Measurement error was “the result of poor question wording or questions being presented in such a way that inaccurate or uninterpretable answers are obtained” (Dillman, 2000, p. 11). This source of error was dealt with by pilot testing both instruments with residents and attending physicians.

Nonresponse error was “the result of people who respond to a survey being different from sampled individuals who do not respond, in a way relevant to the study” (Dillman, 2000, p. 11). Efforts were made to avoid this by offering the survey in different ways, such as paper, email, and in person.

Choice of Questions

In one survey of residents’ information usage, Forrest and Robb (2000) stated, “The intention was to look at information needs in the widest sense rather than confine the study to the use of libraries” (p. 130). This was the goal of this questionnaire as well.

Demographic Questions. The first part of each survey asked for basic demographic information. Like Forrest and Robb’s survey, this questionnaire asked respondents for gender, residency year, and specialty. This was important according to Casebeer et al. (2002), because

“[d]emographic characteristics, experience, salience and beliefs are individual factors that may affect information-seeking behavior” (p. 35). According to Miller (2004), “The instrument must include some demographic questions to enable responses from different user groups to be divided. This may also enable you to identify services important to different groups, and which need to be better marketed or developed” (p. 128).

Information Behavior Questions. Multiple researchers, such as Green, Ciampi, and Ellis (2000), investigated the frequency with which physicians had information needs, how often they sought an answer, and how often they found an answer. This was the basis for the questions, “How frequently do you have a clinical information need?”; “What percent of these information needs do you look for an answer?”; and “What percent of the ones that you look for an answer do you find an answer?”

The questions, “How would you characterize the clinical value of the information received from the ETSU Medical library (electronic or print)?” and “Did information you utilized from the ETSU Medical Library (electronic or print) ever change (followed by a list of outcomes)” were based on the Rochester study (Marshall, 1992). These questions made it necessary to ask if they used QCOML and, if so, how frequently. Questions such as, “What kind of sources best meet your information needs?” and “What is the greatest barrier to your use of clinical information?” were common in information needs surveys (Andrews, Pearce, Ireson, & Love, 2005; Lundeen, Tenopir & Wermager, 1994; Wallace, 1998).

The following question was taken from Nylenna and Aasland (2000) with permission: “The increasing body of information- a) makes me a better doctor in my daily work; b) does steal time from non-professional activities; c) gives me a feeling of powerlessness towards colleagues;

d) gives me a feeling of professional impotence; e) gives me a feeling of better professional control; f) gives me a feeling of powerless towards patients; g) makes me a better researcher.”

Several articles in the literature cited usage statistics of PDAs by physicians. For example, Borzo (2005) reported, “According to Forrester (Research Inc. of Cambridge, Mass.) half of US physicians owned a PDA in 2004, compared with 14% of the population overall” (p.5). The questions, “If you use a PDA, in what ways do you use it? Epocrates or other drug database; InfoRetriever; Medical calculators; Patient tracking; Reference books, such as the *Washington Manual*, *5-Minute Clinical Consult*; Other” and “If you do not use a PDA, do you expect to begin using one?” were adapted from the Kentucky Ambulatory Network Members’ Use of Information Technology Practitioner Survey (Andrews et al., 2005). Barrett, Strayer, and Schubart (2004) specifically surveyed residents’ use of PDAs.

Information Skills Questions. PDA use could be understood as a behavior or a skill, which was the reason for the question, “Rate your skill as a PDA user.” Although this question and the question, “Rate your skills/ knowledge of evidence-based medicine” were asking the respondents to self-evaluate, this information was valuable. A person’s perception of reality and actual reality were both useful to know. Also the question, “Rate your skills/ knowledge of evidence-based medicine” was compared with the attending physicians’ evaluation of the residents on the same question and was compared with the answers from the questions derived from the Fresno test. The questions, “The best type of study for a prognosis question is?” and “The best type of study for a therapy question is?” were taken from the “Fresno Test of Evidence-Based Medicine.” According to Ramos et al. (2003), “The Fresno test is the first

standardized, objective measure of ability in evidence based medicine that requires learners to demonstrate knowledge and skill” (p. 321).

The question, “How important do you believe evidence-based medicine is in providing optimum patient care?” was taken from Byrnes, Kulick, and Schwartz (2004) with permission. The questions about off-campus access and email were added because in training sessions, residents often did not know how to access QCOML databases from off-campus. In order to do so, residents had to know how to activate their email accounts. A question on LoansomeDoc was included because it was an important tool for community physicians to use in order to receive full-text journal articles quickly from a medical library (Paden et al., 2001).

Information Training Questions. The questions, “Have you received clinical information training from attending physicians?” and “Have you received clinical information training from librarians?” were included because the literature reported that residents were unskilled clinical information users (Green & Ruff, 2005), which could indicate inadequate training. The questions “How important would an orientation to ETSU College of Medicine library resources and services be to you?”; “How much time would you be willing to spend on such an orientation?”; “Please indicate which day(s) of the week you would prefer to attend an orientation;” and “Which of the following would you like to see included in a library orientation?” were taken from Abromitis et al. (2003) with permission. The question, “Would you like to have a CML for your program?” was used to aid QCOML in deciding whether or not to have CMLs attached to all nine ETSU residency programs, based on the active discussion of the topic in the literature. QCOML’s 3-year trial of a CML program in one residency program was reported in an unpublished paper presented at the 2004 ETSU Primary Care Research Day Conference

(Wallace, 2004). Seventy-six percent of the residents surveyed in this trial program reported that information they obtained from the CML contributed to higher quality care.

Information Resources Questions. Feedback concerning the library's electronic resources came from survey two. However, the service of the library staff was a resource as well. Therefore, questions were included in survey one that asked the residents to rate the service they received from the libraries they used, including the three hospital libraries. The question, "What three things would you like to see changed/introduced to improve your health information access and use?" was taken from Lundeen et al. (1994) with permission.

Pilot Testing

The surveys were pilot tested with seven residents and attending physicians from several programs. Dillman (2000) stated, "Pilot studies frequently result in substantial revisions being made in the survey design from adding additional contacts or an incentive to improve response rates, to eliminating or adding survey questions" (pp. 146-147). A critique form was given to pilot testers to note changes that should be made to the instruments (Appendix F). According to Miller (2004), "Key representative clients need to be identified and interviewed. If you interview key clients from each user group, it may be possible to develop an instrument that uses the same criteria for all user groups to be surveyed" (p. 126).

Surveying Technique

The survey instruments were mailed using the techniques of Dillman (2000). The first contact was to send a pre-notice letter (See Appendix G) to all ETSU residents and attending physicians by campus mail. The second contact was multi-pronged. The survey instrument was sent to all ETSU residents and attending physicians by campus mail. All those invited to take part

in the surveys were asked to return the surveys using a campus mail envelope that was included and labeled with the medical library's campus mail address. A cover letter was sent with each survey. (See Appendix E). In the same time frame, the residents and attending physicians were addressed at residency noon conference meetings and the surveys were administered there. The survey was sent by email as well.

Following this, a third contact was made by sending thank-you notes by campus mail to all ETSU residents and attending physicians, encouraging them to return the survey if they had not done so. Three weeks after the first survey was sent, a replacement questionnaire was sent to those who failed to return the first. At this point, non-responders were approached in person to encourage them to return the completed survey whenever possible. Department chairs were asked to include a letter with the survey, encouraging the residents and attending physicians to participate (See Appendix H).

Only completed surveys were used. No respondents' names were on the surveys. The mailed surveys were numbered with each resident and attending physician assigned a number that was recorded in an identification table. All personal information was stripped before the data analysis was performed. A third party entered the results of completed surveys into a database. The goal for the project was to achieve a 50% retrieval rate. Efforts were made to insure that no residency program was underrepresented in the results. A small token of appreciation (an ETSU Division of Health Sciences bumper sticker) was sent with each survey (Dillman, 2000). A chart illustrating how the survey questions were related to the papers foci can be found in Appendix D.

Quantitative Data Analysis

Quantitative analysis was performed with the SPSS (v. 14.0 for Windows) software program. The results were expressed in percents in graphical or tabular form. The data were analyzed using descriptive statistics (frequencies, mean, median and mode). The inferential statistics Kruskal-Wallis, Mann-Whitney-U, and Chi-square were used to analyze differences and relationships, such as: differences between residents and attending physicians; differences within residents by program; and relationships between answers to different questions. Non-parametric tests were used because the data were either nominal or ordinal. The chronological steps of the research methodology are shown in Figure 1.

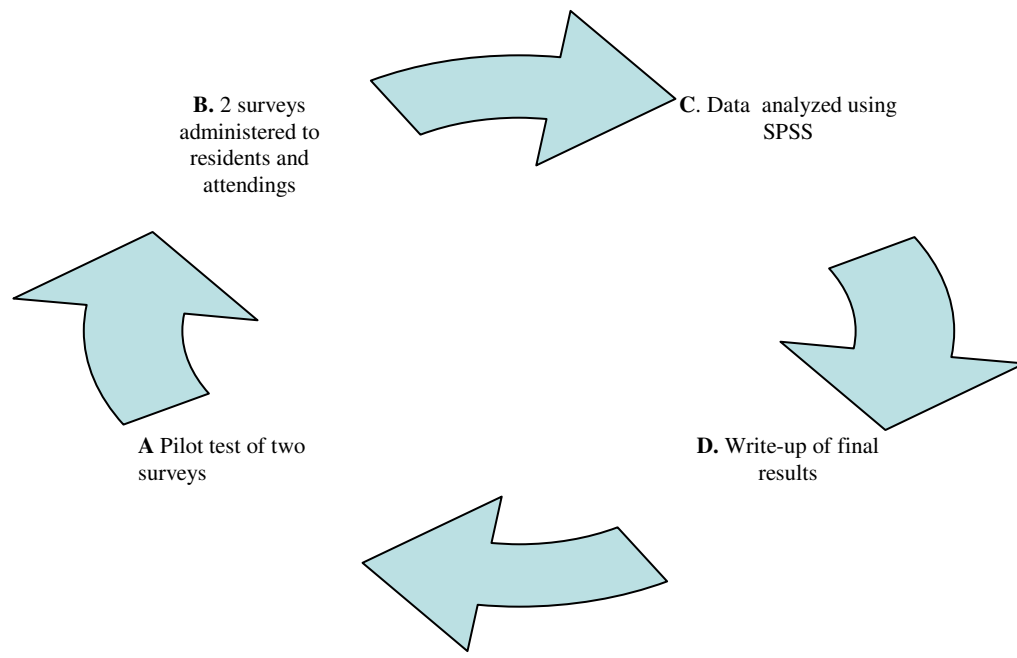


Figure 1. Chronological Steps in Research Methodology

Summary

Two survey instruments were administered to ETSU medical residents and attending physicians. This information was examined using quantitative analysis. The two surveys provided insight into current information-seeking behaviors, information skills, information training experiences, and valuation of information resources by ETSU medical residents.

CHAPTER 4

RESULTS AND ANALYSIS OF DATA

Overview

The focus of this study was the information-seeking behaviors, information skills, training, and resources of ETSU resident physicians and their attendings. This population included a major segment of the ETSU Quillen College of Medicine. Residents had unique information needs, which were not properly understood nationally or locally. The major sections of this chapter are: 1.) Description of Population and Respondents; 2.) Information-Seeking Behaviors of Residents; 3.) Information Skills of Residents; 4.) Information Training of Residents; 5.) Information Services for Residents; and 6.) Evaluation of Library Electronic Resources.

Description of Population and Respondents

The goal of the study was to achieve a 50% return of surveys. There were 217 residents from the 2005-2006 class surveyed. This population was compiled from lists received from the clinical departments and departmental Web pages. Fellows were not included. There were 105 surveys returned for a 48% response rate (See Table 2). ETSU medical faculty who worked with residents were also surveyed. They were referred to as the clinical faculty or attending physicians. The survey was almost identical to the residents' survey; however, there were additional questions that asked the clinical faculty to rate the residents as well as themselves in certain areas. Names of clinical faculty were compiled from faculty Web sites and lists from departmental secretaries. An effort was made to include only M.D.s or D.O.s (Osteopaths) who

were employed by the university and had a role in the training of residents. The names of 140 clinical faculty members were obtained. Responses were returned by 44 faculty physicians (31.4%). The response rate of faculty was broken down by specialty (See Table 2).

Table 2

Response Rate of Residents and Faculty by Residency Program

| Program | Residents- <i>f</i> of Responses | Residents- % of Total Respondents | Faculty- <i>f</i> of Responses | Faculty- % of Total Respondents |
|---------------------------|--|---|--------------------------------------|---------------------------------------|
| Family Medicine (3 sites) | 38 | 36.2 | 13 | 29.5 |
| Internal Medicine | 18 | 17.1 | 15 | 34.1 |
| Obstetrics/Gynecology | 5 | 4.8 | 3 | 6.8 |
| Pathology | 5 | 4.8 | 2 | 4.5 |
| Pediatrics | 7 | 6.7 | 5 | 11.4 |
| Psychiatry | 12 | 11.4 | 1 | 2.3 |
| Surgery | 20 | 19.0 | 5 | 11.4 |
| Total | 105 | 100.0 | 44 | 100.0 |

An effort was made to get an adequate return from each of the seven ETSU residency programs. It was hoped not only to obtain a 50% return from the total population, but also a 50% return from each of the seven programs in order to avoid missing different perspectives that might exist in the different programs (See Table 3). Because only 26.1% of Internal Medicine residents responded, a goodness of fit chi-square test was done by residency ($\chi^2 = 11.735$, $df = 6$,

$p = .068$). The results were not significant. A chi-square test was run to determine if the responses to the faculty survey were representative of the whole population. The sample was representative ($\chi^2 = 9.548$, $df = 6$, $p = .149$).

Table 3

Respondents as Percent of Total Number of Residents and Faculty in Each Program

| Program | Residents- <i>f</i> of Responses | Total Number of Residents in Program | % of Residents in Program Who Responded | Faculty- <i>f</i> of Responses | Total Number of Faculty in Program | % of Faculty in Program Who Responded |
|-----------------------------------|--|--|---|--------------------------------------|---|---|
| Family Medicine: 3 programs | 38 | 66 | 57.6 | 13 | 21 | 61.9 |
| Internal Medicine | 18 | 69 | 26.1 | 15 | 50 | 30.0 |
| Ob/Gyn | 5 | 8 | 62.5 | 3 | 8 | 37.5 |
| Pathology | 5 | 9 | 55.6 | 2 | 9 | 22.2 |
| Pediatrics | 7 | 11 | 63.6 | 5 | 22 | 22.7 |
| Psychiatry | 12 | 25 | 48.0 | 1 | 13 | 7.7 |
| Surgery | 20 | 29 | 69.0 | 5 | 17 | 29.4 |
| Total | 105 | 217 | 48.4 | 44 | 140 | 31.4 |

Roughly one third of the residents were interns, one fourth second year, and one fourth third year. Some residency programs were 3-year programs, while others were 4 or 5 years (See Table 4).

Table 4

Year of Residency:

| Year | <i>f</i> | % | Cumulative % |
|----------------|----------|-------|--------------|
| No Response | 3 | 2.9 | 2.9 |
| PGY 1 (Intern) | 34 | 32.4 | 35.2 |
| PGY 2 (Junior) | 26 | 24.8 | 60.0 |
| PGY 3 (Senior) | 29 | 27.6 | 87.6 |
| PGY 4 | 12 | 11.4 | 99.0 |
| PGY 5 | 1 | 1.0 | 100.0 |
| Total | 105 | 100.0 | |

Approximately 41% of the residents indicated they were female and 58% were male. A goodness of fit test was done by gender. Distributions of respondents did not differ significantly from the population ($\chi^2 = 1.057, p = .304$). The faculty respondents who indicated gender were 26% female and 74% male (See Table 5). The actual percent of male residents for this class was 63.6% and the actual percent of male faculty was 66.2%.

Table 5

Gender of Resident and Faculty Respondents

| Gender | <i>f</i> - | %- | % of | <i>f</i> – | %- | % of |
|-----------|------------|-----------|-------------|------------|---------|-------------|
| | Residents | Residents | Respondents | Faculty | Faculty | Respondents |
| No answer | 6 | 5.7 | | 9 | 20.5 | |
| Female | 41 | 39.0 | 41.4 | 9 | 20.5 | 25.7 |
| Male | 58 | 55.2 | 58.6 | 26 | 59.1 | 74.3 |
| Total | 105 | 100.0 | 100.0 | 44 | 100.0 | 100.0 |

Information-Seeking Behaviors of Residents

The first research question was, “What are the information-seeking behaviors of current ETSU medical residents and their attendings?” The results from this study showed that 69.5% of ETSU residents had at least one information need for every three patients seen. Over 80% of the faculty estimated that residents had at least one information need for every three patients seen compared to 69.5% of the residents who said they had at least one new information need for every three patients seen. This was not a statistically significant difference ($\chi^2 = 6.81, p = .146$) (See Table 6).

Table 6

How Frequently Do You Have a Clinical Information Need?

| Frequency of Need | Residents | | Cumulative | Faculty | | Cumulative |
|-------------------------------|-----------|-------|------------|----------|-------|------------|
| | <i>f</i> | % | % | <i>f</i> | % | % |
| 1 or more every patient | 22 | 21.0 | 21.0 | 13 | 29.5 | 29.5 |
| 1 every 2 patients | 19 | 18.1 | 39.0 | 14 | 31.8 | 61.4 |
| 1 every 3 patients | 32 | 30.5 | 69.5 | 9 | 20.5 | 81.8 |
| 1 every 4 patients | 12 | 11.4 | 81.0 | 4 | 9.1 | 90.9 |
| 1 every 5 or more patients | 20 | 19.0 | 100.0 | 4 | 9.1 | 100.0 |
| Total | 105 | 100.0 | | 44 | 100.0 | |

To test whether there was a difference between residency programs in regards to the question, “How frequently do you have a clinical information need,” a chi-square test was used. At a .001 significance level, there was a relationship between the residency program and the frequency of information need ($\chi^2 = 52.774$, $df = 24$). In order to measure the strength of the relationship, the Cramer’s *V* test was employed. At a significance level of .001, there was a

moderate correlation between type of resident and frequency of information need (Cramers $V = .354$).

Residency programs' frequency of information need was compared (See Table 7).

There were some statistically significant differences between specific residency programs and frequency of clinical information need. Pathology had an information need less often than Family Medicine, Internal Medicine, and OB-GYN. Pediatrics had an information need more often than Family Medicine, Pathology, OB-GYN, Psychiatry, and Surgery. Overall, Pediatrics had the most frequent information needs and Surgery had the least (See table 7a).

Table 7

Results for Pairwise Comparisons Regarding Residency Type and Frequency of Clinical Information Need. (Residents)

| Comparison | χ^2 | p -value | Cramer's V |
|---------------------------------|----------|------------|--------------|
| Family Medicine vs. Pathology | 12.62 | .013 | .54 |
| Family Medicine vs. Pediatrics | 12.05 | .017 | .52 |
| Internal Medicine vs. Pathology | 10.13 | .038 | .66 |
| OB/GYN vs. Pathology | 7.00 | .030 | .84 |
| OB/GYN vs. Pediatrics | 8.91 | .012 | .86 |
| Pathology vs. Pediatrics | 9.94 | .007 | .91 |
| Pediatrics vs. Psychiatry | 11.63 | .009 | .78 |
| Pediatrics vs. Surgery | 12.12 | .016 | .67 |
| Overall | 52.77 | .001 | .35 |

Table 7a

Frequency of Information Need by Residency Program.

| | Need every 1 or 2 patients | | Need every 3, 4, or, 5 patients | | Total |
|--------------|----------------------------|------|---------------------------------|-------|----------|
| Program | <i>f</i> | % | <i>f</i> | % | <i>f</i> |
| Family Med | 29 | 56.9 | 22 | 43.1 | 51 |
| Internal Med | 20 | 60.6 | 13 | 39.4 | 33 |
| OB/GYN | 0 | 0.0 | 8 | 100.0 | 8 |
| Pathology | 0 | 0.0 | 7 | 100.0 | 7 |
| Pediatrics | 9 | 75.0 | 3 | 25.0 | 12 |
| Psychiatry | 3 | 23.1 | 10 | 76.9 | 13 |
| Surgery | 7 | 45.6 | 18 | 72.0 | 25 |

The number of respondents to the question, “Rank the type of clinical information need you have most frequently,” was 60 not 105 because of an error in distributing surveys. Some surveys were accidentally sent out without this question; therefore, a smaller representation of the population was offered the opportunity to respond. Thus, data were lacking for surgery residents. Almost 50% of the residents indicated that the most frequent type of clinical information need they had was for drug information. Therapy information was reported as the second most frequent type of clinical information needed by the greatest number of residents (30%). Diagnostic information was reported as the third most frequent type of clinical information needed by the greatest number of residents (23.3%) (See Table 8).

The faculty perception was that the type of information most frequently needed in the clinic by residents was diagnostic information (50%). Faculty posited that therapy information was the second most frequently needed type of information by residents (36.1%), and drug information (36.1%) the third most frequently needed type of information. There were significant differences between residents and faculty perception of residents on drug information and also for etiology information. Residents ranked drug information significantly higher than faculty ($\chi^2 = 14.86$, $p = .001$). Faculty ranked etiology information significantly higher than residents ($\chi^2 = 6.35$, $p = .042$).

Table 8

Residents' Information Needs Ranked By Frequency of Type of Information Need Compared To Faculty Perceptions of Residents'

Information Needs Ranked By Frequency of Type of Information Need (N = 60 for residents; N = 36 for faculty)

| Information Type | Frequency of Residents Information Need Type- % | | | | Faculty Perceptions-Residents Information Need Type -% | | | |
|------------------|---|------|------|----------|--|-------|-------|----------|
| | #1 | #2 | #3 | Combined | #1 | #2 | #3 | Combined |
| Diagnostic | 26.7 | 26.7 | 23.3 | 76.7 | 50.0 | 27.8 | 8.3 | 86.1 |
| Drug | 48.3 | 15.0 | 15.0 | 78.3 | 11.1 | 25.0 | 36.1 | 72.2 |
| Economic | 3.3 | 1.7 | 1.7 | 6.7 | 0 | 0 | 2.8 | 2.8 |
| Etiology | 0 | 8.3 | 8.3 | 16.7 | 8.3 | 2.8 | 5.6 | 16.7 |
| Patient Ed | 0 | 3.3 | 11.7 | 15.0 | 2.8 | 0 | 11.1 | 13.9 |
| Prognosis | 1.7 | 8.3 | 18.3 | 28.3 | 0 | 8.3 | 13.9 | 22.2 |
| Therapy | 20.0 | 30.0 | 20.0 | 70.0 | 27.8 | 36.1 | 22.2 | 86.1 |
| Other | 0 | 0 | | 3.3 | 0 | 0 | 0 | 0 |
| Total | 100.0 | 93.3 | 98.3 | | 100.0 | 100.0 | 100.0 | |

The second information behavior analyzed was the frequency with which residents actively sought an answer to their information needs in the clinic. In this study, 47.1% of the residents who responded indicated that they sought an answer for their clinical questions at least 50% of the time (See Table 9). A chi-square test was performed to determine if ETSU residents sought answers more frequently because they used PDAs that would enable them to find an answer with less effort. However, this was not true. ($\chi^2 = 11.360$). The faculty physicians asserted that 47.6% of their residents (compared with the 47.1% actually reported by the residents) looked for an answer at least 50% of the time (See Table 9).

Table 9

What Percent of These Information Needs Do You Look For an Answer? Residents' Responses & Faculty Perceptions of Responses

| % of Information Needs- Answer Sought | <i>f</i> Res | <i>f</i> Fac | % Res | % Fac | Cumulative % Res | Cumulative % Fac |
|---------------------------------------|--------------|--------------|-------|-------|------------------|------------------|
| 0-10% | 4 | 1 | 3.8 | 2.3 | 3.8 | 2.4 |
| 10-20% | 5 | 2 | 4.8 | 4.5 | 8.7 | 7.1 |
| 20-30% | 9 | 8 | 8.6 | 18.2 | 17.3 | 26.2 |
| 30-40% | 15 | 7 | 14.3 | 15.9 | 31.7 | 42.9 |
| 40-50% | 22 | 4 | 21.0 | 9.1 | 52.9 | 52.4 |
| 50-60% | 15 | 4 | 14.3 | 9.1 | 67.3 | 61.9 |
| 60-70% | 14 | 6 | 13.3 | 13.6 | 100.0 | 100.0 |
| 70-80% | 5 | 4 | 4.8 | 9.1 | 85.6 | 85.7 |
| 80-90% | 9 | 3 | 8.6 | 6.8 | 94.2 | 92.9 |
| 90-100% | 6 | 3 | 5.7 | 6.8 | 100.0 | 100.0 |
| No Response | 1 | 2 | 1.0 | 4.5 | | |
| Total | 105 | 44 | 100.0 | 99.9 | 100.0 | 100.0 |

Note: Res = Residents Fac = Faculty

For those residents who sought an answer to their clinical questions, 80% indicated that they found an answer at least 50% of the time (See Table 10). In order to know which residency programs needed training programs designed, it was important to determine if any residency program was not being successful in finding answers. The Pearson chi-square test indicated that there was a significant difference at $p = .008$. for residency program and the success in finding an answer. Using the Cramer's V statistic, it was shown that the relationship was moderate (.36). A cross-tabulation table revealed that only 52.6% of Surgery residents , 60% of Obstetrics/Gynecology residents, 71.4% of Pediatrics residents, over 80% of Pathology and Family Medicine residents, and over 90% of Psychiatry and Internal Medicine residents found an answer at least 50% of the time. The faculty postulated that 77.3% (compared with 80% reported by the residents) of their residents found an answer from the literature at least 50% of the time.

Table 10

Percent of Questions in Which Answer Found: Residents' Responses and Faculty's Perceptions of How Residents Would Respond

| | <i>f</i> Residents | <i>f</i> Faculty | % Residents | % Faculty | Cumulative % Residents | Cumulative % Faculty |
|-------------|--------------------|------------------|-------------|-----------|------------------------|----------------------|
| 0-10% | 2 | 0 | 1.9 | 0 | 1.9 | 0 |
| 10-20% | 2 | 0 | 1.9 | 0 | 3.8 | 0 |
| 20-30% | 6 | 2 | 5.7 | 4.5 | 9.5 | 4.5 |
| 30-40% | 5 | 5 | 4.8 | 11.4 | 14.3 | 15.9 |
| 40-50% | 6 | 3 | 5.7 | 6.8 | 20.0 | 22.7 |
| 50-60% | 9 | 1 | 8.6 | 2.3 | 28.6 | 25.0 |
| 60-70% | 2 | 7 | 1.9 | 15.9 | 30.5 | 40.9 |
| 70-80% | 19 | 13 | 18.1 | 29.5 | 48.6 | 70.4 |
| 80-90% | 37 | 9 | 35.2 | 20.5 | 83.8 | 90.9 |
| 90-100% | 16 | 3 | 15.2 | 6.8 | 99.0 | 97.7 |
| No Response | 1 | 1 | 1.0 | 2.3 | 100.0 | 100.0 |
| Total | 105 | 44 | 100.0 | 100.0 | 100.0 | 100.0 |

One behavior that was very important to this study was the importance of QCOML in meeting the information needs of residents (See Table 11). Approximately three fourths of residents used the QCOML resources; whereas, 93.2% of the faculty used the resources of the ETSU Medical Library (See Table 11).

Table 11

Do You Use the Resources of the ETSU Medical Library (Electronic or Print)?

| Response | <i>f</i> Residents | <i>f</i> Faculty | % Residents | % Faculty |
|----------|--------------------|------------------|-------------|-----------|
| Yes | 80 | 41 | 76.2 | 93.2 |
| No | 25 | 3 | 23.8 | 6.8 |
| Total | 105 | 44 | 100.0 | 100.0 |

For residents, the rate of library usage was not consistent among the different programs. Forty percent of Surgery residents, 60% of Pathology residents, 75% of Psychiatry residents, 77.8% of Internal Medicine residents, 80% of Obstetrics/Gynecology residents, 92.1% of Family Medicine residents, and 100% of Pediatric residents used the library (See Table 12). The relationship between residency program and use of library was significant at .001 using chi-square and was moderately strong (.465) as determined by Cramer's *V*.

Table 12

Residents- Do You Use the Resources of the ETSU Medical Library (Electronic or Print)? Cross-Tabulation

| Residency Program | Yes % | No % | Total % |
|-----------------------|-------|------|---------|
| Family Medicine | 92.1 | 7.9 | 100 |
| Internal Medicine | 77.8 | 22.2 | 100 |
| Obstetrics/Gynecology | 80.0 | 20.0 | 100 |
| Pathology | 60.0 | 40.0 | 100 |
| Pediatrics | 100.0 | 0 | 100 |
| Psychiatry | 75.0 | 25.0 | 100 |
| Surgery | 40.0 | 60.0 | 100 |

Of those residents who noted that they used the resources of QCOML, 63% indicated they used the library's resources daily or weekly (See Table 13). However, this was only 48.6% of the total number of respondents. For faculty, 71% of those who used the resources of QCOML used it at least weekly. Two thirds of the total faculty respondents used it at least weekly (See Table 13). The difference between residents and faculty was statistically significant at $p = .015$ (Pearson $\chi^2 = 5.87$). However, the faculty had research and writing responsibilities that residents did not have, therefore, a greater need to use the library.

Table 13

Residents- If Yes, How Frequently Do You Use the Resources of the ETSU Medical Library (Electronic or Print?)

| | <i>f</i> | <i>f</i> | % | % | Cumulative | Cumulative | Cumulative | Cumulative |
|-----------------|----------|----------|---------|---------|------------|------------|-------------|-------------|
| <i>f</i> of Use | Res | Fac | All Res | All Fac | % Res | % Fac | % Res Users | % Fac Users |
| Daily | 17 | 8 | 16.2 | 18.2 | 16.2 | 18.2 | 21.0 | 19.5 |
| Weekly | 34 | 21 | 32.4 | 47.7 | 48.6 | 65.9 | 63.0 | 70.7 |
| Monthly | 26 | 8 | 24.8 | 18.2 | 73.4 | 84.1 | 95.1 | 90.2 |
| Yearly | 4 | 4 | 3.8 | 9.1 | 77.2 | 93.2 | 100.0 | 100.0 |
| No | 24 | 3 | 22.9 | 6.8 | 100.0 | 100.0 | | |
| Response | | | | | | | | |
| Total | 105 | 41 | 100.0 | 100.0 | 100.0 | 100.0 | | |

Note: Res = Residents Fac = Faculty

Not only was a focus of this research interested in finding out how many residents used the library and the frequency with which they used it but also if the information they found was helpful in answering their clinical questions. The results from the same questions were obtained from the faculty. None of the differences between residents and faculty were statistically significant using a chi-square test (See Tables 14 and 15).

Table 14

How Would You Characterize the Clinical Value of the Information Received From the ESTU Medical Library?

| Information from QCOML: | Resident | Faculty | Resident | Faculty | Resident | Faculty |
|--|-----------|-----------|----------------|----------------|----------|---------|
| | Total | Total | Agree <i>f</i> | Agree <i>f</i> | Agree % | Agree % |
| | Responses | Responses | | | | |
| It refreshed my memory of details and/or facts | 81 | 41 | 80 | 41 | 98.8 | 100.0 |
| I found most of it irrelevant | 79 | 40 | 21 | 8 | 26.6 | 20.0 |
| It did (or will) contribute to higher quality care | 78 | 40 | 78 | 40 | 100.0 | 100.0 |
| Some of it was new to me | 79 | 41 | 74 | 40 | 93.7 | 97.6 |
| I found little or nothing of clinical value | 78 | 40 | 4 | 0 | 5.1 | 0 |
| It substantiated what I already knew or suspected | 78 | 38 | 69 | 30 | 88.5 | 78.9 |
| On the whole, it was inaccurate or out of date | 77 | 38 | 4 | 0 | 5.2 | 0 |
| It did or will contribute to better clinical decisions | 80 | 40 | 79 | 39 | 98.8 | 97.5 |

Table 15

Did Information You Used From the ETSU Medical Library (Electronic Or Print) Ever Change (Clinical Situations):

| Change | Resident Responses | Faculty Responses | Resident Yes <i>f</i> | Faculty Yes <i>f</i> | Resident Yes % | Faculty Yes % |
|---|-----------------------|----------------------|--------------------------|-------------------------|-------------------|------------------|
| How you handled a clinical situation | 80 | 41 | 66 | 38 | 82.5 | 92.7 |
| Diagnosis | 78 | 40 | 56 | 30 | 71.8 | 75.0 |
| Choice of tests | 78 | 40 | 67 | 32 | 85.9 | 80.0 |
| Choice of drugs | 78 | 40 | 70 | 35 | 89.7 | 87.5 |
| Choice of other treatment | 77 | 40 | 64 | 34 | 83.1 | 85.0 |
| Length of stay (reduce) | 75 | 39 | 33 | 13 | 44.0 | 33.3 |
| Post-hospital care or treatment | 76 | 40 | 52 | 26 | 68.4 | 65.0 |
| Advice given to the patient | 77 | 40 | 60 | 33 | 77.9 | 82.5 |

The residents' information behaviors previously reported were 1) frequency of clinical information need; 2) most common type of information need; 3) tendency for residents to seek answers for clinical questions; 4) tendency for residents to find an answer for their clinical questions; 5) the role of QCOML in answering these information needs; 6) and the clinical value

of the information retrieved from QCOML. Another important information behavior of physicians researched and reported in the literature queried the source of information that physicians most frequently consulted. This information was gathered from ETSU residents and faculty (See Table 16). There was no statistically significant difference between residents and faculty using chi-square in Table 16. Electronic information was the best source of information for residents and faculty (See Table 16). Almost 60% of residents and 68.2% of faculty rated electronic information first. The next best source for residents (28.6%) and for faculty (38.6%) was print journals. Print books were rated the third best source of information by most residents (22.9%). CME was rated the third best source by the greatest number of faculty (22.7%). Using chi-square, no relationship between the type of resident and the type of information source preferred was found at $p = .05$.

Table 16

Residents- What Kind of Sources Best Meet Your Information Needs?

| | Most Important Source | | | | 2 nd Most Important | | | | 3 rd Most Important | | | | Combined- 1 st , 2 nd or 3 rd Most Important | | | |
|-----------------------|-----------------------|------|----------|------|--------------------------------|------|----------|------|--------------------------------|------|----------|------|---|------|----------|------|
| Source of Information | Res | | Fac | | Res | | Fac | | Res | | Fac | | Res | | Fac | |
| | <i>f</i> | % | <i>f</i> | % | <i>f</i> | % | <i>f</i> | % | <i>f</i> | % | <i>f</i> | % | <i>f</i> | % | <i>f</i> | % |
| CME | 2 | 1.9 | 5 | 11.4 | 6 | 5.7 | 6 | 13.6 | 11 | 10.5 | 12 | 27.3 | 19 | 18.1 | 23 | 52.3 |
| Colleagues | 6 | 5.7 | 1 | 2.3 | 14 | 13.3 | 7 | 15.9 | 15 | 14.3 | 9 | 20.5 | 35 | 33.3 | 17 | 38.6 |
| Drug reps | 2 | 1.9 | 0 | 0 | 1 | 1.0 | 0 | 0 | 1 | 1.0 | 1 | 2.3 | 4 | 3.8 | 1 | 2.3 |
| Electronic | 62 | 57.1 | 30 | 68.2 | 9 | 8.6 | 8 | 18.2 | 7 | 6.7 | 1 | 2.3 | 78 | 74.3 | 39 | 88.6 |
| Print books | 8 | 7.6 | 1 | 2.3 | 22 | 21.0 | 4 | 9.1 | 24 | 22.9 | 10 | 22.7 | 54 | 51.4 | 15 | 34.0 |
| Print journals | 7 | 6.7 | 6 | 13.6 | 30 | 28.6 | 1 | 38.6 | 19 | 18.1 | 8 | 18.2 | 56 | 53.3 | 31 | 70.5 |
| Videos | 0 | 0 | 0 | 0 | 2 | 1.9 | 0 | 0 | 4 | 3.8 | 1 | 2.3 | 6 | 5.7 | 1 | 2.3 |
| Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2.3 | 0 | 0 | 1 | 2.3 |

Note: Res = Residents Fac = Faculty

Another important component in the study of the information behaviors of any population was to investigate the barriers that could restrict the flow of information to the group. More (31.4%) residents reported time as the most significant barrier to accessing information than any other barrier (See Table 17). The results for the faculty physicians were similar to residents with time (52.3%) the greatest barrier as well (See Table 18). The greatest number of responses for “second greatest barrier” for residents was “overwhelmed by too much information” (33.3%) and also for faculty (25%). Cost received the most responses for “third greatest barrier” from residents (21%) and for faculty it was “lack of searching skill” (22.7%). When the greatest barrier, second greatest barrier, and third greatest barrier were combined, the barriers with the most responses from residents were time (61.2%), “overwhelmed by too much information” (61.2%), cost (42.9%), and “lack of searching skills” (42.9%). For faculty the top three were time (77.3%), “overwhelmed by too much information” (52.3%), and “lack of searching skills” (38.6%). The lack of searching skills indicated by both groups presented an opportunity for the QCOML reference department. Both groups indicated they were overwhelmed by too much information. There was no statistically significant difference between the faculty and the resident rankings using χ^2 .

Table 17

Residents- What Is the Greatest Barrier to Your Use of Clinical Information?

| | Greatest | 2 nd Greatest | 3 rd Greatest | Combined 1 st , 2 nd & 3 rd | |
|---|---------------------|--------------------------|--------------------------|--|---------------------|
| | Barrier | Barrier | Barrier | Greatest Barriers | |
| Barrier | % of Total <i>N</i> | % of Total <i>N</i> | % of Total <i>N</i> | <i>f</i> | % of Total <i>N</i> |
| Cost | 13.3 | 8.6 | 21.0 | 45 | 42.9 |
| Inadequate technology | 9.5 | 9.5 | 12.4 | 33 | 31.4 |
| Lack of searching skills | 16.2 | 14.3 | 12.4 | 45 | 42.9 |
| Overwhelmed by too much information | 12.4 | 33.3 | 16.2 | 65 | 61.2 |
| Time | 31.4 | 17.1 | 13.3 | 65 | 61.2 |
| Other | 1.0 | 0 | 0 | 1 | 1.0 |

Table 18

Faculty- What Is the Greatest Barrier to Your Use of Clinical Information?

| | Greatest | 2 nd Greatest | 3 rd Greatest | Combined 1 st , 2 nd & 3 rd | |
|---|---------------------|--------------------------|--------------------------|--|---------------------|
| | Barrier | Barrier | Barrier | Greatest Barriers | |
| Barrier | % of Total <i>N</i> | % of Total <i>N</i> | % of Total <i>N</i> | <i>f</i> | % of Total <i>N</i> |
| Cost | 2.3 | 2.3 | 15.9 | 9 | 20.5 |
| Inadequate technology | 11.4 | 6.8 | 11.4 | 13 | 29.5 |
| Lack of searching skills | 9.1 | 6.8 | 22.7 | 17 | 38.6 |
| Overwhelmed by too much information | 18.2 | 25.0 | 9.1 | 23 | 52.3 |
| Time | 52.3 | 22.7 | 2.3 | 34 | 77.3 |
| Other | | | | 7 | 15.9 |

The one “other” comment listed by residents was “library location”. The comments listed by faculty as “other” were: 1.) “Lack of access to many of journals I use by electronic or print;” 2.) Access; 3.) Computer not up to date, inadequate knowledge of library portal site; 4.) “Limited availability of electronic information when it comes to journals pertaining to my needs;” 5.) Location – offsite; 6.) Location/staffing; and 7.) Don’t know what is available.

In the previous question, information overload was noted as a problem. The following survey question investigated this phenomenon for both residents and faculty (See Table 19).

Table 19

The Increasing Body of Information

| | Residents | | Faculty | | Residents | | Faculty | |
|--|-----------|---------------|----------|---------------|-----------|---------------|----------|---------------|
| The increasing body of information: | Yes | | Yes | | No | | No | |
| | <i>f</i> | % of <i>N</i> | <i>f</i> | % of <i>N</i> | <i>f</i> | % of <i>N</i> | <i>f</i> | % of <i>N</i> |
| Makes me a better doctor in my daily work | 81 | 77.1 | 40 | 90.9 | 23 | 21.9 | 4 | 9.1 |
| Does steal time from non-professional activities | 40 | 38.1 | 23 | 52.3 | 64 | 61.0 | 21 | 47.7 |
| Gives me a feeling of powerless towards colleagues | 12 | 11.4 | 1 | 2.3 | 92 | 87.6 | 43 | 97.7 |
| Gives me a feeling of professional impotence | 17 | 16.2 | 3 | 6.8 | 87 | 82.9 | 41 | 93.2 |
| Gives me a feeling of better professional control | 62 | 59.0 | 29 | 65.9 | 42 | 40.0 | 15 | 34.1 |
| Gives me a feeling of powerlessness towards patients | 7 | 6.7 | 0 | 0 | 97 | 92.4 | 44 | 100 |
| Makes me a better researcher | - | - | 27 | 61.4 | - | - | 17 | 38.6 |

These results indicated that the explosion of information in medicine was mainly a positive thing. Both groups reported that information made them better doctors and for the faculty, better researchers. However, the fact that 38.1% of residents and 52.3% of faculty indicated that the increasing body of information stole time from non-professional activities was a significant finding, indicating a need to help physicians stay current with the information they needed in a more efficient fashion. This also pointed out a need for continued and even better support for QCOML. A well-trained library staff could reduce the burden physicians had in finding clinical information and could do so at a lower cost than doctors having to find the information on their own or not finding it at all. There was no statistically significant difference using chi-square between residents and faculty.

A phenomenon in the information behavior of physicians was the explosive adoption of personal digital assistants (PDAs) as information tools in clinical medicine. Over 80% of the residents were using one of the devices. Almost two-thirds of faculty used PDAs. In order to determine if the usage was even across specialties, a cross-tabulation was done (See Table 20).

Table 20

Use of PDA by Residency Program: Cross-Tabulation

| | Res | Fac | Res | Fac | Res | Fac | Res | Fac | | |
|-------------------|------|------|----------|----------|------|------|----------|----------|-------|-------|
| Residency | No | No | <i>f</i> | <i>f</i> | % | % | <i>f</i> | <i>f</i> | Res | Fac |
| Program | Ans. | Ans. | Yes | Yes | Yes | Yes | No | No | Total | Total |
| Family Medicine | 0 | 0 | 38 | 12 | 100 | 92.3 | 0 | 1 | 38 | 13 |
| Internal Medicine | 0 | 0 | 13 | 7 | 72.2 | 46.7 | 5 | 8 | 18 | 15 |
| Ob/Gyn | 0 | 0 | 3 | 0 | 60.0 | 0 | 2 | 3 | 5 | 3 |
| Pathology | 0 | 0 | 1 | 2 | 20.0 | 100 | 4 | 0 | 5 | 2 |
| Pediatrics | 0 | 0 | 7 | 3 | 100 | 60.0 | 0 | 2 | 7 | 5 |
| Psychiatry | 0 | 0 | 11 | 0 | 91.7 | 0 | 1 | 1 | 12 | 1 |
| Surgery | 1 | 0 | 12 | 4 | 63.2 | 80.0 | 7 | 1 | 20 | 5 |
| Total | 1 | 0 | 85 | 28 | 81.0 | 63.6 | 19 | 16 | 105 | 44 |

Note: Res = Resident; Fac = Faculty

It appeared that the use of a PDA was dependent upon specialty. For example, four out of five Pathology residents were not using PDAs. Sixty-three percent of Surgery residents used them, whereas 100% of Family Medicine residents used PDAs. In order to test the significance of this assumption, the chi-square statistic was used. There was a significant relationship ($\chi^2 = 35.038$). The Cramer's *V* statistic was used to measure the strength of the relationship between type of resident and the use of a PDA. It demonstrated at $V = .408$ that there was a moderate strength of relationship between type of specialty and the use of a PDA.

The faculty indicated that they used PDAs at a significantly lower rate than their residents (63.6% vs. 81%). The difference in PDA use between residents and faculty was supported by χ^2 analysis ($\chi^2 = 5.61, p = .018$). When asked the type of device they used, 82 residents responded. Palm users outnumbered PocketPC users by greater than a two-to-one margin. Whereas residents were more than two to one Palm users, the faculty was fairly evenly divided between Palms and PocketPCs (See Table 21).

Table 21

Type of PDA Used by Residents and Faculty

| Type of Device | Residents | | Faculty | | Residents % | Faculty % |
|----------------|-----------|----------|---------|-------|----------------|----------------|
| | <i>f</i> | <i>f</i> | % | % | of Respondents | of Respondents |
| No Answer | 23 | 15 | 21.9 | 34.1 | - | - |
| PocketPC | 26 | 13 | 24.8 | 29.5 | 27.6 | 44.8 |
| Palm | 56 | 16 | 53.3 | 36.4 | 68.3 | 55.2 |
| Total | 105 | 44 | 100.0 | 100.0 | 100.0 | 100.0 |

Almost all the resident PDA users employed them to access drug databases. Seventy-six and seven-tenths percent of the respondents used medical calculators on a PDA. Most of the faculty used PDAs for drug information (75%) and medical calculators (74.1%). A significant percentage also used them for InfoRetriever (residents 45.3%, faculty 39.3%), reference books (residents 60.5%, faculty 37%) and “other” (See Table 22).

Table 22

If You Use a PDA, In What Ways Do You Use It?

| | Epocrates or other drug database | InfoRetriever | Medical calculator | Patient tracking | Reference books | Other |
|---|-------------------------------------|---------------|-----------------------|---------------------|--------------------|-------|
| Residents (NA) | 19 | 19 | 19 | 19 | 19 | 18 |
| Faculty (NA) | 16 | 16 | 17 | 17 | 17 | 15 |
| Residents Yes | 81 | 39 | 66 | 6 | 52 | 20 |
| Faculty Yes | 21 | 11 | 20 | 1 | 10 | 10 |
| Residents No | 5 | 47 | 20 | 80 | 34 | 67 |
| Faculty No | 7 | 17 | 7 | 26 | 17 | 19 |
| % of Resident Respondents Who Use | 94.2 | 45.3 | 76.7 | 7.0 | 60.5 | 3.0 |
| % of Faculty Respondents Who Use | 75.0 | 39.3 | 74.1 | 3.7 | 37.0 | 34.5 |
| % of Total Residents Who Use | 77.1 | 37.1 | 62.9 | 5.7 | 49.0 | 19.0 |
| % of Total Faculty Who Use | 47.7 | 25.0 | 45.5 | 2.3 | 22.7 | 22.7 |
| Residents Rank | 1 | 4 | 2 | 6 | 2 | 5 |
| Faculty Rank | 1 | 3 | 2 | 6 | 4 | 5 |

Other resident responses were given. Some respondents listed more than one item. If the item listed was in one of the categories above, it was not listed. Almost all of these “other” responses were non-clinical applications. They included: notes (5), calendar (4), contacts (3),

antibiotics guide (2), Internet (1), email (1), dictionary (1), alarm (1), schedules (1), specialized programs (1), and phone (1). Uses listed under “other” for faculty were: basic Palm functions, calendar, contacts, notes, Pain Stat, Johns Hopkins Antibiotic Guide, Pepid, Pocket *Merck Manual*, *PDR*, *The Medical Letter*, *Medical Letter Guidelines to Therapeutics*, and UpToDate.

Eleven of the resident non-PDA users (10.5% of *N*) indicated that they did not plan to use a PDA or were not sure. Seven other residents (6.7%) responded that they would begin using a PDA in the next 12 or 24 months. Of the faculty who did not use PDAs now, 11 (25% of all respondents) indicated that they would not start using one or were not sure. Three others (6.8%) responded that they would begin using a PDA in the next 12 or 24 months (See Table 23).

Table 23

If You Do Not Use a PDA, Do You Expect To Begin Using One?

| | Residents | Faculty | Residents | Faculty | Residents | Faculty |
|---|-----------|----------|-----------|---------|-----------------|-----------------|
| Response | <i>f</i> | <i>f</i> | % | % | Cumulative % | Cumulative % |
| No Answer | 87 | 30 | 82.9 | 68.2 | 82.9 | 68.2 |
| Yes, expect to in the next 12 months | 5 | 2 | 4.8 | 4.5 | 87.6 | 72.7 |
| Yes, expect to in the next 24 months | 2 | 1 | 1.9 | 2.3 | 89.5 | 75.0 |
| No | 7 | 4 | 6.7 | 9.1 | 96.2 | 84.1 |
| Not sure | 4 | 7 | 3.8 | 15.9 | 100.0 | 100.0 |
| Total | 105 | 44 | 100.0 | 100.0 | 100.0 | 100.0 |

This concludes the section detailing the information behaviors of medical residents. The information behaviors examined were: 1) frequency of clinical information need; 2) most common type of information need; 3) tendency for residents to seek answers for clinical questions; 4) tendency for residents to find an answer to their clinical questions; 5) the role of QCOML in answering these information needs; 6) the clinical value of the information retrieved from QCOML; 7) sources of information most frequently consulted; 8) barriers encountered in the pursuit of information; 9) frustration with information overload; and 10) PDA use. The next section examined the residents' information skills.

Information Skills of Residents

The line that distinguished information skills from information behaviors was not clear, nevertheless, using the two different categories was helpful. For example, the use of a PDA was considered a behavior in this context, but the aptitude with which the PDA was used was a measure of skill. Although the skills in the following section were self-reported and, consequently, had all the problems that could be associated with self-reporting, they were still valuable. For example, the question about evidence-based medicine (EBM), which asked residents to report their EBM skill levels, was immediately followed by two questions from the Fresno test (Ramos et al. 2003), which was a validated test used to measure EBM skills. Thus, if residents rated themselves as excellent EBM practitioners, yet missed both Fresno questions, this might indicate that the residents had an inflated view of their skills. The results of these questions were also compared to the identical questions used in the faculty survey, which asked the faculty to rate the residents' skills. This comparison would reveal any significant differences in the residents' (trainees) evaluation of their skill levels compared to the way in which the faculty (trainers) rated the residents' skill levels.

The residents were asked to evaluate their PDA skills (See Figure 2). The mean was 5.11, the median was 5.00, and the mode was 6 on a 7-point Likert-type scale. In order to determine if there were significant differences between residency programs, the Kruskal-Wallis Analysis of Variance statistic was used. There was no significant difference ($\chi^2 = 5.936, p = .430$). For faculty, the mean was 4.83, the median was 5.0, and the mode was 5 on a 7-point Likert-type scale (See Figure 2). Almost 20% of residents and 25% of faculty rated their PDA skills below the midpoint. There was not a significant difference found between the reported PDA skills of

residents and faculty. The Mann-Whitney U Test statistic was used to make this determination ($z = -1.252, p = .211$).

The faculty rated their residents' skills as a mean of 5.37, median of 6.0, and mode of 6 (See Appendix Figure L1). The actual mean reported by residents was 5.11. There was no statistically significant difference between the residents rating of their PDA skills and the faculty's rating of the residents' PDA skills. The Mann-Whitney U Test statistic was used to make this determination ($z = -.326, p = .744$).

Just as the majority (57.1%) of the residents rated themselves above the midpoint in their PDA skills, so also the majority (63.11%) of the residents rated themselves above the midpoint in their EBM skills. The mean was 4.82, the median was 5.0, and the mode was 5. There was a significant difference between residency groups. This was determined using the Kruskal-Wallis statistic ($\chi^2 = 18.900, p = .004$). Using the Mann Whitney U Test, it was determined that Family Medicine ($z = -2.727, p = .006$), Internal Medicine ($z = -2.877, p = .004$), Obstetrics/Gynecology ($z = -2.305, p = .021$), Pathology ($z = -2.588, p = .010$), and Psychiatry ($z = -2.250, p = .024$) rated their EBM knowledge higher than Surgery; and Pathology residents rated their EBM knowledge higher than Pediatrics residents ($z = -2.185, p = .029$) (See Table 24).

Table 24

*Results for Pairwise Comparisons Regarding Residency Type and Rating of EBM Knowledge.
(Residents)*

| Comparison | <i>Mann Whitney U</i> | <i>p</i> -value |
|-------------------------------|-----------------------|-----------------|
| Pathology vs. Pediatrics | -2.185 | .029 |
| OB/GYN vs. Surgery | -2.305 | .021 |
| Internal Medicine vs. Surgery | -2.877 | .004 |
| Family Medicine vs. Surgery | -2.727 | .006 |
| Pathology vs. Surgery | -2.588 | .010 |
| Psychiatry vs. Surgery | -2.250 | .024 |
| Overall | 52.77 | .001 |

For the faculty's rating of their own EBM skills, the mean was 5.6, the median 6.0, and the mode 6 (See Appendix Figure L2). There was no significant difference found using the Kruskal-Wallis statistic ($\chi^2 = 7.981$, $df = 6$, $p = .239$) between specialties. The faculty rated their residents' EBM skills as a mean of 4.83, median of 5.0, and a mode of 5 (See Appendix Figure L2). This was almost an exact match of the residents' actual reporting of their EBM skills (4.82). There was no statistically significant difference using the Mann-Whitney U Test ($z = 1.105$, $p = .916$) between the residents' ratings of their EBM skills and the faculty's view of these ratings.

Seventy-nine percent of the residents knew that a randomized controlled trial was the best type of study for a therapy question (See Table 25). This matched closely with the residents self-reporting of their EBM skills. Eighty-one percent of the residents rated themselves

at the midpoint or above in their EBM skills. Knowing the correct answer to this question reflected mastery of basic EBM knowledge. Eighty-six and four-tenths percent of the faculty respondents knew the correct answer. There were no differences between residency programs using the Kruskal-Wallis statistic for this therapy Fresno test question ($\chi^2 = 10.12, p = .120$). There was no difference found using Kruskal- Wallis ($\chi^2 = 1.09, p = .297$) between faculty departments. Using the Mann Whitney U Test, it was determined that there were no differences between residents and faculty (See Table 25).

Table 25

The Best Type of Study For a Therapy Question Is

| Response | Residents <i>f</i> | Faculty <i>f</i> | Residents % | Faculty % |
|-----------------------------|--------------------|------------------|-------------|-----------|
| No Answer | 4 | 2 | 3.8 | 4.5 |
| Randomized Controlled Trial | 83 | 38 | 79.0 | 86.4 |
| Cohort Study | 3 | 0 | 2.9 | 0 |
| Case Control Study | 7 | 2 | 6.7 | 4.5 |
| Case Study | 1 | 0 | 1.0 | 0 |
| Review Article | 7 | 2 | 6.7 | 4.5 |
| Total | 105 | 44 | 100.0 | 100.0 |

A second Fresno test question was posed to the residents. The correct answer was “cohort study” but only 37.1% of the residents gave the correct response (See Table 26). This indicated that the residents EBM knowledge was not as in-depth as it should be. Faculty answered correctly only 50% of the time (See Table 26). These two Fresno tests, at first glance, appeared to offer credibility to the faculty’s self-reported superiority in EBM; however, the differences were not statistically significant. Using Kruskal Wallis, there was no significant difference found between departments for residents ($\chi^2 = 2.12, p = .145$), faculty or between residents and faculty for the prognosis Fresno question.

Table 26

Residents- The Best Type of Study For a Prognosis Question Is

| | Residents | Faculty | Residents | Faculty | Residents | Faculty |
|------------------|-----------|----------|-----------|---------|--------------|--------------|
| Response | <i>f</i> | <i>f</i> | % | % | Cumulative % | Cumulative % |
| No Answer | 4 | 2 | 3.8 | 4.5 | 3.8 | 4.5 |
| Randomized | | | | | | |
| Controlled Trial | 35 | 10 | 33.3 | 22.7 | 37.1 | 27.2 |
| Cohort Study | 39 | 22 | 37.1 | 50.0 | 74.3 | 77.2 |
| Case Control | | | | | | |
| Study | 10 | 5 | 9.5 | 11.4 | 83.8 | 88.6 |
| Case Study | 4 | 0 | 3.8 | 0 | 87.6 | 88.6 |
| Review Article | 13 | 5 | 12.4 | 11.4 | 100.0 | 100.0 |
| Total | 105 | 44 | 100.0 | 100.0 | 100.0 | 100.0 |

Skills were closely associated with attitudes. The following question was asked to measure the residents' attitudes towards EBM. At one point in the United States there was resistance to the adoption of EBM. Apparently, these attitudes changed because 78.1% of the residents and 76.74% of the faculty (See Appendix Figure L3) rated EBM towards the end of a 7-point Likert-type scale (6 or 7) indicating that EBM was very important to them in providing optimal patient care. There was no significant difference found between specialties for residents (Kruskal-Wallis $\chi^2 = 6.03$, $p = .42$), for faculty (Kruskal-Wallis: $\chi^2 = 7.29$, $p = .295$) or between residents and faculty (Mann-Whitney U: $z = -.528$, $p = .598$). The mean was 6.22, the median

was 6.50, and the mode was 7 for the residents. The mean was 6.12, the median was 6.0, and the mode was 7 for the faculty.

Many ETSU residents would go into rural practice; consequently, they would not be at a facility that had a library. LoansomeDoc was a Web-based program that allowed a doctor to order a journal article from a participating LoansomeDoc library, such as QCOML. This program significantly reduced the information disadvantage of serving in a rural area. The residents infrequently used LoansomeDoc (Table 27). When analyzed between residency program using χ^2 , it was discovered that Pediatrics used LoansomeDoc more than Family Medicine ($\chi^2 = 6.45$, $p = .011$, Cramer's $V = .33$) or Surgery ($\chi^2 = 8.67$, $p = .003$, Cramer's $V = .52$) and Psychiatry used LoansomeDoc more than Surgery ($\chi^2 = 3.83$, $p = .05$, Cramer's $V = .32$). Faculty used LoansomeDoc more frequently than residents, probably because the faculty member's department paid the costs (See Table 27). The difference in LoansomeDoc use between residents and faculty was statistically significant ($\chi^2 = 13.92$, $p = <.001$).

Table 27

Do You Use LoansomeDoc?

| Response | Resident <i>f</i> | Faculty <i>f</i> | Resident % | Faculty % |
|----------|-------------------|------------------|------------|-----------|
| Yes | 13 | 17 | 12.4 | 39.5 |
| No | 92 | 26 | 87.6 | 60.5 |
| Total | 105 | 43 | 100.0 | 100.0 |

The total was low for residents primarily because departments normally did not allow ETSU residents to use the LoansomeDoc service because of costs. However, residents could

establish LoansomeDoc service with the area hospital libraries. It was unfortunate the LoansomeDoc use was so low because the service might be the only tool that the physician in private practice had to stay current with the literature. Not only were the residents primarily non-LoansomeDoc users, but also the few resident LoansomeDoc users were not particularly confident users. Forty-seven percent rated themselves at the midpoint or below in their LoansomeDoc skills. The mean for residents was 4.27, the median was 5.0, and the mode was 3 (See Appendix Figure L4). There were no significant differences between different residencies as far as their LoansomeDoc skills (Kruskal-Wallis $\chi^2 = 3.5, p = .477$). Faculty rated their LoansomeDoc skills higher than their residents' (mean 5.0 versus 4.27) (See Appendix Figure L4). The mean for the faculty was 5.0, the median was 5.0, and the mode was 6. Although their mean was higher, it was not significant, according to an analysis by the Mann Whitney U Test ($z = -.960, p = .337$).

Two other skills that experience showed were lacking in ETSU residents were: 1) the ability to access QCOML electronic databases, full-text books, and full-text journals from off-campus and 2) the ability to activate and use ETSU email. The off-campus access to electronic databases was made possible through a proxy server. It was necessary to activate email because the email username and password served as the username and password for the proxy server. If residents did not have these skills, they would miss the opportunity to access needed clinical information from home and in the hospitals. Approximately 50% of the residents did not know how to use the proxy server (See Table 28). There was a significant difference between residency programs in this skill ($\chi^2 = 14.75, p = .022$, Cramers $V = .38$). Specifically, Family Medicine was significantly better than Internal Medicine at accessing resources from off-campus ($\chi^2 = 9.42, p =$

.002, Cramers $V = .37$) and Family Medicine was significantly better than Surgery ($\chi^2 = 7.57, p = .006$, Cramers $V = .35$). Sadly, almost 40% of the faculty did not know how to access ETSU resources from off-campus (See Table 28). This revealed a serious shortcoming in the library's training of its patrons. There was no significant difference between faculty and residents knowing how to access databases off campus ($\chi^2 = 1.22, p = .269$).

Table 28

Do You Know How to Access ETSU Medical Databases Off-Campus?

| Response | Residents <i>f</i> | Faculty <i>f</i> | Residents % | Faculty % |
|----------|--------------------|------------------|-------------|-----------|
| Yes | 53 | 26 | 50.5 | 60.5 |
| No | 52 | 17 | 49.5 | 39.5 |
| Total | 105 | 43 | 100.0 | 100.0 |

Most residents knew how to activate their email (See Table 29). There were significant differences in email skills between programs ($\chi^2 = 19.52, p = .003$, Cramer's $V = .43$).

Significantly fewer Pathology residents knew how to activate their ETSU email accounts than Family Medicine residents ($\chi^2 = 6.12, p = .013$, Cramer's $V = .38$), Pediatrics residents ($\chi^2 = 4.28, p = .039$, Cramer's $V = .62$), or Psychiatry residents ($\chi^2 = 6.86, p = .009$, Cramer's $V = .66$). The majority of faculty knew how to activate their email (See Table 29). There was no significant differences between faculty and residents in the ability to activate email ($\chi^2 = .006, p = .937$).

Table 29

Do You Know How to Activate Your ETSU Email Account?

| Response | Residents <i>f</i> | Faculty <i>f</i> | Residents % | Faculty % |
|-------------|--------------------|------------------|-------------|-----------|
| No response | 1 | 1 | 1.0 | |
| Yes | 90 | 37 | 85.7 | 86.0 |
| No | 14 | 6 | 13.3 | 14.0 |
| Total | 105 | 43 | 100.0 | 100.0 |

Information Training of Residents

This section examined the information training of residents. Just as learning how to take a history and give a physical were acquired through training, so also were learning the skills to properly use clinical information. Sixty-one percent of the residents indicated that they had received information training from their attending physicians (See Table 30).

Table 30

Have You Received Clinical Information Training From Attending Physicians?

| Response | <i>f</i> | % |
|-----------|----------|-------|
| No Answer | 6 | 5.7 |
| Yes | 64 | 61.0 |
| No | 35 | 33.3 |
| Total | 105 | 100.0 |

These results from the residents almost exactly matched the response from the faculty who reported they had formal EBM training programs (See Table 31).

Table 31

Faculty- Do You Have a Formal EBM Training Program in Your Residency Program?

| Response | <i>f</i> | <i>%</i> |
|-----------|----------|----------|
| No Answer | 7 | 15.9 |
| Yes | 28 | 63.6 |
| No | 9 | 20.5 |
| Total | 44 | 100.0 |

There was no statistically significant difference between residency programs regarding having a formal EBM program ($\chi^2 = 10.088$, $df = 5$, $p = .073$) (See Table 32).

Table 32

By Residency Program - Do You Have a Formal EBM Training Program in Your Residency Program?

| Program | Yes | No | Total |
|-----------------------|-----|----|-------|
| Family Medicine | 12 | 1 | 13 |
| Internal Medicine | 7 | 6 | 13 |
| Obstetrics/Gynecology | 0 | 1 | 1 |
| Pathology | 2 | 0 | 2 |
| Pediatrics | 4 | 1 | 5 |
| Psychiatry | 0 | 0 | 0 |
| Surgery | 3 | 0 | 3 |
| Total | 28 | 9 | 37 |

The amount of time that faculty reported spent in information skills training with their residents varied greatly, from 6 hours per year to 20 hours per week . Forty-five percent of the faculty (N=20) did not respond to this question. Of the 24 who did respond, 41% (N=10) were evenly split between 1 and 2 hours monthly.

Attending physicians highly rated the information training they gave residents (See Appendix Figure L5). Over 90% rated their information training at the midpoint or higher. Residents indicated they were satisfied with the information training they received from attending physicians (See Appendix Figure L5). Almost 80% rated the training higher than the midpoint. The mean score was 5.45, the median was 6.00 and the mode was 6 for the 65

residents who provided an answer. Attending physicians' mean for the information they gave residents was 5.03 and the median was 5.00. A Mann-Whitney U indicated that there were no significant differences between the faculty and residents' ratings of the information training ($Z = -1.74, p = .082$)

Sixty-eight and six-tenths percent of the residents indicated that they received information training from librarians (See Table 33). This was slightly higher than those who indicated that they received information training from attending physicians (61%).

Table 33

Have You Received Clinical Information Training From Librarians?

| Response | <i>f</i> | Percent |
|-----------|----------|---------|
| No Answer | 7 | 6.7 |
| Yes | 72 | 68.6 |
| No | 26 | 24.8 |
| Total | 105 | 100.0 |

Eighty-one and three-tenths percent of the residents rated the training from the librarians higher than the midpoint of the scale (See Appendix Figure L6). Seventy-eight and five-tenths percent rated the training from the faculty higher than the midpoint of the scale. For the 75 residents who answered, the mean score was 5.69, the median was 6.00, and the mode was 6.

The majority (79.05%) of the residents indicated that an orientation to QCOML would be important to them by rating the importance of training past the mid-point on a Likert-type scale (See Appendix Figure L7). The mean score was 5.74, the median was 7.00, and the mode was 7.

The faculty reported that a library orientation for their residents would be very important. The mean score for the faculty was 5.98, the median 6.00, and the mode was 6. Almost 80% of the residents indicated a library orientation would be important to them by rating the importance of training past the mid-point on a Likert-type scale; whereas, 90.91% of the faculty indicated a library orientation would be important to their residents by rating the importance of training past the mid-point on a Likert-type scale (See Appendix Figure L7). A Mann-Whitney U test indicated that there was no significant difference between residents' and faculty's ratings of the importance of a library orientation ($Z=-.603$, $p=.547$).

A 1-hour time period was the most preferred (45.71%) length for a training class (See Appendix Figure L8). One-half hour was preferred by 26.67% and 2 hours were preferred by 21.9% of the residents. The preferred amount of time for an orientation indicated by faculty was 1 hour (51.22%) followed by 2 hours (31.71%) (See Appendix Figure L8). The most preferred day of the week for residents for a training class was Monday (23.5%), followed by Wednesday (20.4%) and Friday (19.1%). Respondents were able to choose more than one day of the week. Faculty preferred Wednesday (31.6%) or Thursday (31.6%) (See Table 34).

Table 34

Please Indicate Which Day(s) of the Week You Would Prefer an Orientation.

| Day of the Week | Residents <i>f</i> | Faculty <i>f</i> | Residents % | Faculty % | Residents Rank | Faculty Rank |
|-----------------|--------------------|------------------|-------------|-----------|----------------|--------------|
| No Answer | 15 | 25 | | | | |
| Monday | 38 | 1 | 23.5 | 5.3 | 1 | 5 |
| Tuesday | 29 | 3 | 17.9 | 15.8 | 4 | 3 |
| Wednesday | 33 | 6 | 20.4 | 31.6 | 2 | 1 |
| Thursday | 20 | 6 | 12.3 | 31.6 | 5 | 1 |
| Friday | 31 | 3 | 19.1 | 15.8 | 3 | 3 |
| Saturday | 7 | 0 | 4.3 | 0 | 6 | 6 |
| Sunday | 4 | 0 | 2.5 | 0 | 7 | 6 |
| Total | 162 | 44 | 100.0 | 100.0 | - | - |
| Answers | | | | | | |

The residents were asked what type of instruction they wanted to receive in a training class (See Table 35). The most requested type of instruction was “an overview of all available library resources and services” (73.3%), followed by “instruction on searching locally available databases” (65.7%). Those who selected “other” included the following: “How I get access to library at home,” “How to print articles,” “I want to be able to retrieve full text articles that I can incorporate into my research,” and “How to do a search/find info.” For faculty, “an overview of all available library resources and services,” “an in-depth description of local electronic

resources” and “instruction on searching locally available databases” were desired by 75% of the respondents in a library orientation (See Table 35).

Table 35

Which of the Following Would You Like to See Included in a Library Orientation?

| Response | Res | Fac | Res | Fac | Res | Fac | Res | Fac |
|---|------|------|----------|----------|------|------|------|------|
| | No | No | Yes | Yes | Yes | Yes | Rank | Rank |
| | Ans. | Ans. | <i>f</i> | <i>f</i> | % | % | | |
| An overview of all available library resources and services | 3 | 4 | 77 | 30 | 73.3 | 75.0 | 1 | 1 |
| An in-depth description of local electronic resources | 3 | 4 | 60 | 30 | 57.1 | 75.0 | 3 | 1 |
| Instruction on searching locally available databases | 3 | 4 | 69 | 30 | 65.7 | 75.0 | 2 | 1 |
| PDA instruction | 3 | 4 | 57 | 22 | 54.3 | 55.0 | 4 | 4 |
| Other | | | 7 | | 6.7 | | 5 | |

Note: Res = Residents Fac = Faculty

The final question related to training inquired if the residents and faculty would like a clinical medical librarian (CML) attached to their program (See Table 36). The only program that QCOML provided this service for was the Johnson City Family Medicine program. A QCOML CML attended their hospital meeting two times per week from 2003-2007. Called “morning report,” this activity discussed the care of hospitalized patients. The CML both provided a

service by quickly looking up high quality information for the physicians to use in immediate patient care and by providing occasional training on how to search the literature effectively. The majority (80.4%) of residents wanted a CML. Even a higher percentage of faculty (82.9%) indicated they wanted a CML for their program (See Table 36).

Table 36

Would You Like to Have a CML for Your Program?

| Response | Residents <i>f</i> | Faculty <i>f</i> | Residents % | Faculty % |
|-----------|--------------------|------------------|-------------|-----------|
| No Answer | 3 | 3 | | |
| Yes | 82 | 34 | 80.4 | 82.9 |
| No | 20 | 7 | 19.6 | 17.1 |
| Total | 105 | 44 | 100.0 | 100.0 |

Although a large majority (80.4%) of the residents indicated they would like to have a CML, it was necessary to determine if this were true in all the individual programs. The results of a cross-tab indicated that a CML program was highly desired by Internal Medicine, Pediatrics, Psychiatry and Surgery, but not by Obstetrics-Gynecology or Pathology (See Table 37). In order to test the statistical significance of the findings, a chi-square test was performed. The test was significant ($\chi^2 = 31.823$, $df = 6$, $p = .000$) and the strength of this relationship was moderately strong (Cramer's $V = .559$, $p = .000$).

In order to test if the faculty results were the same across all residency programs, a chi-square test was also performed. There was a relationship demonstrated at $p = .029$ ($\chi^2 = 14.043$,

df = 6). Also the Cramer's V test was used, which indicated a moderately strong relationship (Cramer's $V = .585$, $p = .029$) between the residency program and the desire to have a CML (See Table 37). As represented by the residents' responses, the faculties of Family Medicine, Pediatrics, Psychiatry, Internal Medicine, and Surgery indicated a desire to have this type of program implemented; whereas, Pathology did not want a program.

Table 37

Cross Tabulation - Residency Program & "Would You Like to Have a CML for Your Program?"

| Program | Res Yes | Fac Yes | Res No | Fac No | Res % Yes | Fac % Yes | Res Total | Fac Total |
|------------|------------|------------|-----------|-----------|--------------|--------------|--------------|--------------|
| Family | | | | | | | | |
| Medicine | 32 | 12 | 5 | 0 | 86.5 | 100 | 38 | 12 |
| Internal | | | | | | | | |
| Medicine | 17 | 12 | 1 | 3 | 94.4 | 80.0 | 18 | 15 |
| Ob/Gyn | 2 | 2 | 3 | 1 | 40.0 | 66.7 | 5 | 3 |
| Pathology | 0 | 0 | 5 | 2 | 0 | 0 | 5 | 2 |
| Pediatrics | 7 | 4 | 0 | 0 | 100 | 100 | 7 | 4 |
| Psychiatry | 10 | 1 | 1 | 0 | 91.1 | 100 | 12 | 1 |
| Surgery | 14 | 3 | 5 | 1 | 73.7 | 75.0 | 20 | 4 |
| Total | 82 | 34 | 20 | 7 | 80.4 | 82.9 | 105 | 41 |

Note: Res = Residents Fac = Faculty

Information Resources and Services

The final section of this study was an evaluation of QCOML resources and services. The library expended large sums of money for resources and services and it was essential that these funds were used effectively. The focus of resources was electronic library databases, books, and journals. Services were activities that required interaction with a staff person. Fifty-four and three-tenths percent of the residents indicated that they used the services of QCOML. A Pearson Chi-square revealed significant differences between the residents and faculty use of the library services ($\chi^2 = 5.53, p = .018$). A higher percentage of faculty used library services than did residents (See Table 38). Services the library provided were interlibrary loan-document delivery, training, PDA assistance, clinical librarianship, help at the circulation-customer service desk, and reference assistance.

Table 38

Do You Use the Information Services Provided By the College of Medicine Library?

| Response | Residents <i>f</i> | Faculty <i>f</i> | Residents% | Faculty % |
|----------|--------------------|------------------|------------|-----------|
| Yes | 57 | 33 | 54.3 | 75.0 |
| No | 48 | 11 | 45.7 | 25.0 |
| Total | 105 | 44 | 100.0 | 100.0 |

There was some variation in the use of library services based on specialty ($\chi^2 = 12.888, df = 6, p = .045$). All Pediatric residents indicated they used library services; whereas, only 30% of Surgery residents indicated that they had used the library's services (See Table 39). There was a moderate relationship (Cramer's $V = .35$ at $p = .045$) between the use of the information services

provided by QCOML and residency type. There were no statistically significant differences found between programs for faculty ($\chi^2 = 5.108$, $df = 6$, $p = .530$).

Table 39

By Residency Program - Do You Use the Information Services Provided By The College of Medicine Library? Cross-Tabulation

| Program | Residents Yes | | Faculty Yes | | Residents No | | Faculty No | | Residents | Faculty |
|-------------------|---------------|------|-------------|-------|--------------|------|------------|------|-----------|---------|
| | <i>f</i> | % | <i>f</i> | % | <i>f</i> | % | <i>f</i> | % | Total | Total |
| Family Medicine | 24 | 63.2 | 11 | 84.6 | 14 | 36.8 | 2 | 15.4 | 38 | 13 |
| Internal Medicine | 9 | 50.0 | 11 | 73.3 | 9 | 50.0 | 4 | 26.7 | 18 | 15 |
| OB/GYN | 2 | 40.0 | 1 | 33.3 | 3 | 60.0 | 20 | 66.7 | 5 | 3 |
| Pathology | 2 | 40.0 | 2 | 100.0 | 3 | 60.0 | 1 | 0 | 5 | 2 |
| Pediatrics | 7 | 100 | 4 | 89.0 | 0 | 0 | 0 | 20.0 | 7 | 5 |
| Psychiatry | 7 | 58.3 | NA | NA | 5 | 41.7 | NA | NA | 12 | NA |
| Surgery | 6 | 30.0 | 3 | 60.0 | 14 | 70.0 | 2 | 40.0 | 20 | 5 |
| Total | 57 | 54.2 | 33 | 75.0 | 48 | 45.7 | 11 | 25.0 | 105 | 44 |

Traditionally, QCOML library services had not focused on residents. The library focused more on faculty and students. Residents were left to find their own way or might receive assistance from the hospital librarians. The residents who did use library services were asked to evaluate the quality of the service. Eighty-nine and three-tenths percent of the residents who used QCOML services rated “speed of service” above the midpoint on a 7-point Likert-type scale (See Appendix Figure L9). The mean score was 5.64, the median was 6.00, and the mode was 6. The faculty were also evaluated for their feedback regarding library services. The mean for faculty for speed of service was 5.94 on a 7-point Likert-type scale (See Appendix Figure L9). Eighty-five and five-tenths percent of the residents who used QCOML services rated “knowledge and ability of staff” above the midpoint of a Likert-type scale (See Appendix Figure L10). The mean score was 5.75, the median was 6.00, and the mode was 6. The mean rating for faculty for “knowledge and ability of staff” was 6.06 (See Appendix Figure L10).

Ninety-eight and two-tenths percent of the residents who used QCOML services rated “cooperativeness of staff” above the midpoint of a Likert-type scale (See Appendix Figure L11). The mean score was 6.16, the median was 6.00, and the mode was 6. The mean rating for faculty for “cooperativeness of staff” was 6.39. Ninety and one-tenths percent of the residents who used QCOML services rated “overall opinion of service” above the midpoint of a Likert-type scale (See Appendix Figure L12). The mean score was 5.85, the median was 6.00, and the mode was 6. The mean for “overall opinion of service” was 6.26 for faculty. There were no significant differences between residents’ and faculty’s ratings of the quality of specific services. However,

faculty members' "overall opinion of service" was significantly higher than the residents' "overall opinion of service" ($z = -2.04, p = .042$).

Residents and faculty were asked to "please comment on any experience with the QCOML service and its ability to provide you with clinically useful information". Respondents were pleased with the service. They referred to the QCOML service as excellent, great, good, efficient, timely, helpful, and professional. They were positive about the PDA service, the CML service, assistance in finding materials, and the resource UpToDate. They expressed negatives about access from the Veterans Administration Hospital to QCOML resources, a desire to receive more training, the speed of connectivity, the design of the QCOML Web page, and a desire to have the librarians more frequently in the Kingsport Family Medicine clinic.

Much of the residents' education took place in the four teaching hospitals associated with the programs. The hospitals were Johnson City Medical Center (JCMC), the Veterans Administration (VA) Hospital, Bristol Regional Medical Center, and Holston Valley Medical Center. These hospitals were fortunate to have outstanding libraries and librarians. It was important to know the impact that these libraries were having on ETSU residents. Twenty-one percent of the residents indicated that they used the VA library. The faculty was also queried about their interactions with the hospital libraries. The faculty used the VA library less frequently than the residents, with 11.4% of faculty indicating that they used the services of the VA library. Forty-seven and six-tenths percent of the residents and 13.6% of the faculty indicated that they used the Johnson City Medical Center Library. One third of the residents and 15.9% of the faculty indicated that they used the services of the two Wellmont libraries. Residents used the

services of the JCMC and Wellmont libraries significantly more than faculty ($\chi^2 = 15.26$, $p < .001$; $\chi^2 = 4.65$, $p = .031$) (See Table 40).

Table 40

Residents and Faculty Use of Hospital Libraries.

| | Residents Yes | Residents No | Faculty Yes | Faculty No |
|----------|---------------|--------------|--------------|--------------|
| Library | <i>f</i> (%) | <i>f</i> (%) | <i>f</i> (%) | <i>f</i> (%) |
| VA | 22 (21.0) | 83 (79.0) | 5 (11.4) | 39 (88.6) |
| JCMC | 50 (47.6) | 55 (52.4) | 6 (13.6) | 38 (86.4) |
| Wellmont | 35 (33.3) | 70 (66.7) | 7 (15.9) | 37 (84.1) |

Approximately 90% of the residents rated the services of the VA library above the mid-point on a Likert-type scale (See Appendix Figure L13). The mean was 5.71, the median was 6.0, and the mode was 6. The mean rating for the VA Library by the faculty ($f = 5$) was 6.4, with a median of 7.0 and a mode of 7. Ninety-eight percent of the residents rated the services of the Johnson City Medical Center Library above the mid-point on a Likert-type scale (See Appendix Figure L14). The mean was 5.8, the median was 6.0, and the mode was 6. The mean rating for the faculty for the JCMC Library was 6.2 ($f = 5$), with a median of 7.0 and a mode of seven. Eighty-two and nine-tenths percent of the residents rated the services of the Wellmont Libraries above the mid-point on a Likert-type scale (See Appendix Figure L15). The mean was 6.63, the median was 6.00 and the mode was 6. The mean rating for the Wellmont libraries for faculty was 6.29 ($f = 7$), the median was 6.0, and the mode was 6.

Twenty-five and seven-tenths percent of the residents indicated there were not adequate computer stations in clinical areas (hospital and ambulatory) for them to access electronic information (See Appendix Figure L16). The residents and faculty were given the opportunity to list specific places where computer access was inadequate in clinical areas. They mentioned the ICU (no hospital specified), the ETSU pediatrics clinic, Indian Path Pavilion, labor and delivery, the Wellmont library, Wellmont Hospital, Holston Valley Hospital, and the Johnson City Medical Center. They specifically said about JCMC and Holston Valley,

For example at JCMC, access to internet and computers are located in family waiting areas which is absolutely unnecessary- residents have to fight to have a computer-printer-phone in the same room – these resources are just too scarce. Same goes for Wellmont Holston Valley. When setting up such systems the in charge folks need to ask the residents on what system would be better - because we are the ones using it with more experience. JCMC and Wellmont Holston Valley have excellent librarians

Other problem areas listed were the JCMC emergency room, the VA Hospital, women's care outpatient for OB-GYN, Erwin, the ambulatory clinic (not specified), the nursing station computers at Holston Valley, residents' lounge (not specified), call rooms, and the Family Medicine clinic.

Evaluation of Library Electronic Resources

QCOML spent a significant amount of money on electronic resources. Most of the library's acquisitions budget was spent on electronic resources rather than print. Therefore, it was important that the library used this money effectively. The major library electronic resources were ranked by frequency of use (See Table 41).

Table 41

Frequency of Use of Major Library Electronic Resources

| Resource | Residents Yes | | | Residents No | | Faculty Yes | | | Faculty No | |
|-----------------------|---------------|------|------|--------------|---------|-------------|------|------|------------|---------|
| | <i>f</i> | % | rank | <i>f</i> | No Ans. | <i>f</i> | % | rank | <i>f</i> | No Ans. |
| Cinahl | 5 | 5.0 | 14 | 95 | 5 | 1 | 2.5 | 15 | 39 | 4 |
| ClinicalTrials.gov | 8 | 8.0 | 12 | 92 | 5 | 6 | 15 | 10 | 34 | 4 |
| Cochrane | 44 | 44.0 | 8 | 56 | 5 | 21 | 52.5 | 7 | 19 | 4 |
| Embase-Psychiatry | 5 | 5.0 | 14 | 95 | 5 | 0 | 0 | 17 | 40 | 4 |
| Google | 93 | 93.0 | 1 | 7 | 5 | 37 | 92.5 | 1 | 3 | 4 |
| Health Reference Ctr. | 6 | 6.0 | 13 | 94 | 5 | 1 | 2.5 | 15 | 39 | 4 |
| ImagesMD | 12 | 12.0 | 9 | 88 | 5 | 6 | 15.0 | 10 | 34 | 4 |
| InfoRetriever | 59 | 59.0 | 7 | 41 | 5 | 14 | 35.0 | 8 | 26 | 4 |
| MD Consult | 73 | 73.0 | 5 | 27 | 5 | 29 | 70.7 | 5 | 12 | 3 |
| National Guideline | | | | | | | | | | |
| Clearinghouse | 12 | 12.0 | 9 | 88 | 5 | 14 | 35.0 | 8 | 26 | |
| Online Journals | 62 | 62.0 | 6 | 38 | 5 | 35 | 87.5 | 3 | 5 | 4 |
| PsychInfo | 4 | 4.0 | 16 | 95 | 6 | 3 | 7.5 | 13 | 37 | 4 |
| PubMed | 82 | 82.0 | 2 | 18 | 5 | 34 | 85.0 | 4 | 6 | 4 |
| StatRef | 11 | 11.0 | 11 | 89 | 5 | 2 | 5.0 | 14 | 38 | 4 |
| Toxline | 3 | 3.0 | 17 | 97 | 5 | 4 | 10.3 | 12 | 35 | 5 |
| UpToDate | 79 | 79.0 | 3 | 21 | 5 | 26 | 68.4 | 6 | 12 | 6 |
| WorldWideWeb | 77 | 77.0 | 4 | 23 | 5 | 37 | 94.9 | 1 | 2 | 5 |

The electronic resources were also rated on their clinical value (See Table 42). A 1 - 7 point Likert-type scale was used. The lower numbers represented the higher clinical value.

Table 42

Rating of Major Library Electronic Resources - (1=extremely valuable; 7= no value)

| Resource | Res Rating | Res Rank | Fac Rating | Fac Rank |
|--|------------|----------|------------|----------|
| Cinahl | 5.00 | 15 | 4.2 | 12 |
| ClinicalTrials.gov | 2.17 | 1 | 4.0 | 11 |
| Cochrane | 3.45 | 6 | 3.4 | 4 |
| Embase-Psychiatry | - | - | 4.6 | 14 |
| Google | 4.06 | 14 | 3.6 | 5 |
| Health Reference Center | 4.00 | 11 | 4.8 | 16 |
| ImagesMD | 4.00 | 11 | 4.9 | 17 |
| InfoRetriever | 3.36 | 4 | 3.8 | 9 |
| MD Consult | 3.43 | 5 | 3.6 | 5 |
| National Guideline Clearinghouse (NGC) | 3.77 | 9 | 4.6 | 14 |
| Online Journals | 2.94 | 2 | 3.0 | 1 |
| PsychInfo | 3.00 | 3 | 4.3 | 13 |
| PubMed | 3.50 | 8 | 3.7 | 7 |
| StatRef | 6.00 | 16 | 3.8 | 9 |
| Toxline | 4.00 | 11 | 3.7 | 7 |
| UpToDate | 3.48 | 7 | 3.2 | 2 |
| WorldWideWeb | 3.86 | 10 | 3.3 | 3 |

The rankings of the electronic resources by frequency of use and rating by clinical value were combined with the resources cost in order to determine the value of the resource to the residents and to the faculty (See Table 43).

Table 43

Combined Frequency Rank, Clinical Value Rank, and Cost of Resource Rank

| Resource | <i>f</i> Rank | | Clinical | | Cost | Avg. of 3 Rankings | | Resource |
|----------------------|---------------|-----|------------|-----|------|--------------------|-----|-----------|
| | | | Value Rank | | Rank | Combined: | | Cost to |
| | Res | Fac | Res | Fac | | Res | Fac | ETSU |
| Cinahl | 14 | 15 | 12 | 12 | 1 | 11 | 12 | 0 |
| ClinicalTrials.gov | 12 | 10 | 11 | 11 | 1 | 5 | 6 | 0 |
| Cochrane | 8 | 7 | 4 | 4 | 13 | 8 | 9 | \$2,389 |
| Embase-Psychiatry | 14 | 17 | 14 | 14 | 12 | 17 | 17 | \$2,091 |
| Google | 1 | 1 | 5 | 5 | 1 | 1 | 2 | 0 |
| Health Reference Ctr | 13 | 15 | 16 | 16 | 1 | 12 | 14 | 0 |
| ImagesMD | 9 | 10 | 17 | 17 | 10 | 16 | 16 | \$956 |
| InfoRetriever | 7 | 8 | 9 | 9 | 14 | 12 | 13 | \$3968 |
| MD Consult | 5 | 5 | 5 | 5 | 16 | 10 | 10 | \$28,368 |
| NGC | 9 | 8 | 14 | 14 | 1 | 5 | 8 | 0 |
| Online Journals | 6 | 3 | 1 | 1 | 17 | 5 | 5 | \$329,000 |
| PsychInfo | 16 | 13 | 13 | 13 | 1 | 12 | 11 | 0 |
| PubMed | 2 | 4 | 7 | 7 | 1 | 3 | 3 | 0 |
| StatRef | 11 | 14 | 9 | 9 | 11 | 15 | 15 | \$1,965 |
| Toxline | 17 | 12 | 7 | 7 | 1 | 8 | 4 | 0 |
| UpToDate | 3 | 6 | 2 | 2 | 15 | 4 | 7 | \$9,000 |
| WorldWideWeb | 4 | 1 | 3 | 3 | 1 | 2 | 1 | 0 |

Note: Res = Residents Fac= Faculty

A comparison of QCOML free electronic resources was performed (See Appendix Figure L17). This comparison was derived by multiplying the frequency of use by the clinical value of the resource. A comparison of QCOML paid electronic resources (See Appendix Figure L18) was also performed. This comparison was derived by multiplying the frequency of use by the clinical value of the resource and dividing this number into the cost. Online journals were not included in this comparison.

When analyzed in this manner, the free electronic resources that were rated the highest were PubMed (287.0), Google (273.42), and the Web (241.78) by a large margin over ClinicalTrials.gov (38.64), Health Reference Center- Academic (18.0), PsychInfo (16.0), Cinahl (10.0), and Toxline (9.0). The higher numbers represented the greatest value. The highest rated electronic resources that cost were Cochrane (15.29), InfoRetreiver (18.48), ImagesMD (26.56), and UpToDate (32.36). The lower numbers represented the greater value. The next group was MD Consult (108.85) and StatRef (178.64) followed by online journals at an astounding 1307.01.

Residents and faculty were asked to suggest other electronic resources for the library to consider for purchase. They suggested Pepid, ePocrates, LexiComp, ACOG site, Medical Letter, Journal Watch, OVID, Micromedex, American Psychological Association, e-Medicine, AAFP site, gpnotebook.com, CDC, Dynamed, Infectious Disease resources, Merck Medicus, PIER, STATA, vesalius.com, the *American Journal of Vascular Surgery*, *Unbound Surgery*, ACS surgery book online, Cameron's textbook, psych.org, more pathology journals, and neiglobal.org.

Residents and faculty were asked, “What three things would you like to see changed/introduced to improve your health information access and use?” The most frequent item mentioned was more training. Specific areas of training mentioned were PubMed, PDAs, how to search databases, EBSCO, and InfoRetriever. Suggestions were given as how to train such as giving a tour of the library, doing training in the clinic, frequent Grand Rounds, providing a list of library services, more training in Kingsport, printed manuals or email instructions for library resources, flyers or mailers on library programs, providing a list of pathology resources, giving practical examples in training classes, and doing training earlier on in the residency period.

Another category that elicited several responses was the improvement of searching. Suggestions were better search software, easier access to MD Consult, easier access to electronic journals, better organization of electronic books on the QCOML Web site (by category not alphabetically by title), easier search engines, better home access, faster home access, better VA journal availability online, printed instructions for finding online journals, and quicker librarian response. The category of costs or money was also one that had many comments. The residents and faculty requested free software, free interlibrary loans, free printing in the library, free PDAs, free ePocrates (the paid version), and discounts on hardware and software.

There were many responses in the category of computer hardware. The residents and faculty requested more access to computers, better computers, computer access in the residents’ lounge, computers that work, computers in the clinic, computers in the call room, faster computers, small laptops for bedside use, standardization of computers and PDAs, easier computer access in patient areas, workable printers in the Family Medicine clinic, and a fax machine for residents in the library. Another technology issue mentioned was for campus-wide

wireless connectivity and wireless access in the hospitals. One resident mentioned that email was difficult to use because of the need to frequently change the password.

Two faculty and one resident expressed a desire for more journals. Two residents stated they wanted a CML. One was a surgery resident who wanted the CML at the mortality and morbidity conference. There were 12 respondents who expressed a desire for the library to keep the electronic resource UpToDate. Many of these requested access to UpToDate from home and one requested UpToDate on a PDA. Requests for issues involving PDAs were numerous.

Twenty-three responses mentioned PDAs. Some of these responses were listed above. Other PDA responses included giving out a list of free PDA resources, wireless access to PDAs, help installing software on PDAs, more PDA programs, PDA training, updating InfoRetriever training, PDA training at the beginning of residency, executing orders through a PDA in the hospital, and understanding PDAs better.

CHAPTER 5

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

Introduction

It is imperative that effective leaders make good policies. Edwards Deming, the Father of Total Quality Management, taught that an organization is usually flawed, not because of the people who worked in it or used it, but because of flaws in its systemic design (Aguayo, 1991). In the field of librarianship, the first prerequisite in designing successful, useful library systems is to gain profound knowledge of the current system in place. This involves discovering what the information behaviors of a set of users are and how well library systems already in place, such as training systems and resource systems, are meeting the information needs of the user group. Armed with new data, library professionals can then adjust the current system in order to reduce the variation between what the users have and what they want. This should be a never-ending process. This chapter compares the research findings reported in Chapter 4 to the literature review in Chapter 2 and the research questions from Chapter 1. Recommendations are made for Quillen College of Medicine Library based on the findings.

Summary of Findings Compared to Reports in the Literature

Demographics

According to Dillman (2000), non-response error was “the result of people who respond to a survey being different from sampled individuals who do not respond, in a way relevant to the

study” (p. 11). An attempt was made to obtain a set of respondents that was similar to the whole population. A chi-square test was used to determine that it was representative for residency specialty. The faculty set of respondents was representative for specialty as well. Nineteen percent of the respondents were in Surgery, 36.2% in Family Medicine (three programs), 17.1% in Internal Medicine, 4.8% in Ob/Gyn, 4.8% in Pathology, 6.7% in Pediatrics, and 11.4% in Psychiatry. Approximately one third of the resident respondents were interns, one fourth were second year, one fourth were third year, and 12.4% were fourth or fifth year. About 60% were male and 40% female. These demographics were not significantly different from the total population of residents.

Frequency of Information Needs, Type of Need, Answers Sought, and Answers Found

According to Shaneyfelt et al. (2006), quoting Covell et al. (1985), “physicians tend to underestimate their information needs and overestimate the degree of pursuit” (p. 1124). ETSU residents were asked in this study to report their frequency of information needs and degree of pursuit. About 70% of ETSU residents reported that they had at least one new information need for every three patients seen. A study from Yale University stated that Yale primary care residents had two information needs for every three patients seen (Green et al., 2000). About 80% of ETSU primary care residents (Family Medicine, Internal Medicine, and Pediatrics) reported that they had an average of one new information need for every two patients seen. The mean for all primary care residents at ETSU was one new information need for every 2.5 patients seen. Thus, ETSU’s results were similar to what was reported at Yale. The study of Yale primary care residents by Green et al. (2000) found that, “Therapy and diagnosis were the two most common clinical tasks represented in the questions (p. 220).” This was also true for ETSU

residents. The most frequently needed types of information were for therapy information (including drug information - 48.3% and general therapy information - 20% for an overall total of 68.3%) and for diagnostic information (26.7%).

The Yale study indicated that primary care residents sought answers to clinical questions only 30% of the time, mainly because of time constraints. The ETSU residents' mean response was that they looked up an answer 40%-50% of the time. Again, this was similar to what was reported at Yale. A study by Schilling, Steiner, Lundahl, and Anderson (2005) found that "residents ... found answers to 89% of questions" (p. 51). Other studies such as Ely et al. (1999) found similar results, stating "doctors pursued only a minority of their questions but found answers to about 80% of those pursued" (p. 360) which indicated that the literature was a valuable resource in the clinic to help with patient management. The mean response for ETSU residents was 70%-80%. The median and the mode were 80%-90%. Again, this was similar to the results found by other investigators.

Usefulness of Information Obtained From QCOML

Marshall (1992) reported that 29% of clinicians who consulted the medical literature made changes in their diagnosis. Fifty-one percent changed their choices of tests and, in 19% of the cases, the patient experienced a reduced length of hospitalization because of the information the clinician found in the literature. Also, 72% of the clinicians who consulted the literature reported changes in the advice given to patients. Over 70% of the ETSU residents reported that information they acquired from QCOML changed a diagnosis they made; 85.9% indicated that it

changed their choice of tests; and 44% reported that it led to a reduced length of hospitalization for a patient.

Sources of Information Consulted

More ETSU residents (57.1%) rated electronic resources as the best source to meet their information needs than any other source. The source that was rated the second most important source by more residents was print journals (28.6%) and the third most important was print books (22.9%). Over half of ETSU residents rated print journals either the first, second, or third best resource which differed from Connelly et al. (1990) who found:

Clinicians rated research articles lowest of all resources in terms of clinical applicability and understandability. Research articles were second only to pharmaceutical industry representatives in terms of low credibility, a not altogether unwarranted view. Practicing physicians view the literature primarily as a vehicle for researchers to communicate to other researchers, and find the practical content of research articles wanting. (p. 358)

Pharmaceutical representatives were rated low by residents.

Barriers to Accessing Information

Craig, Irwig, and Stockler (2001) noted, “In a recent survey, Australasian physicians identified insufficient time (74%), limited search skills (41%) and limited access to evidence (43%) as impediments to making better use of research data” (p. 248). The ETSU results were similar to the literature for the greatest barrier. More residents at ETSU reported that time was their greatest barrier to accessing information (31.4%). The barrier that was rated the second greatest by most residents was “overwhelmed by too much information” (33.3%). This phenomenon of feeling overwhelmed was also researched and reported in the literature. Lee (2005) stated:

The flood of new information and the demands of simply getting through the day have become so overwhelming that many physicians no longer find the time for “lifelong learning” These changes contribute to the malaise felt by many physicians in the face of modern medicine. Once they were the experts. Today they cannot even stay a step ahead of patients. (p. 1068)

PDA Use

The faculty indicated that they used PDAs at a significantly lower rate than their residents (63.6% vs. 81%). The difference in PDA use between residents and faculty was supported by χ^2 analysis ($\chi^2 = 5.61, p = .018$). This could indicate that the faculty as non-users presented a barrier to residents’ adoption of the devices. According to Tilghman, Raley, and Conway (2006), “Faculty may view the PDA as unnecessary and feel that true learning and application is best achieved through traditional methods” (p. 116). Because of this possibility, in 2004 QCOML obtained an internal ETSU grant to purchase PDAs to use to train clinical faculty. PDA training for clinical faculty ought to be continued. McLeod et al. (2003) stated, “A clear preference for Palm OS devices over Pocket PC devices was noted among physician PDA users at our institution and has been similarly shown in other investigations” (p. 607). Over two thirds of ETSU residents preferred Palm devices over PocketPC machines.

Almost all the resident PDA users employed them to access drug databases. This harmonized with the literature. According to Rothschild et al. (2006),

Physicians ... used the pharmacopeia for unique drug lookups a mean of 6.3 times per day (SD 12.4). The majority of users (61%) believed that in the prior 4 weeks, use of the clinical reference prevented adverse events or medication errors 3 or more times. (p. 619)

Evidence-Based Medicine

Evans (2001) found that, “Several major factors influence the uptake of the practice of evidence-based medicine in primary care, including time constraints and the volume of clinical literature” (p. a11). What was needed in the opinion of Evans was, “an innovative, educational intervention that will help primary-care practitioners to become evidence-based knowledge managers as they move to community practice” (p. a11). Almost two thirds of ETSU clinical faculty reported that they offered an EBM class for their residents. These figures were compared to what was reported by McGinn, Selz, and Korenstein (2002):

The implementation of EBM has had a great impact on the teaching, practice, and study of medicine. In a survey of internal medicine residency programs, over 35% of respondents participated in freestanding EBM programs, and more than 80% of the programs were in the process of integrating EBM into traditional education venues (e.g. morning report and medical attending rounds.) (p. 1150)

At one point there was resistance to evidence based medicine. According to Miser (2006), “EBM [was] embraced by many as the best way to practice medicine, others scorn its use, calling it arrogant, inflammatory and misleading” (p. 811). However, this was not true at ETSU. When asked the importance of EBM to them in providing optimum patient care, the mean for residents was 6.22 and 6.12 for the faculty on a 7-point Likert-type scale.

Adequate Access To Electronic Clinical Information

About 26% of ETSU residents reported that they did not have adequate computer stations in clinical areas. Reilly and Lemon (1997) stated why it was important that residents had access: “Ideally, at least in our setting, these [electronic library resources] should be available on or near the patient care areas at all hours every day” (p. 425).

Use of Electronic Resources

Google was the highest ranked resource by ETSU residents. It was (out of seventeen) first in frequency of use, fifth in clinical value and, of course, first in cost (free). The Worldwide Web was ranked second. The use of Google and free Web resources presented problems that health science librarians had to address. Information on the Web, particularly health information, ran the risk of being dangerous, useless, or biased. Fees paid to search engine companies made paying sites come up first in a search. Therefore, search results were not based on quality. Many Google searches for professional health research information were linked to existing search engines such as PubMed. It proved a much better strategy to start the search in PubMed because of the sophistication of the PubMed search engine than it was to ignore PubMed and go directly through Google. A study by Wentz (2006) found that PubMed searches that started with Google left out many important citations that would have been found if the searcher had started in PubMed. Wentz stated, “Out of Tang’s 26 scenarios a PubMed search identified potentially relevant studies in 23 cases (88%), a better success rate than the corresponding Google searches (58%). (<http://www.bmj.com/cgi/eletters/bmj.39003.640567.AEv1#149565>)

Summary of Answers to Research Questions

The research questions described in Chapter 1 could be answered as a result of the data presented in Chapter 4. The following provided these answers:

Research Question 1: What are the information-seeking behaviors of current ETSU medical residents?

1. Frequency of Clinical Information Need- Almost 70% of ETSU residents had at least one new information need for every three patients seen. Twenty-one percent had at least one new information need for every patient seen and 39% had at least one new information need for every two patients seen. Therefore, ETSU residents had frequent needs for new information in the clinic. If the ETSU data were compared between primary care and non-primary care programs, it revealed that 28.6% of primary care, compared to 9.5% of non-primary care residents, had at least one new information need for every patient seen; and 25% of primary care residents, compared to 7.1% of non-primary care residents, had at least one new information need for every two patients seen. The attending faculty for ETSU residents asserted that the residents had a new information need 29.5% of the time for every patient seen (actual 21%), 61.4% (cumulative) for every two patients seen (actual 39%) and 81.8% (cumulative) for every three patients seen (actual 69.5%). The mean answer for ETSU residents concerning how frequently they had new information needs in the clinic was one for every three patients seen. For primary care residents, the mean response was one for every 2.5 patients seen.

In summary, ETSU residents had frequent information needs in the clinic, indicating the value of information in the clinic and the need for good information skills training. This comported well with data found by other researchers. Primary care residents had more frequent information needs in the clinic than did non-primary care residents. Although attendings asserted that the residents had information needs more frequently than the residents reported, the differences were not statistically significant

2. Type of Information Sought- Drug information, a type of therapy information, was the most frequently sought after type of information for ETSU residents, followed by therapy

information and diagnostic information. Faculty underestimated the importance of drug information to residents (11.1% faculty compared to 48.3% residents), but otherwise were accurate in their perceptions of the types of information that were most important to their residents in the clinic except for etiology information.

3. Frequency of Answer-Seeking- About half of ETSU residents sought an answer for their clinical questions at least 50% of the time. There was no difference between ETSU residents who used PDAs and those who did not as far as how frequently they sought an answer to a clinical question. The faculty expressed that their residents were looking up answers to their clinical questions 47.6% of the time. The mean score for residents for the percent of information needs in which an answer was sought was 40%-50% of the time. This indicated a need to find ways to help residents look-up more of their questions.

4. Success in Answer-Finding- Almost 80% of ETSU residents found answers to their clinical questions at least 50% of the time. However, only 52.6% of ETSU surgery residents found an answer to their clinical questions at least 50% of the time. The faculty posited that 76.7% of their residents found an answer for their clinical questions at least 50% of the time; therefore, indicating, as they did throughout the survey, that they were very attuned to their residents' abilities. This demonstrated that the literature was valuable in answering clinical questions.

5. Use of Quillen College of Medicine Library- Seventy-six and two-tenths percent of ETSU residents used QCOML. There was a moderately strong relationship between type of resident and the use of the library. One hundred percent of Pediatric residents indicated they used the QCOML (either print or electronic), 92.1% of Family Medicine residents, and 77.8% of

Internal Medicine residents affirmed QCOML use. Only 40% of Surgery residents reported using the library. Ninety three and two-tenths percent of the faculty reported using the library.

A disturbing 48.6% of the total resident respondents indicated that they used the medical library on only a monthly or less frequent basis. Seventy and seven-tenths percent of the faculty reported that they used QCOML at least weekly. The residents highly valued the information they retrieved from QCOML. Ninety-eight and eight-tenths percent of the residents indicated that it refreshed their memory of details and (or) facts, 100% denoted that it did (or would) contribute to higher quality care, 93.7% indicated that some of it was new to them, 88.5% indicated that it substantiated what they already knew or suspected, and 98.8% responded that it would contribute to better clinical decisions. Twenty-six and six-tenths percent reported that they found most of it irrelevant, 5.1% found nothing of clinical value, and 5.2% answered that it was inaccurate or out of date.

Over 80% of the residents reported that the information they got from QCOML changed how they handled a clinical situation (82.5%), their choice of tests (85.9%), their choice of drugs (89.7%), or their choice of other treatment (83.1%). Over 70% of the residents indicated that the information they retrieved from QCOML changed their diagnosis and advice given to their patients. Sixty-eight and four-tenths percent reported that the information changed post-hospital care or treatment of their patients and 44% said that the information they retrieved from QCOML resulted in a reduced length of stay for their patients. The faculty had very similar responses to the residents. Overall, the residents indicated that the information they obtained from QCOML was extremely valuable for patient care.

6. Information Sources Sought- The number one source of information used by both residents and their attendings was electronic resources. This was good because QCOML invested the majority of its acquisition budget in electronic resources. Almost 60% of residents and 68.2% of faculty rated electronic information first. This upheld a basic presupposition of this study that electronic resources were the most important source of information for this population and, therefore, should be the primary focus. The second best resource for residents was print journals (28.6%) and also for faculty (38.6%). Traditionally, print journals were the major vehicle, instead of books, for the dissemination of new medical information because of the time it took for books to be published. This was why the print collection at QCOML was dominated by journals. Print books were the third most important resource for most residents as was CME for faculty. When the first, second, and third best resources were combined, continuing medical education conferences (CME) were rated highly (52.3%) for faculty but not for residents (18.1%) and textbooks were rated highly by residents (51.4%) but not by faculty (34%). This made sense because textbooks often contained what was termed “background” information, which was the basic building block type of information that medical students acquired in their first 2 years. Residents still needed to reinforce their knowledge in these areas. CME events were crafted for the experienced clinician and, therefore, were not targeted for residents. Colleagues were not rated in the top three best resources by either group. In many older studies of community physicians, colleagues were frequently listed as the top information source. It was important that ETSU residents learn how to be their own data analyzers while in residency because many would locate in rural practices where they had very few colleagues to consult.

There was a small correlation between the type of information source preferred and the type of residency program (Cramer's $V = .310$). For example, of the 12 Internal Medicine residents who responded, all answered that electronic information was the most important source of information for them; whereas, only 7 of 13 Surgery residents rated it as the most important source.

7. Barriers Encountered in Accessing Information- The number one barrier to accessing clinical information perceived by both residents (31.4%) and their mentors (52.3%) was time. This finding was duplicated in study after study in the literature. Therefore, it was the responsibility of information professionals (librarians) to design information delivery systems for physicians that delivered the information they needed in the time they had. Residents (33.3%) and faculty (25%) ranked the problem of being overwhelmed by too much information as their second greatest barrier. Too much information as an information barrier was a by-product of the "information explosion" and the "digital age". Not only should designs of information systems fit the tight time frames of physicians, but they should also filter the highest quality information so that physicians could make the best patient care decisions.

The third greatest barrier for faculty (22.7%) was a lack of searching skills. This finding presented a great opportunity and challenge for QCOML. Cost (21%) was the third greatest barrier for residents (42.9%) but was not ranked highly by faculty. Faculty information was paid for by the university; whereas, residents might have to pay for their own information, while making considerably less income. Cost became an even greater barrier for community physicians practicing in rural areas, the destination of many ETSU residents.

8. Psychological Responses to the Increasing Body of Information- On the positive side, 77% of residents and 90.9% of their teachers indicated that the increasing body of information made them better doctors in their daily work; and 59% of residents and 65.9% of attending physicians responded that the increasing body of information gave them a feeling of better professional control. From a negative perspective, 38.1% of residents and 52.3% of faculty affirmed that the increasing body of information stole time from non-professional activities. This finding was important and related to the data in the previous section that being overwhelmed by too much information was a problem for both residents and faculty. Only 11.4% of residents and 2.3% of faculty reported that the increasing body of information gave them a feeling of powerlessness towards colleagues; only 16.2% of residents and 6.8% of faculty reported that it gave them a feeling of professional impotence; and only 6.7% of residents and 0% of faculty responded that it gave them a feeling of powerlessness towards patients. Sixty-one and four-tenths percent of the faculty reported that the increasing body of information made them better researchers.

9. Use of Personal Digital Assistants (PDAs)- Eighty-one percent of the residents reported that they used a PDA. PDA use by residents was dependent on specialty, producing a moderately strong relationship (Cramer's $V = .408$). All 38 Family Medicine residents and all 7 Pediatric residents indicated that they used PDAs; whereas, only 1 of 5 Pathology residents used the devices. Palm devices (68.3%) were preferred over PocketPC machines (27.6%). Of those residents who used PDAs, 94.2% used them for drug information, 76.7%, for medical calculators, 60.5%, for reference books, and 45.3%, for InfoRetriever, a database paid for by

QCOML. Only 10.5% of the residents indicated that they did not plan to use a PDA or were not sure, compared to 25% of the faculty.

Quillen College of Medicine clinical faculty used PDAs at a lower rate than did residents (81% residents - 63.6% faculty). This could present a problem because attending physicians who did not use PDAs might resent their use in the clinic by residents. Like residents, the number one use of PDAs by the faculty was for drug information (75%) and the second was medical calculators (74.1%). Faculty did not rate reference books as highly as residents (faculty 37% - residents 60.5%); however, this was probably based on the same reasons that were mentioned above regarding why residents use print textbooks more than faculty did. Faculty (39.3%) and residents (45.3%) used InfoRetriever about equally. InfoRetriever was the only one of the PDA databases for which QCOML paid.

Research Question 2: What level of skill and knowledge as clinical information users do ETSU medical residents and have?

1. PDA Skills- On a 7-point Likert-type scale, ETSU residents reported a mean of 5.11 when asked to rate their skills as PDA users. Faculty rated their skill level at a mean of 4.83. The faculty ranked the residents' PDA skills as a mean of 5.37.

2. EBM Skills- On a 7-point Likert-type scale, ETSU residents reported a mean of 4.82 when asked to rate their skills as EBM practitioners. The mean for the faculty was 5.6 and the mean given by the faculty for what they perceived their residents' skill level to be was 4.83 (compared to 4.82 actually reported by the residents). Self-reports were followed by two questions from the Fresno test, a validated test to evaluate the EBM skills of practitioners. Both residents (79% correct answers) and faculty (86.4% correct answers) did well on the first Fresno

question, “What is the best type of study for a therapy question.” This was very basic EBM knowledge. However, on the second Fresno question, “What is the best type of study for a prognosis question,” only 37.1% of residents and 50% of faculty gave the correct answer. Therefore, the Fresno questions tended to bear out self-reports that faculty was more advanced in EBM than residents and that both groups had adequate, but not extensive skills in using the tools of EBM. When asked to state the importance of EBM in providing optimum patient care, the mean for residents was 6.22 and the mean for faculty was 6.12. Therefore, both groups seemed to be well aware of the importance of obtaining EBM skills.

3. LoansomeDoc Skills- LoansomeDoc was a function of the PubMed database that allowed articles to be ordered from a participating library. QCOML had hundreds of LoansomeDoc users in rural communities. This might be the only information access that they had. Only 12.4% of residents and 39.5% of faculty knew how to use LoansomeDoc. The low use for residents was primarily because the departments feared that the residents would over use the service and incur too many costs from the library. This was unfortunate because many of the ETSU residents would practice in rural locations and would greatly benefit from knowing how to use LoansomeDoc. The small number of resident LoansomeDoc users rated their skills as a mean of 4.27 and the faculty rated their skills as a mean of 5.0.

4. Database Access Skills- The library shifted dramatically in the period from 1997-2006 from print resources that were accessible only from the library to electronic resources that were accessible anywhere. However, to benefit from this shift, residents needed to know how to access the electronic resources. To access the library from a non-ETSU site, one had to go through a proxy server. Only 50.5% of ETSU residents and 60.5% of faculty knew how to do this. This

highlighted a training need for QCOML. In order to use the proxy server, an ETSU employee first had to activate their ETSU email. Eighty-five and seven-tenths percent of the residents and 86% of the faculty knew how to activate their email.

Research Question 3: Is information training provided for ETSU residents adequate?

1. Information Training By Clinical Faculty- Sixty-one percent of the residents reported that they had received clinical information training from the clinical faculty. This almost exactly matched the report of the faculty. Sixty-three and six-tenths percent of the faculty reported that they had a formal EBM program for their residents. The majority of faculty from all residency programs reported that they had EBM programs, except Obstetrics-Gynecology from which only one faculty member reported. The time spent in these programs ranged from 6 hours per year to 20 hours per week. The residents rated the information training they received from attending physicians as a mean of 5.45 on a 7-point Likert-type scale. The attendings rated the training that they gave residents as a mean of 5.03.

2. Information Training By Librarians- Sixty-eight and six-tenths percent of ETSU residents indicated that they received information training from librarians. The mean for the rating of the librarian training was 5.69, slightly higher than that given by the clinical faculty.

3. Need for Formal Information Classes- Seventy-nine and five-tenths percent of the residents reported that they would like an orientation to the QCOML. A 1-hour class was preferred by 45.71%, a half-hour class by 26.67% and a 2-hour class by 21.9%. Monday was preferred as the ideal day for a class by 23.5%, followed by Wednesday (20.4%) and Friday (19.1%). The most requested type of library orientation was “an overview of all available library resources and services” (73.3%), followed by “an introduction on searching locally available

databases” (65.7%). A significant number wanted “an in-depth description of local electronic resources” (57.1%) and 54.3% wanted PDA instruction.

The faculty indicated that a library orientation for the residents would be very important to them as well. To the question, “How important would it be to you to have an orientation to ETSU College of Medicine library resources and services made available to you and your residents,” the mean score was 6.0 on a 7-point Likert-type scale. The preferred amount of time for the class was 1 hour (51.22%), which was the same time length requested by the residents, followed by 2 hours (31.71%). “An overview of all available library resources and services” (75%) was the most requested type of class, which was also the residents’ top choice. Tied for first (75%) for classes preferred by the faculty was a class on searching locally available databases.” This was the residents’ second choice. Also at 75% was “instruction on searching locally available databases”. Fifty-five percent of the faculty wanted PDA instruction and they preferred the instruction to be on Wednesday or Thursday.

4. Desire for a Clinical Medical Library Program- A majority of the residents indicated a desire to have a clinical medical library (CML) program (80.2%). This was not true for all specialties. In Family Medicine, 86.5% of residents indicated they would like a CML. Johnson City Family Medicine was a program that already had a CML program provided by QCOML. Pediatrics was a program in which 100% of the residents expressed a desire for a CML. Over 90% of Internal Medicine residents and Psychiatry residents and 73.7% of Surgery residents expressed an interest in a CML program. The two programs that QCOML staff assessed would not be in favor of a CML program were indeed not in favor. None of the Pathology residents and

only 40% of the Obstetrics-Gynecology residents reported that they would like to have a CML program.

Over 80% of the faculty indicated they would like to have a CML for their program. The breakdown between programs was similar to the residents' breakdown, with 100% of Family Medicine, Pediatrics, and Psychiatry indicating a desire for a CML, 80% of Internal Medicine, and 75% of Surgery. None of the Pathology faculty wanted a CML. Sixty-six and seven-tenths percent of the Obstetrics-Gynecology faculty wanted a CML, which was higher than their residents.

Research Question 4: Are information resources - citation databases; full-text electronic books and journals; and library programs and services - provided for ETSU residents adequate and do respondents' rating of the information resources correspond to the resources cost? That is, are information resources that are most expensive, the ones that are rated highest by residents?

1. Use of QCOML Services- Slightly over half of the residents indicated that they used library services. This was dependent on specialty. One hundred percent of Pediatric residents stated that they used library services, but only 30% of Surgery residents used the services. Faculty used QCOML services at a higher rate (75%). There was variation between uses of library services by specialty just as there was with the residents. It made sense that faculty would use library services more than residents because of the academic requirements of research and publication that faculty had. Some residents were permanently located in Bristol or Kingsport and were infrequently in Johnson City; therefore, they could not easily use QCOML. The QCOML services were rated highly. On a 7-point Likert-type scale, the residents reported speed of service at a mean of 5.64, knowledge and ability of staff at 5.75, cooperativeness of staff at

6.16, and overall opinion at 5.85. Faculty also rated the library services well. They rated speed of service at 5.94, knowledge and ability of staff at 6.06, cooperativeness of staff at 6.39, and overall opinion at 6.26.

2. Hospital Libraries- The four teaching hospital libraries were not under the control of ETSU but were used by ETSU residents and, therefore, worthy of evaluation. Only 21% of ETSU residents indicated that they used the VA library. Those who used it rated it highly (mean of 5.71). Almost half of the residents used the Johnson City Medical Center library. The JCMC library was rated extremely well (mean of 6.49). One third of the residents used the services of the Wellmont libraries. Wellmont libraries were rated highly with a mean of 5.63. Very few of the faculty reported using the hospital libraries. Only 11.45% indicated that they used the VA library, 15.9% used the Wellmont libraries, and 13.6% used the Johnson City Medical Center library. The few who used the hospital libraries rated them highly. The VA library was rated at a mean of 6.4, the Johnson City Medical Center library at 6.2, and the Wellmont hospital libraries at 6.29. In both the QCOML and the hospital libraries, the faculty reported being more satisfied with services than the residents.

3. Computer Access- It was important that residents had computer access to retrieve library information in the hospitals and in the ambulatory clinics. A majority of the residents (73.3%) reported that there were adequate computer resources in their clinical work areas.

4. Evaluation of Library Electronic Resources- The most frequently used resources by residents were Google (93%), PubMed (82%), UpToDate (79%), the WorldWideWeb (77%), MD Consult (73%), Online Journals (62%), InfoRetriever (59%), and Cochrane (44%). No other resource was used by more than 12% of the residents. Of the top four, only one – UpToDate –

produced a cost for the library. Each of the second four was leased by the library. It was important to note that the library bought electronic resources for multiple constituencies, of which the residents were only one. The library also served medical students and basic science researchers. It was perhaps not a clear distinction to use Google and the WorldWideWeb as separate categories. What was meant was Google was a search engine; whereas, the WorldWideWeb referred to using the Internet for free resources. All of the resources on the list were electronic resources and, therefore, were all accessed via the Web. The disturbing fact about the popularity of Google was that studies showed when Google was used as the primary entry point to searching health resources, the results were sub-optimal (Wentz, 2006). The best search strategy for finding quality professional-level health information was to use highly developed databases, first secondary (UpToDate, InfoRetriever, and others) and then primary (PubMed) and then to use Google as a last resort if nothing else were found.

The most frequently used resources for faculty were the Web (94.9%), Google (92.5%), online journals (87.5%), PubMed (85%), MD Consult (70.7%), UpToDate (68.4%), Cochrane (52.5%), InfoRetriever (35%), and the National Guideline Clearinghouse (35%). No other resource was used by more than 15% of the faculty

Their distribution on a 7-point Likert-type scale of the rating of these electronic resources was 2.17 – 6.00. In this scale, the lower the number, the higher the clinical value of the electronic resource to the respondent. The highest rated resource was ClinicalTrials.gov (2.17), followed by online journals (2.94), PsychInfo (3.00), InfoRetriever (3.36), MD Consult (3.43), Cochrane (3.45), UpToDate (3.48), PubMed (3.50), National Guideline Clearinghouse (3.77), the WorldWideWeb (3.86), and both Images MD (4.0) and Toxline (4.0).

The faculty spread was 3.0 – 4.9. The highest rated online resource was online journals with a rating of 3.0. This was good because journals were the most expensive electronic resource the library leased. The second highest was UpToDate (3.2) followed by the WorldWideWeb (3.3), Cochrane (3.4), Google (3.6), MD Consult (3.6), PubMed (3.7), Toxline (3.7), InfoRetriever (3.8), StatRef (3.8), and ClinicalTrials.gov (4.0). Four was the mid-point of the scale. Several of the electronic resources that had the highest ratings were also the most frequently used.

5. Relationship Between Frequency of Use, Clinical Value, and Resource Cost-

The combined rating (frequency of use, clinical value, and cost) of the electronic resources was discussed in eight categories. Note that the cost of the electronic resources were simply ranked and not rated. For example, the most expensive resource was online journals, which cost approximately \$329,000 per year, and the next most expensive was MD Consult, which cost \$28,368 per year. Yet on the rating scale, they were only one point apart. The eight categories were:

Google, WWW- These resources were rated first and second by residents and faculty. Google was a popular search engine. It enabled one to find and retrieve hard to find information quickly. Often in the past, finding this type of information was a major component of library reference department service desks. The Web for the purpose of this study referred to the free resources available on the Web. The problem with this type of information was quality, including reliability, validity, accuracy, and currency.

PubMed- This database was rated third highest. It was produced by the National Library of Medicine, one of the National Institutes of Health. It was free, of very high quality, and

comprehensive. When an analysis was done by weighting the frequency of use of the resource, PubMed was the highest rated resource in the category of resources that did not cost the library.

UpToDate, Online Journals- These electronic resources were tied for fourth. They are two of the three most expensive resources. They were rated one and two in clinical value by both residents and faculty. When an analysis was done by weighting the cost and the frequency of use of the resource, UpToDate was rated highly in the category of resources that cost the library but online journals rated last by a huge margin.

ClinicalTrials.gov, National Guideline Clearinghouse, and Toxline- These resources, all produced by the federal government, had low to moderate use and clinical value and were free. They were rated sixth through eighth overall.

Cochrane- Cochrane was rated in the middle of the electronic resources by both residents and faculty. It was inexpensive (\$2,389 per year), had a high clinical value, and a moderate frequency of use. When an analysis was done by weighting the cost and the frequency of use of the resource, InfoRetriever was the highest rated resource in the category of resources that cost the library.

CINAHL, Health Reference Center, and PsychInfo- All three of these free resources had low frequency of use and low clinical value ratings. They were proprietary databases but were paid for by entities other than QCOML. Overall, they were rated 11th, 12th, and 12th (tied).

MD Consult, InfoRetriever- These proprietary databases were rated 10th and 12th (tied). MD Consult was rated fifth in frequency of use and clinical value but was the second most expensive. InfoRetriever was rated in the middle in both frequency of use and clinical value. InfoRetriever was the only one of these electronic resources that could be used freely on a PDA.

When an analysis was done by weighting the cost and the frequency of use of the resource, InfoRetriever was the second highest rated resource in the category of resources that cost the library. MD Consult was rated low.

StatRef, ImagesMD, and Embase Psychiatry- These proprietary databases were rated 15th, 16th, and 17th, respectively, out of 17 electronic resources. StatRef was low in use but moderate in clinical value. ImagesMD was moderate in use but last in clinical value, and Embase-Psychiatry was low in both categories because it had a specialized user base (Psychiatry). These resources could be considered for elimination in a budget crisis. These resources would probably be used more frequently, if the library did a better job of exposing patrons to them.

Conclusion

According to Miser (2006), “The challenge to health care providers is to provide up-to-date medical care to their patients while incorporating valid new information. The ultimate goal should be to help patients live long, functional, satisfying, and pain- and symptom-free lives” (p. 811). Medical librarians play a critical role in this process. The purpose of this study was to add to the field of information science new knowledge that could help meet this challenge to health care providers. The study was helpful both in discovering better ways to prepare ETSU medical residents to be information masters and to affirm that QCOML was already doing the right thing in many areas.

ETSU residents were much like other residents and other physicians in general in their information behaviors. This was true for their frequency of information needs, their frequency for

seeking information and finding information, the type of barriers they have to using information, and their use of PDAs. They had a desire to practice evidence-based medicine which is congruent with the goals of QCOML. They also expressed a desire to have a Clinical Medical Librarian (CML) for their programs. This was helpful information because QCOML wanted to expand its CML program but did not know if it would be well received. It was satisfying to discover that QCOML's adaptation of its programs to an EBM model and its strategy to push its CML program were validated by this research

ETSU residents used the web and Google frequently. They expressed a strong desire for their like of the database UpToDate. QCOML did a good job purchasing information resources for residents. QCOML also did a good job providing services for residents. The hospital libraries were used some by residents and were rated high but were used very infrequently by faculty. In most cases there was a congruence between how the residents answered and how the faculty estimated they would answer.

QCOML needed to do a better job reaching more residents. One of the most disturbing findings of the study was the high number of residents who used the QCOML library on a monthly or less frequent basis. There was also a response that indicated a need that QCOML needed to increase the training in the use of library electronic resources for residents. The assumption that residents preferred electronic resources over other types was shown to be true.

Having the data that demonstrated the frequency of information needs of ETSU residents and the data that showed how information from QCOML actually was useful in patient care is excellent information for the library to use to market its value to the College of Medicine

leadership. The high frequency of PDA use by residents validated the library's recent shift of emphasis to provide major support for PDA users. QCOML needed to improve its training of residents to know how to access the QCOML resources from off-campus. Information was obtained that will inform QCOML staff how to best plan for information resource training classes for residents.

Other than the web and Google, the most frequently used electronic resources were PubMed, UpToDate, MDConsult, online journals, and InfoRetriever. The highest rated resources as far as their clinical value were ClinicalTrials.gov, online journals, PsychInfo, InfoRetriever, MDConsult, Cochrane, UpToDate, and PubMed. Google and the web were rated low as to clinical value. This validated the assumption that Google and the web were great for general information needs but not good as clinical information tools.

This was a comprehensive analysis of the information characteristics of ETSU medical residents. Much was gained from the interaction with the literature and the interaction with the residents in gathering this voluminous data. This type of research had never been previously attempted at ETSU. It will provide a baseline for future studies.

Recommendations for QCOML Based on Findings

1. Focus on Primary Care Residents- ETSU primary care residents had more frequent information needs than other residents. Because of this and the school's focus on primary care, QCOML should focus on primary care residents first. This confirmed the library's prevailing

pattern in working primarily with Family Medicine residents and Pediatric residents. The next step should be to start working more extensively with Internal Medicine residents.

2. Do Not Ignore Other Residents- Although the first priority should be made with primary care programs, more needed to be done to help the other residency programs, especially Surgery. Less than 50% of surgery residents used QCOML resources and only 30% used library services. Psychiatry and Surgery expressed a desire for a CML.

3. Do More Presentations to Resident Didactic Sessions Such as Noon Conferences- A disturbing 51.4% of residents used QCOML resources monthly or less, in spite of the fact that most resources are digital and, therefore, easily accessible from anywhere.

4. Teach Frequent Database Searching Classes- In a list of possible offerings for library orientation classes, database searching was a highly preferred choice. Almost half (42.9%) of residents listed “lack of searching skills” as their first, second, or third greatest barrier to the use of clinical information. Library orientation classes were highly desired by both residents and faculty.

5. Expand the Library’s Clinical Medical Library Program- Time was the greatest barrier to the use of clinical information. The QCOML CML program was designated to save residents time. Also a large majority of most residency programs (both residents and faculty) indicated a desire to have a CML program. Therefore, QCOML should continue its CML program with Johnson City Family Medicine, expand to Pediatrics, and start a program with Internal Medicine in the VA Medical Center. It might not be possible logistically to provide a CML program for

Bristol and Kingsport Family Medicine programs because of travel. Because the Johnson City Medical Center Librarians were doing a CML program with Internal Medicine residents already, QCOML should consider starting a CML program with Psychiatry or Surgery instead of Internal Medicine. A CML program should not be started with Pathology or Obstetrics-Gynecology.

6. More PDA Training for Faculty- Faculty used PDAs at a significantly lower rate than residents. Of the 14 faculty members who stated that they did not use a PDA, 11 indicated they did not have plans to start using one or were not sure. Because faculty served as role models for residents, it was important that they were comfortable using PDAs.

7. More Training in EBM Skills- ETSU residents and faculty revealed that EBM was very important to them. They indicated that they had limited EBM skills. Therefore, this was an opportunity for QCOML librarians to contribute to the residents' training. However, QCOML librarians needed to be sure that their own EBM skills and knowledge were profound. Therefore, the library should provide funding for the QCOML public service librarians to acquire these skills.

8. More LoansomeDoc Training- Although there were financial barriers that prevented residents from using Loansome Doc, they should still be made aware of the program and taught how it works because it might be their only access to the literature if they entered rural practice. More faculty should be taught how to use LoansomeDoc. Only 39.5% of the clinical faculty used this service.

9. Teach How to Access QCOML Resources from Off-Campus- Sadly, 50% of residents and 40% of faculty did not know how to access ETSU proprietary electronic resources from off-campus.

10. Train! Train! Train!- QCOML needed to provide much more training. The time for training classes should be one hour. The classes that should be taught were: 1) “an overview of all available resources and services at QCOML”; 2) database searching on multiple databases; and 3) an in-depth coverage of all QCOML electronic resources. Wednesday would be the best day.

11. Search Engine-Web Searching Classes- Google was rated the top overall electronic resource by residents. Because search engines were used frequently by residents, QCOML should encourage their use, teach residents how to use them effectively, and warn of their dangers.

12. Online Journals- Online journals were rated highest in clinical value by faculty and second by residents. Therefore, QCOML should offer classes that show how to access them because access could be confusing. This class could include how to access QCOML resources from off-campus. Even though online journals were expensive, they should be maintained. However, QCOML should regularly survey residents and clinical faculty to see if the library had the journals they needed and make necessary deletions and additions to the journal collection.

13. PubMed Classes- After Google and the Web, PubMed was the highest overall rated resource. Because PubMed had some sophisticated search features, PubMed classes should be taught on a regular, ongoing basis. LoansomeDoc training could be combined with this.

14. Promote Free Underused Databases- National Guideline Clearinghouse, Toxline, CINAHL, Health Reference Center- Academic, and PsychInfo were all used infrequently. However, they were provided at no cost to QCOML and might be used more if they were promoted more and if there were regular classes on their use.

15. Make Possible Cuts: Embase Psychiatry, ImagesMD and StatRef- These were the three lowest rated resources. If cuts were needed, this would save QCOML about \$5,000 per year. However, in the section where residents were allowed to write in specific suggestions for QCOML it was mentioned that ImagesMD was desirable to have. ImagesMD did rate high, when an analysis was performed that weighted cost and frequency of use. Also StatRef could be kept in case the expensive MD Consult resource needed to be cut for financial resources or in order to keep UpToDate which was very popular and was under threat of elimination because of severe price increases by the product vendor. StatRef and MD Consult were similar products. However, MD Consult does contain several full-text journals that the library would have to pay to replace if it was eliminated.

16. Do Not Eliminate UpToDate- This database was rated the second highest in clinical value by residents and was the third most frequently used resource. It had been considered for elimination because of threats of price increases by the product vendor. It was the third most

expensive product purchased by QCOML. In the comments section, both residents and faculty asked for the UpToDate subscription to continue.

17. Better Promote QCOML- Residents clearly indicated that the information they received from QCOML had an impact on patient care. The services of QCOML were highly rated. The library needed to let administration know this.

18. Maintain Strategy of Focusing on Electronic Over Print Resources- By far, residents and faculty indicated that electronic resources were the most important source of information for their needs.

19. Further Research- QCOML, the University of Tennessee School of Information Studies, and ETSU Family Medicine Research Division should work cooperatively on further research projects dealing with the use of information by physicians.

20. Stronger Information Component in Residency- This study has highlighted the importance of information to clinical practice. It has also highlighted areas where ETSU residents were lacking in information fluency. Therefore, a stronger information component should be developed for ETSU residencies.

21. More Librarians- This study has highlighted the value of the librarian to clinical practice. ETSU had three public service librarians to serve nine residency programs as well as perform many other professional duties not involving residents.

22. Comprehensive Health Sciences Library- The same information needs that physicians had were also needs of nurses, audiologists, public health workers, and other health care

professionals trained at ETSU. The division of colleges at ETSU resulted in QCOML only working with medicine. There needed to be a single health science library to meet these needs in all health professions.

23. Change Perceptions About Libraries and Librarianship- Many people stereotyped librarians as maintainers of a warehouse of books and journals. This perception was far from the truth. Librarians contribute immensely to the educational process and to the care of the patient. These perceptions should be changed.

24. Make QCOML More Attractive to Residents- The library did not provide residents the ability to make photocopies from the computer lab. Classes were not being conducted that residents needed or that were convenient to their schedules. The ambiance of the library lacked qualities that made the library not as attractive of a place as it ought to be. Bureaucratic regulations made it difficult to meet unique resident needs in the library spontaneously. Residents mentioned that they would like the library to provide free interlibrary loans and to provide a fax machine for their use.

25. Recommendations for Further Study- The original intent of this research project was to have a qualitative component. A qualitative analysis of this population would provide helpful data. This quantitative study should be repeated longitudinally at 5-year intervals to document the changes in residents' information habits over time. The data could also be mined for relationships that were not pursued in this research. For example, was there a relationship between frequency of information seeking and the preferred type of information resource? It

would be good to combine these data with similar data from other residency programs into a systematic review.

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Appendix A

Survey Instrument for Residents

ETSU RESIDENTS: USE OF CLINICAL INFORMATION SURVEY

Residency Program:

____ Family Practice

____ Internal Medicine

____ Obstetrics/Gynecology

____ Pathology

____ Pediatrics

____ Psychiatry

____ Surgery

Year:

____ PGY1

____ PGY2

____ PGY3

____ PGY4

____ PGY5

____ PGY6

____ PGY7

Gender:

____ Female

____ Male

Section 1: Information-Seeking Behaviors

1. How frequently do you have a clinical information need?

- _____ 1 or more every patient
- _____ 1 every 2 patients
- _____ 1 every 3 patients
- _____ 1 every 4 patients
- _____ 1 every 5 or more patients

Please rank the type of clinical information need you have most frequently:

(RANK THE TOP 3 IN IMPORTANCE- 1 = MOST IMPORTANT, 2 = NEXT IMPORTANT, 3)

DO NOT CHECK, PLEASE RANK THE TOP 3

- _____ Diagnostic information
- _____ Drug information
- _____ Economic information
- _____ Etiology information
- _____ Patient education information
- _____ Prognosis information
- _____ Therapy information
- _____ Other: Please list _____

2. What percent of these information needs do you look for an answer?

- _____ 0-10%
- _____ 10-20%
- _____ 20-30%
- _____ 30-40%
- _____ 40-50%
- _____ 50-60%

_____ 60-70%
_____ 70-80%
_____ 80-90%
_____ 90-100%

3. What percent of the ones that you look for an answer do you find an answer?

_____ 0-10%
_____ 10-20%
_____ 20-30%
_____ 30-40%
_____ 40-50%
_____ 50-60%
_____ 60-70%
_____ 70-80%
_____ 80-90%
_____ 90-100%

4. Do you use the resources of the ETSU Medical Library (electronic or print)?

Yes_____ No_____

If yes, how frequently do you use the resources of the ETSU Medical Library (electronic or print?)

_____ daily
_____ weekly
_____ monthly
_____ yearly

5. If yes, how would you characterize the clinical value of the information received from the ETSU Medical library (electronic or print)?

| | | |
|---|-------|----------|
| It refreshed my memory of details and/or facts..... | Agree | Disagree |
| I found most of it irrelevant..... | Agree | Disagree |
| It did (or will) contribute to higher quality care | Agree | Disagree |
| Some of it was new to me..... | Agree | Disagree |
| I found little or nothing of clinical value..... | Agree | Disagree |
| It substantiated what I already knew or suspected..... | Agree | Disagree |
| On the whole, it was inaccurate or out of date..... | Agree | Disagree |
| It did (or will) contribute to better clinical decisions..... | Agree | Disagree |

6. If yes, did information you utilized from the ETSU Medical Library (electronic or print) ever change:

| | | |
|--|-----|----|
| How you handled a clinical situation | Yes | No |
| Diagnosis..... | Yes | No |
| Choice of tests..... | Yes | No |
| Choice of drugs..... | Yes | No |
| Choice of other treatment..... | Yes | No |
| Length of stay (reduce)..... | Yes | No |
| Post-hospital care or treatment..... | Yes | No |
| Advice given to the patient..... | Yes | No |

7. What kind of sources best meet your information needs?

(RANK THE TOP 3 IN IMPORTANCE- 1 = MOST IMPORTANT, 2 NEXT = IMPORTANT, 3)

DO NOT CHECK, PLEASE RANK THE TOP 3

CME events_____ Colleague_____ Drug reps _____ Electronic_____

Print Books_____ Print Journals _____ Videos_____ Other_____

If other, please list: _____

8. What is the greatest barrier to your use of clinical information?

(RANK THE TOP 3 IN IMPORTANCE- 1 = MOST IMPORTANT, 2 = NEXT IMPORTANT, 3)

DO NOT CHECK, PLEASE RANK THE TOP 3

_____ Cost _____ Inadequate technology _____ lack of searching skills
_____ overwhelmed by too much information _____ time
_____ other (please explain:) _____

9. The increasing body of information: (please check all that apply)

_____ makes me a better doctor in my daily work
_____ does steal time from non-professional activities
_____ gives me a feeling of powerlessness towards colleagues
_____ gives me a feeling of professional impotence
_____ gives me a feeling of better professional control
_____ gives me a feeling of powerlessness towards patients

10. Do you use a PDA? _____ Yes _____ No

11. If yes, what type? _____ PocketPC _____ Palm

12. If you use a PDA, in what ways do you use it? (please check all that apply)

_____ Epocrates or other drug database
_____ InfoRetriever
_____ Medical calculators
_____ Patient tracking
_____ Reference books such as the Washington Manual, 5-Minute Clinical Consult
_____ Other (please specify) _____

13. If you do not use a PDA, do you expect to begin using one?

_____ Yes, expect to in the next 12 months
_____ Yes, expect to in the next 24 months

_____ No

_____ Not sure

Section 2: Information Skills

14. If you use a PDA, rate your skill as a PDA user:

Very Poor 1 2 3 4 5 6 7 Very Good

15. Rate your skills/ knowledge of evidence-based medicine:

Very Poor 1 2 3 4 5 6 7 Very Good

16. The best type of study for a therapy question is:

Randomized control trial _____ Cohort study _____ Case control study _____

Case study _____ Review article _____

17. The best type of study for a prognosis question is:

Randomized control trial _____ Cohort study _____ Case control study _____

Case study _____ Review article _____

18. How important do you believe evidence-based medicine is in providing optimum patient care?

Not Important 1 2 3 4 5 6 7 Very Important

19. Do you use LoansomeDoc? Yes _____ No _____

If yes, rate your skills in using LoansomeDoc?

Very Poor 1 2 3 4 5 6 7 Very Good

20. Do you know how to access ETSU medical databases off-campus?

Yes _____ No _____

21. Do you know how to activate your ETSU email account?

Yes_____ No_____

Section 3: Information Training

22. Have you received clinical information training from attending physicians?

Yes_____ No_____

If yes, rate the information training you have received as a resident from attending physicians

Very Poor1 2 3 4 5 6 7 Very Good

23. Have you received clinical information training from librarians?

Yes_____ No_____

If yes, rate the information training you have received as a resident from librarians (College of Medicine and hospital):

Very Poor1 2 3 4 5 6 7 Very Good

24. How important would an orientation to ETSU College of Medicine library resources and services be to you?

Not Important 1 2 3 4 5 6 7 Very Important

25. How much time would you be willing to spend on such an orientation?

_____ ½ hour _____ 1 hour _____ 1-1/2 hours _____ 2 hours

26. If you would like an orientation, please indicate which day(s) of the week you would prefer to attend an orientation.

_____Monday _____Tuesday _____Wednesday _____Thursday

_____Friday _____Saturday _____Sunday

27. If you would like an orientation, which of the following would you like to see included in a library orientation?

(Please check all that apply)

- _____ An overview of all available library resources and services
- _____ An in-depth description of local electronic resources
- _____ Instruction on searching locally available databases
- _____ PDA instruction
- _____ Other (please specify :) _____

28. A Clinical Medical Librarian (CML) is a librarian who attends morning report on a regular basis (example- twice/week). They take questions from the service and get answers from the literature back quickly. They do information training and give updates of new information resources occasionally as well.

Would you like to have a CML for your program?

Yes _____ No _____

Section 4: Information Resources/Services

29. Do you use the information services provided by the College of Medicine library?

Yes _____ No _____

If yes, rate the information services provided by the College of Medicine library:

| | <u>Very Poor</u> | | | | | | <u>Very Good</u> |
|-----------------------------------|------------------|---|---|---|---|---|------------------|
| a. Speed of service | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. Knowledge and ability of staff | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| c. Cooperativeness of staff | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| d. Overall opinion of service | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

30. Please comment on any experience with the QCOM library service and its ability to provide you with clinically useful information.

31. Do you use the information services provided by the VA library?

Yes_____ No_____

If yes, rate the information services provided by the VA library:

Very Poor1 2 3 4 5 6 7 Very Good

32. Do you use the information services provided by the JCMC library?

Yes_____ No_____

If yes, rate the information services provided by the JCMC library:

Very Poor1 2 3 4 5 6 7 Very Good

33. Do you use the information services provided by the Wellmont library?

Yes_____ No_____

If yes, rate the information services provided by the Wellmont library:

Very Poor 1 2 3 4 5 6 7 Very Good

34. Are there adequate computer stations in clinical areas (hospital and ambulatory) for you to access electronic information?

Yes_____ No_____

If no, please indicate where?

35. What three things would you like to see changed/introduced to improve your health information access and use? (Please write on back if needed)

Appendix B

Survey Instrument for Clinical Faculty

ETSU CLINICAL FACULTY- USE OF CLINICAL INFORMATION SURVEY

Residency Program:

_____ Family Practice

_____ Internal Medicine

_____ Obstetrics/Gynecology

_____ Pathology

_____ Pediatrics

_____ Psychiatry

_____ Surgery

Gender:

_____ Female

_____ Male

Section 1: Information Behaviors

1. How frequently do you think your residents have a clinical information need?

_____ 1 or more every patient

_____ 1 every 2 patients

_____ 1 every 3 patients

_____ 1 every 4 patients

_____ 1 every 5 or more patients

Please rank the type of clinical information needs you think your residents most frequently have:

(RANK THE TOP 3 IN IMPORTANCE- 1 = MOST IMPORTANT, 2 = NEXT IMPORTANT, 3)

DO NOT CHECK, PLEASE RATE THE TOP 3

- _____ Diagnostic information
- _____ Drug information
- _____ Economic information
- _____ Etiology information
- _____ Patient education information
- _____ Prognosis information
- _____ Therapy information
- _____ Other: Please list _____

2. What percent of these information needs do you think they look for an answer?

- _____ 0-10%
- _____ 10-20%
- _____ 20-30%
- _____ 30-40%
- _____ 40-50%
- _____ 50-60%
- _____ 60-70%
- _____ 70-80%
- _____ 80-90%
- _____ 90-100%

3. What percent of the questions that they look for an answer do you think they find an answer?

- _____ 0-10%

- _____ 10-20%
- _____ 20-30%
- _____ 30-40%
- _____ 40-50%
- _____ 50-60%
- _____ 60-70%
- _____ 70-80%
- _____ 80-90%
- _____ 90-100%

4. Do you use the resources of the ETSU Medical Library (electronic or print)?

Yes _____ No _____

If yes, how frequently do you use the resources of the ETSU Medical Library (electronic or print?)

- _____ daily
- _____ weekly
- _____ monthly
- _____ yearly

5. If yes, how would you characterize the clinical value of the information received from the ETSU Medical library (electronic or print)?

- a. It refreshed my memory of details and/or facts..... Agree Disagree
- b. I found most of it irrelevant..... Agree Disagree
- c. It did (or will) contribute to higher quality care..... Agree Disagree
- d. Some of it was new to me..... Agree Disagree
- e. I found little or nothing of clinical value..... Agree Disagree
- f. It substantiated what I already knew or suspected..... Agree Disagree

- g. On the whole, it was inaccurate or out of date..... Agree Disagree
 h. It did (or will) contribute to better clinical decisions..... Agree Disagree

6. If yes, did information you utilized from the ETSU Medical Library (electronic or print) ever change:

| | | |
|--|-----|----|
| How you handled a clinical situation | Yes | No |
| Diagnosis..... | Yes | No |
| Choice of tests..... | Yes | No |
| Choice of drugs..... | Yes | No |
| Choice of other treatment..... | Yes | No |
| Length of stay (reduce)..... | Yes | No |
| Post-hospital care or treatment..... | Yes | No |
| Advice given to the patient..... | Yes | No |

7. What kind of sources best meet your information needs?
 (RANK THE TOP 3 IN IMPORTANCE- 1 BEING MOST IMPORTANT, 2 NEXT IMPORTANT, 3)

DO NOT CHECK, PLEASE RATE THE TOP 3

| | | | |
|------------------|----------------------|-----------------|-----------------|
| CME events_____ | Colleague_____ | Drug reps _____ | Electronic_____ |
| Print Books_____ | Print Journals _____ | Videos_____ | Other_____ |

If other, please list: _____.

8. What is the greatest barrier to your use of clinical information?

(RANK THE TOP 3 IN IMPORTANCE- 1 BEING MOST IMPORTANT, 2 NEXT IMPORTANT, 3)

DO NOT CHECK, PLEASE RATE THE TOP 3

| | | |
|--|----------------------------|-------------------------------|
| _____Cost | _____Inadequate technology | _____lack of searching skills |
| _____overwhelmed by too much information | _____time | |
| _____other (please explain :) _____ | | |

9. The increasing body of information: (please check all that apply)

_____ makes me a better doctor in my daily work
_____ does steal time from non-professional activities
_____ gives me a feeling of powerlessness towards colleagues
_____ gives me a feeling of professional impotence
_____ gives me a feeling of better professional control
_____ gives me a feeling of powerlessness towards patients
_____ makes me a better researcher

10. Do you use a PDA? _____ Yes _____ No

11. If yes, what type? _____ PocketPC _____ Palm

12. If you use a PDA, in what ways do you use it?

_____ Epocrates or other drug database

_____ InfoRetriever

_____ Medical calculators

_____ Patient tracking

_____ Reference books such as the Washington Manual, 5-Minute Clinical Consult

_____ Other (please specify) _____

13. If you do not use a PDA, do you expect to begin using one?

_____ Yes, expect to in the next 12 months

_____ Yes, expect to in the next 24 months

_____ No

_____ Not sure

Section 2: Information Skills

14. If you use a PDA, rate your skill as a PDA user:

Very Poor 1 2 3 4 5 6 7 Very Good

15. Rate your residents' skills as PDA users:

Very Poor 1 2 3 4 5 6 7 Very Good

16. Rate your skills/knowledge of evidence-based medicine (EBM):

Very Poor 1 2 3 4 5 6 7 Very Good

17. Rate your residents' skills/knowledge of evidence-based medicine (EBM):

Very Poor 1 2 3 4 5 6 7 Very Good

18. The best type of study for a therapy question is:

Randomized control trial_____ Cohort study_____ Case control study_____

Case study_____ Review article_____

19. The best type of study for a prognosis question is:

Randomized control trial_____ Cohort study_____ Case control study_____

Case study_____ Review article_____

20. How important do you believe evidence-based medicine is in providing optimum patient care?

Not Important 1 2 3 4 5 6 7 Very Important

21. Do you use LoansomeDoc? Yes_____ No_____

If yes, rate your skill as a LoansomeDoc user?

Very Poor 1 2 3 4 5 6 7 Very Good

22. Do you know how to access ETSU medical databases off-campus?

Yes_____ No_____

23. Do you know how to activate your ETSU email account?

Yes_____ No_____

Section 3: Information Training

24. Do you have a formal EBM training program in your residency program?

Yes_____ No_____

25. Do you personally teach EBM to your residents?

Yes_____ No_____

26. Rate the information training you give residents:

Very Poor 1 2 3 4 5 6 7 Very Good

27. How much time do you spend on the information training you give residents?

_____ hours per _____ (day, week, month, year)

28. How important would it be to you to have an orientation to ETSU College of Medicine library resources and services made available to you and your residents?

Not Important 1 2 3 4 5 6 7 Very Important

29. If you would like an orientation, how much time would you be willing to spend on such an orientation?

_____ ½ hour _____ 1 hour _____ 1-1/2 hours _____ 2 hours

30. If you would like an orientation, please indicate which day(s) of the week you would prefer to attend an orientation.

_____Monday _____Tuesday _____Wednesday _____Thursday

_____Friday _____Saturday _____Sunday

31. If you would like an orientation, which of the following would you like to see included in a library orientation?

(Please check all that apply)

_____ An overview of all available library resources and services

_____ An in-depth description of local electronic resources

_____ Instruction on searching locally available databases

_____ PDA instruction

_____ Other (please specify :) _____

32. A Clinical Medical Librarian (CML) is a librarian who attends morning report on a regular basis (example- twice/week). They take questions from the service and get answers from the literature back quickly. They do training and updates of new information resources occasionally as well.

Would you like to have a CML for your program?

Yes_____ No_____

Section 4: Information Resources

33. Do you use the information services provided by the College of Medicine library?

Yes_____ No_____

If yes, rate the information services provided by the College of Medicine library:

| | Very Poor | | | | | | Very Good |
|-----------------------------------|-----------|---|---|---|---|---|-----------|
| a. Speed of service | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. Knowledge and ability of staff | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| c. Cooperativeness of staff | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| d. Overall opinion of service | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

34. Please comment on any experience with the QCOM library service and its ability to provide you with clinically useful information.

35. Do you use the information services provided by the VA library?

Yes_____ No_____

If yes, rate the information services provided by the VA library:

Very Poor1 2 3 4 5 6 7 Very Good

36. Do you use the information services provided by the JCMC library?

If yes, rate the information services provided by the JCMC library:

Very Poor1 2 3 4 5 6 7 Very Good

37. Do you use the information services provided by the Wellmont library?

If yes, rate the information services provided by the Wellmont library:

Very Poor1 2 3 4 5 6 7 Very Good

38. Are there adequate computer stations in clinical areas (hospital and ambulatory) for you to access electronic information?

Yes_____ No_____

If no, please indicate where:

39. What three things would you like to see changed/introduced to improve your health information access and use? (Please write on back if needed)

Appendix C

Survey Instrument 2

SURVEY INSTRUMENT 2- ETSU QUILLEN COLLEGE OF MEDICINE LIBRARY

ELECTRONIC INFORMATION RESOURCES

Instructions: please rate the following databases on a scale of 1 (high clinical value) to 7 (low clinical value). Please return with the other survey in the enclosed campus mail envelope. Thank you.

Residency Program:

| | |
|-----------------------|-------|
| Family Medicine | _____ |
| Internal Medicine | _____ |
| Obstetrics/Gynecology | _____ |
| Pathology | _____ |
| Pediatrics | _____ |
| Psychiatry | _____ |
| Surgery | _____ |

Year:

| | |
|------|-------|
| PGY1 | _____ |
| PGY2 | _____ |
| PGY3 | _____ |
| PGY4 | _____ |
| PGY5 | _____ |
| PGY6 | _____ |
| PGY7 | _____ |

| | |
|-----------|-------|
| Attending | _____ |
|-----------|-------|

CINAHL

Do you use? Yes _____ No _____

If yes, please rate:

| | | | | | | |
|----------|---|---|---|---|---|--------------------|
| No Value | | | | | | Extremely Valuable |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

ClinicalTrials.gov

Do you use? Yes _____ No _____

If yes, please rate:

No Value Extremely Valuable

1 2 3 4 5 6 7

Cochrane Library

Do you use? Yes _____ No _____

If yes, please rate:

No Value Extremely Valuable

1 2 3 4 5 6 7

Embase: Psychiatry

Do you use? Yes _____ No _____

If yes, please rate:

No Value Extremely Valuable

1 2 3 4 5 6 7

Google

Do you use? Yes _____ No _____

If yes, please rate:

No Value Extremely Valuable

1 2 3 4 5 6 7

Health Reference Center Academic

Do you use? Yes _____ No _____

If yes, please rate:

No Value

Extremely Valuable

1 2 3 4 5 6 7

ImagesMD

Do you use? Yes _____ No _____

If yes, please rate:

No Value

Extremely Valuable

1 2 3 4 5 6 7

InfoRetriever (InfoPOEM)

Do you use? Yes _____ No _____

If yes, please rate:

No Value

Extremely Valuable

1 2 3 4 5 6 7

MD Consult

Do you use? Yes _____ No _____

If yes, please rate:

No Value

Extremely Valuable

1 2 3 4 5 6 7

National Guideline Clearinghouse

Do you use? Yes _____ No _____

If yes, please rate:

No Value

Extremely Valuable

Online full-text journals

If yes, please rate:

PsychINFO

If yes, please rate:

PubMed

If yes, please rate:

StatRef

If yes, please rate:

TOXLINE

Do you use? Yes _____ No _____

If yes, please rate:

No Value Extremely Valuable

1 2 3 4 5 6 7

UpToDate

Do you use? Yes _____ No _____

If yes, please rate:

No Value Extremely Valuable

1 2 3 4 5 6 7

World Wide Web

Do you use? Yes _____ No _____

If yes, please rate:

No Value Extremely Valuable

1 2 3 4 5 6 7

PLEASE LIST ANY OTHER RESOURCES THAT YOU USE THAT ARE NOT LISTED.

TELL US DATABASES YOU WOULD LIKE US TO BUY:

Description of databases:

CINAHL

The information contained in the CINAHL Database is compiled and published by CINAHL, which covers literature in the fields of nursing and allied health.

ClinicalTrials.gov

ClinicalTrials.gov provides regularly updated information about federally and privately supported clinical research in human volunteers. ClinicalTrials.gov gives you information about a trial's purpose, who may participate, locations, and phone numbers for more details

Cochrane Library

The Cochrane Database of Systematic Reviews contains full text articles, as well as protocols focusing on the effects of healthcare. The reviews are highly structured and systematic, with evidence included or excluded on the basis of explicit quality criteria, to minimize bias. Data is that of evidence-based medicine and is often combined statistically (with meta-analysis) to increase the power of the findings of numerous studies, each too small to produce reliable results individually.

Embase: Psychiatry

EMBASE Psychiatry includes abstracts and citations concerning psychiatry. Also included are abstracts from other medical disciplines which have relevance to psychiatry. The scope of Psychiatry includes all aspects of medical psychology and psychiatry.

Health Reference Center Academic

Use this database to find articles on: Fitness, Pregnancy, Medicine, Nutrition, Diseases, Public Health, Occupational Health and Safety, Alcohol and Drug abuse, HMOs, Prescription Drugs, etc. The material contained in this database is intended for informational purposes only.

ImagesMD

ImagesMD is the first online encyclopedia of medical images available on the Web. This is a comprehensive visual reference of medicine that aims to transform lectures, discussions, and presentations. ImagesMD features more than 48,000 images from more than 90 collections ranging from allergy to cardiology, from neurology to urology, each accompanied by authoritative explanatory text from 2000 of the world's leading medical experts.

InfoRetriever (InfoPOEM)

InfoRetriever (which is also called as InfoPOEM) database simultaneously searches the complete POEMs database (POEM stands for Patient-Oriented Evidence that Matters.) POEMs have to meet three criteria: they address a question faced by physicians; they measure outcomes that physicians and patients care about: symptoms, morbidity, quality of life, and mortality; and they have the potential to change the way physicians practice. It also searches 6 additional evidence-based databases, plus the leading quick-reference tool, to enable rapid lookup and application of information and tools while you practice. In seconds, you search the complete POEMs database, 120 clinical decision rules, 1700+ diagnostic-test and H&PE calculators, the complete set of Cochrane systematic review abstracts, all USPSTF guidelines plus all evidence-based guidelines from the National Guidelines Clearinghouse (NGC), and the Five-Minute Clinical Consult. The information is organized and presented for immediate application to your practice. There is even basic drug information and an ICD-9 lookup tool within the application. The database can be loaded on a PDA.

MD Consult

MD Consult contains information from over 55 of the best medical journals and clinics, 39 renowned medical reference books, over 600 clinical practice guidelines, 3,000 customizable patient handouts, and drug information for more than 30,000 medications.

National Guideline Clearinghouse

The National Guideline Clearinghouse™ (NGC™) is a public resource for evidence-based clinical practice guidelines. NGC is sponsored by the Agency for Healthcare Research and Quality (AHRQ), U.S. Department of Health and Human Services, in partnership with the American Medical Association and the American Association of Health Plans.

PubMed

PubMed is a service of the National Library of Medicine that includes over 16 million citations from MEDLINE and other life science journals for biomedical articles back to the 1950s. PubMed includes links to full text articles and other related resources.

PsychINFO

PsycINFO provides access to international literature in psychology and related disciplines. Unrivaled in its depth of psychological coverage and respected worldwide for its high quality, the database is enriched with literature from an array of disciplines related to psychology such as psychiatry, education, business, medicine, nursing, pharmacology, law, linguistics, and social work. Nearly all records contain nonevaluative summaries, and all records from 1967 to the present are indexed using the Thesaurus of Psychological Index Terms. PsycINFO includes

psychological research and its applications; the database is of prime relevance to many industries and research establishments worldwide. The sources include over 1,400 professional journals, chapters, books, reports, theses and dissertations, published internationally.

StatRef

Full-text medical and drug information for healthcare professionals available online. It is a collection of full-text books.

TOXLINE

TOXLINE is the extensive collection of the National Library of Medicine online bibliographic information covering the biochemical, pharmacological, physiological, and toxicological effects of drugs and other chemicals.

UpToDate

UpToDate is specifically designed to answer the clinical questions that arise in daily medical practice and to do so quickly and easily so that it can be used right at the point of care

Appendix D

Correlation of Research Questions and Research Instruments

| Area of research | Research questions | Quantitative questions | Literature |
|--|---|--|---|
| Information-seeking behaviors of current ETSU medical residents? | How do ETSU residents describe their information needs/behaviors? | <p>SURVEY 1</p> <ol style="list-style-type: none"> 1. How frequently do you have a clinical information need? 2. What percent of these information needs do you look for an answer? 3. What percent of the ones that you look for an answer do you find an answer? 7. What kind of sources best meet your information needs? 8. What is the greatest barrier to your use of clinical information? 9. The increasing body of information: | <p>Demographics: Forrest & Robb (2000) Casebeer <i>et al.</i>(2002) 1-3. Green, Ciampi & Ellis (2000)</p> <p>7-8. Lundeen, Tenopir & Wermager (1994); Andrews, Pearce, Ireson & Love (2005) 9. Nylenna & Aasland (2000)</p> |
| | How do ETSU residents obtain (or not obtain) information to meet their needs? | <ol style="list-style-type: none"> 4. Do you use the resources of the ETSU medical library? If yes, how frequently do you use the resources of the ETSU Medical Library (electronic or print)? 7. What kind of sources best meet your information needs? | |

| Area of research | Research questions | Quantitative questions | Literature |
|------------------|--|--|---|
| | How do ETSU residents describe their use of information technology including software programs such as online databases and hardware such as personal digital assistants (PDAs) to meet their information needs? | <p>5. How would you characterize the clinical value of the information received from the ETSU medical library?</p> <p>6. Did information you utilized from the ETSU Medical Library ever change: diagnosis/tests/therapy/ etc.</p> <p>10. Do you use a PDA?</p> <p>11. If yes, what type?</p> <p>12. If you use a PDA, in what ways do you use it?</p> <p>13. If you do not use a PDA, do you expect to begin using one?</p> | <p>5-6. Marshall (1992)</p> <p>10-13. Borzo (2005); Andrews <i>et al.</i>(2005); Barrett, Strayer & Schubart (2004)</p> |

| Area of research | Research questions | Quantitative questions | Literature |
|--|---|---|---|
| Information skills/knowledge of current ETSU residents | What level of skill as clinical information users do ETSU medical residents have? | 1. Rate your skill as a PDA user. 2. Rate your knowledge of evidence-based practice medicine: 3. The best type of study for a therapy question is: 4. The best type of study for a prognosis question is: 5. How important do you believe EBM is in providing optimum patient care? 6. Do you use LoansomeDoc? 7. Do you know how to access ETSU databases off-campus? 8. Do you know how to activate your ETSU email account? | 3-4. Ramos, Schafer & Tracz (2003) 5. Byrnes, Kulick & Schwatz (2004) 6-7. Paden, Batson & Wallace (2001) |

| Area of research | Research questions | Quantitative questions | Literature |
|--|---|---|---|
| Information training of ETSU medical residents | Is the information training provided for ETSU residents adequate? | <p>1. Have you received clinical information training from attending physicians? Rate</p> <p>2. Have you received clinical information training from librarians? Rate</p> <p>3. How important would an orientation to ETSU College of Medicine library resources and services available to you?</p> <p>4. How much time would you be willing to spend?</p> <p>5. Please indicate which day(s) of the week you would prefer:</p> <p>6. Which of the following would you like to see in an orientation?</p> | <p>1-2. Green & Ruff (2005)</p> <p>3-6. Abromitis <i>et al.</i>(2003)</p> |

| Area of research | Research questions | Quantitative questions | Literature |
|------------------|--|--|----------------|
| | Do ETSU residents need a Clinical Medical Library program? | 7. Would you like a Clinical Medical Librarian for your program? | Wallace (2004) |

| Area of research | Research questions | Quantitative questions | Literature |
|---|--|---|--|
| Information resources available to ETSU residents | Are the information resources, including citation databases, full-text electronic books and journals, and library programs provided by the ETSU medical library for ETSU residents adequate? | <p>1. Do you use the information services provided by the College of Medicine library? Rate-</p> <p>2. Do you use the information services provided by the VA library? Rate-</p> <p>3. Do you use the information services provided by the JCMC library? Rate-</p> <p>4. Do you use the information services provided by the Wellmont library? Rate-</p> <p>5. Rate the accessibility of information from the ETSU medical library.</p> <p>6. Are there adequate computer stations in clinical areas (hospital and ambulatory) for you to access electronic information?</p> <p>7. What three things would you like to see changed to improve your health information access?</p> <p>SURVEY 2</p> | <p>7. Lundeen, Tenopir & Wermager (1994)</p> |

| Area of research | Research questions | Quantitative questions | Literature |
|------------------|---|------------------------|------------|
| | | | |
| | Do residents' valuation of the information correspond to the resource's cost? | SURVEY 2 | |

Appendix E

Survey Cover Letter



James H. Quillen College of Medicine

Learning Resources - Box 70693 - Johnson City, Tennessee 37614-1710 - (423) 439-6252 - Fax: (423) 439-7025

May 9, 2006

ETSU Resident and Attending Physicians:

I am writing to ask your help in a study of information use by residents being conducted by the ETSU medical library. This study is part of an effort to learn how happy ETSU residents are with the training and information resources they have and to learn more about their information needs.

We are conducting our survey with all 240 ETSU residents and all full-time clinical faculty who work with residents.

Results from the survey will be used to help the library select the databases it leases and design its training programs. By understanding the information needs of residents the library can better design its programs to meet these needs.

By taking the survey you are giving your informed consent. Your answers are completely confidential and will be released as summaries in which no individual's answers can be identified. When you return your completed questionnaire, your name will be deleted from the mailing list and never connected to your answers in any way. The survey is voluntary. However, you can help us very much by taking a few minutes to share your experiences and opinions.

I have enclosed a bumper sticker as a small token of appreciation as a way of saying thanks for your help.

If you have any questions or comments about this study, I would be happy to talk with you. My number is 439-8071 or 416-8141 (cell). My email is wallacer@etsu.edu.

Thank you very much for helping with this important study.

Sincerely,

Rick Wallace
Associate Professor
ETSU College of Medicine

Appendix F

Critique Sheet for Survey Pilot Testers

SURVEY ASSESSMENT TOOL ^a

| Please answer the following questions for each Health Care Professionals Survey Item: Write recommended changes to question number: | Clear & Unambiguous Yes or No | Relevant to this Study Yes or No |
|--|--|---|
| 1. | | |
| 2. | | |
| 3. | | |
| 4. | | |
| 5. | | |
| 6. | | |
| 7. | | |
| 8. | | |
| 9. | | |
| 10. | | |
| 11. | | |
| 12. | | |
| 13. | | |
| 14. | | |
| 15. | | |
| 16. | | |
| 17. | | |
| 18. | | |
| 19. | | |
| 20. | | |
| 21. | | |
| 22. | | |
| What questions or issues should be added to this survey? Add: | | |
| How many minutes did it take you to complete this survey? | | |

^a Source: Byington R. Dissertation, 2004.

Appendix G
Survey Pre-notice Letter (Dillman, 2000)



James H. Quillen College of Medicine

Learning Resources - Box 70693 - Johnson City, Tennessee 37614-1710 - (423) 439-6252 - Fax: (423) 439-7025

May 1, 2006

ETSU Medical Resident

A few days from now you will receive in the mail a request to fill out a brief questionnaire for an important research project being conducted by East Tennessee State University.

It concerns the use of information resources by ETSU residents.

I am writing in advance because we have found many people like to know ahead of time that they will be contacted. This study is an important one that will help the ETSU medical library select databases for residents to use and training programs to expose residents to the proper use of the databases.

Thank you for your time and consideration. It is only with the generous help of people like you that our research can be successful.

Sincerely,

Rick Wallace
Associate Professor
ETSU College of Medicine

P.S. We will be enclosing a bumper sticker as a small token of appreciation with the questionnaire as a way of saying thanks.



James H. Quillen College of Medicine

Learning Resources - Box 70693 - Johnson City, Tennessee 37614-1710 - (423) 439-6252 - Fax: (423) 439-7025

May 1, 2006

ETSU Faculty Physician

A few days from now you will receive in the mail a request to fill out a brief questionnaire for an important research project being conducted by East Tennessee State University.

It concerns the use of information resources by ETSU residents.

I am writing in advance because we have found many people like to know ahead of time that they will be contacted. This study is an important one that will help the ETSU medical library select databases for residents to use and training programs to expose residents to the proper use of the databases.

Thank you for your time and consideration. It is only with the generous help of people like you that our research can be successful.

Sincerely,

Rick Wallace, MA, MDiv, MAOM, MSLS
Associate Professor
ETSU College of Medicine

Appendix H

Sample Letter of Clinical Department Chair to Attendings and Residents

Dear Resident,

Please make every effort to return these two surveys to the medical library. Library and information services are important to the practice of medicine. This information gathered from this survey will help the library better serve you. Thank-you for your help.

Sincerely,

Dr. _____

Appendix I
Permissions to Use Survey Questions

Richard,
Yes, you are welcome to use it. Please attribute appropriately. Good luck with your dissertation!
Best,
Jennifer

From: Wallace, Richard Lane [<mailto:WALLACER@mail.etsu.edu>]
Sent: Fri 2/3/2006 9:49 PM
To: Byrnes, Jennifer
Subject: Survey question

May I use the question from your survey in JMLA 92(3), 334-340:

"How important do you believe evidence-based medicine is in providing optimum patient care?"

in my dissertation:

A Mixed Methods Analysis of the Information-Seeking Behaviors, Information Skills,
Information Training and Information Resources for ETSU Medical Residents

Thank-you

Absolutely you have our permission (Lundeen says yes too). Good luck. Carol
Tenopir>===== Original Message From "Wallace, Richard Lane"
<WALLACER@mail.etsu.edu> =====
>May I use the question from:
>Bull Med Libr Assoc 82(2) April 1994
>
>"Info needs of rural health care practitioners in hawaii"
>
>in my dissertation survey??
>
>
>The question is, "What three things would you like to see
>changed/introduced

to improve your health information access and use?" was taken from Lundeen *et al.* (1994) with permission.

>

>thanks!

Carol Tenopir, Professor
School of Information Sciences and
Interim Director, Center for Information Studies University of Tennessee
1345 Circle Park Drive, 451 Communications Bldg.
Knoxville, TN 37996-0341
(865) 974-7911 FAX (865) 974-4967
Web.utk.edu/~tenopir/

Richard,

You are of course heartily welcome to use this question. Please give a reference to the primary source and I would (for many reasons) appreciate a copy of your dissertation.

Kind regards

Magne

Magne Nylenna
Professor dr.med.
Norwegian electronic health library
PO Box 7004 St Olavs plass, N-0130 Oslo, Norway Tlf + 47 24 16 33 64 Fax + 47 23 25 50 20
Mobil + 47 911 35 180
E-mail: magne.nylenna@helsebiblioteket.no

-----Opprinnelig melding-----

Fra: Wallace, Richard Lane [<mailto:WALLACER@mail.etsu.edu>]

Sendt: 31. januar 2006 02:59

Til: Magne Nylenna

Emne: Use of Survey Question

Dr Nylenna,

I am writing a dissertation for an EdD degree.

I would like to use a question of yours from:

Scandinavian J Primary Health Care

2000

volume 18

"Primary care physicians and their information-seeking behaviour"

The question is:

The increasing body of information: (please check all that apply)

_____ makes me a better doctor in my daily work

_____ does steal time from non-professional activities

_____ gives me a feeling of powerless towards colleagues

_____ gives me a feeling of professional impotence

_____ gives me a feeling of better professional control

_____ gives me a feeling of powerless towards patients

_____ makes me a better researcher

The dissertation title is:

A Mixed Methods Analysis of the Information-Seeking Behaviors, Information Skills, Information Training and Information Resources for ETSU Medical Residents

THANK-YOU!

RE: permission to use these questions on my EdD dissertation

Michelle Brewer [MBrewer@njha.com]



The sender of this message has requested a read receipt. [Click here to send a receipt.](#)

To: Wallace, Richard Lane

Cc: Mackes, Robert; Erica Moncrief; Annemarie Edinger; Angela Harris

Wallace, Richard Lane [<mailto:WALLACER@mail.etsu.edu>]

East Tennessee State University College of Medicine library

Hi Richard,

Wow, a blast from the past. I had totally forgotten these HSLANJ surveys were in that MLA publication. If you are referencing HSLANJ and "Instrument 2.3" (pages 63 through 80, where I am listed as the contact) published in the MLA DOCKIT on "Evaluation Instruments for Health Sciences Libraries," you are more than welcome to reuse the survey and questions for your dissertation. We did not revise this information. What was published remained as it.

You might be interested to know that we adapted or used on our survey the "clinical outcomes" questions from the "Rochester study" created by Bernie Todd Smith. You may be familiar with it, and if not these citations would be useful to you. It was published by Joanne G. Marshall. See citations below.

1. Marshall, Joanne G. "The Impact of the Hospital Library on Clinical Decision Making: The Rochester Study," BMLA, 80(2) April 1992, pp. 169-178. (I believe this has the original questions and survey results)
2. Proceedings, Ninety-second Annual Meeting of the Medical Library Association, Inc., Washington, District of Columbia, May 15-21, 1992. BMLA 81(1), Jan 1993.
3. "Impact of Hospital Libraries on Patient Care: A Report on Library User Surveys Conducted in the New York Metropolitan Reference and Research Library Agency (METRO) Region." Final Report, March 2003. Submitted by Debra C. Rand, Health Sciences Library Director, Long Island Jewish Medical Center. (Debra is still at LIJ, if you need to contact her. I think this was published separately, and not in BMLA, but you can probably double-check.)

I applaud your continuing research in this area and use in your doctoral dissertation!

Michelle M. Volesko Brewer
Dir. Lib. & Corp. Info. Svcs.
New Jersey Hospital Association
Voice: 609-275-4230; Fax: 609-275-4107
Email: Work mvolesko@njha.com

-----Original Message-----

From: Wallace, Richard Lane [<mailto:WALLACER@mail.etsu.edu>]
Sent: Saturday, April 01, 2006 7:18 PM
To: Michelle Brewer
Subject: permission to use these questions on my EdD dissertation

I am a medical librarian at East Tennessee State University College of Medicine library and am writing a doctoral dissertation in education on: Information-Seeking Behaviors, Information Skills, Training and Resources for ETSU Medical Residents. I would like to use these questions in my survey instrument. I will cite the sources in my dissertation. I saw the questions in the MLA Docket: Evaluation Instruments for Health Sciences Libraries.

Did information you utilized (electronic or print) ever change:

| | | |
|---|-----|----|
| How you handled a clinical situation..... | Yes | No |
| Diagnosis..... | Yes | No |
| Choice of tests..... | Yes | No |
| Choice of drugs..... | Yes | No |
| Choice of other treatment..... | Yes | No |
| Length of stay (reduce)..... | Yes | No |
| Post-hospital care or treatment..... | Yes | No |
| Advice given to the patient..... | Yes | No |

How would you characterize the clinical value of the information received from the library (electronic or print)?

| | | |
|---|-------|----------|
| It refreshed my memory of details and/or facts..... | Agree | Disagree |
| I found most of it irrelevant..... | Agree | Disagree |
| It did (or will) contribute to higher quality care | Agree | Disagree |
| Some of it was new to me..... | Agree | Disagree |
| I found little or nothing of clinical value..... | Agree | Disagree |
| It substantiated what I already knew or suspected..... | Agree | Disagree |
| On the whole, it was inaccurate or out of date..... | Agree | Disagree |
| It did (or will) contribute to better clinical decisions..... | Agree | Disagree |

Do you use the information services provided by the College of Medicine library?

If yes, rate the information services provided by the College of Medicine library:

| | | | | | | | |
|-----------------------------------|-----------|---|---|---|---|---|-----------|
| | Very Poor | | | | | | Very Good |
| a. Speed of service | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. Knowledge and ability of staff | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| c. Cooperativeness of staff | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| d. Overall opinion of service | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Thank you very much.

Appendix J INFORMED CONSENT DOCUMENT

This Informed Consent will explain about being a research participant in an experiment. It is important that you read this material carefully and then decide if you wish to be a volunteer.

PURPOSE:

The purpose of this research study is as follows:

To discover where ETSU is lacking in its training of residents to be clinical information users. The results will be used to improve library and information resources and services to residents.

DURATION

The research consists of two surveys that take about 10 minutes to complete. All ETSU residents and full-time attendings will be sent the survey.

PROCEDURES

The procedures, which will involve you as a research subject, include you filling out and returning the 2 surveys to the ETSU Medical Library by campus mail.

ALTERNATIVE PROCEDURES/TREATMENTS: none

POSSIBLE RISKS/DISCOMFORTS

The possible risks and/or discomforts of your involvement include: none

POSSIBLE BENEFITS

The possible benefits of your participation are that the results will be used to provide better library and information services to ETSU residents.

FINANCIAL COSTS: none

VOLUNTARY PARTICIPATION

Participation in this research experiment is voluntary. You may refuse to participate.

CONTACT FOR QUESTIONS

If you have any questions, problems or research-related problems at any time, you may call Rick Wallace at (423 439-8071), or Dr Hal Knight at (439-7616). You may call the Chairman of the Institutional Review Board at 423/439-6054 for any questions you may have about your rights as a research subject. If you have any questions or concerns about the research and want to talk to someone independent of the research team or you can't reach the study staff, you may call an IRB Coordinator at 423/439-6055 or 423/439/6002.

CONFIDENTIALITY

Every attempt will be made to see that your study results are kept confidential. A copy of the records from this study will be stored in the ETSU Medical Library for at least 10 years after the end of this research. The results of this study may be published and/or presented at meetings without naming you as a subject. Although your rights and privacy will be maintained, the Secretary of the Department of Health and Human Services, the ETSU/VA IRB for medical research and personnel particular to this research (Rick Wallace, Medical Library) have access to the study records. Your records will be kept completely confidential according to current legal requirements. They will not be revealed unless required by law, or as noted above.

By signing below, you confirm that you have read or had this document read to you. You will be given a signed copy of this informed consent document. You have been given the chance to ask questions and to discuss your participation with the investigator. You freely and voluntarily choose to be in this research project.

SIGNATURE OF PARTICIPANT

DATE

PRINTED NAME OF PARTICIPANT

DATE

SIGNATURE OF INVESTIGATOR

DATE

Appendix K

IRB Forms



East Tennessee State University

Office for the Protection of Human Research Subjects • Box 70565 • Johnson City, Tennessee 37614-1707 • (423) 439-6053
Fax: (423) 439-6060

IRB APPROVAL - Initial Review (Exempt)

April 5, 2006

Richard L. Wallace, MSLS
Medical Library
Box 70693

Re: Information Seeking Behaviors, Information Skills, Training and Resources for ETSU Medical Residents

IRB#: 05-221e
EXEMPT

The following items were reviewed:

- Form 103 (05/02/2006)
- Narrative
- Informed Consent Document (03/02/2006)
- CV
- Conflict of Interest Form
- Letter of Clinical Dept Chair to Residents
- Survey Cover Letter
- Survey Pre-Notice Letter
- Questionnaire / Survey - ETSU Residents - Use of Clinical Information

On March 29, 2006, a final exemption approval was granted by Kenneth E. Olive, MD, Chair, ETSU/VA Medical IRB. It is understood this project will be conducted in full accordance with all applicable sections of the IRB Policies. No continuing review is required. The exempt approval will be reported to the convened board on May 2, 2006.

I reviewed the above-referenced study and find that it qualifies as exempt under category:
45 CFR 46.101(b)(1)

Research conducted in established or commonly accepted educational settings, involving normal education practices, such as

- (a) research on regular and special instructional strategies, OR
(b) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods



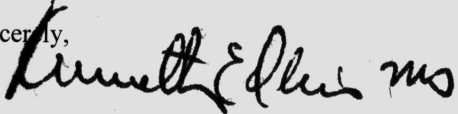
Page 1 of 2

Accredited Since December 2005

Unanticipated Problems Involving Risks to Subjects or Others must be reported to the IRB (and VA R&D if applicable) within 10 working days.

Proposed changes in approved research can not be initiated without IRB review and approval. The only exception to this rule is that a change can be made prior to IRB approval when necessary to eliminate apparent immediate hazards to the research subjects [21 CFR 56.108 (a)(4)]. In such a case, the IRB must be promptly informed of the change following its implementation (within 10 working days) on Form 109 (www.etsu.edu/irb). The IRB will review the change to determine that it is consistent with ensuring the subject's continued welfare.

Sincerely,

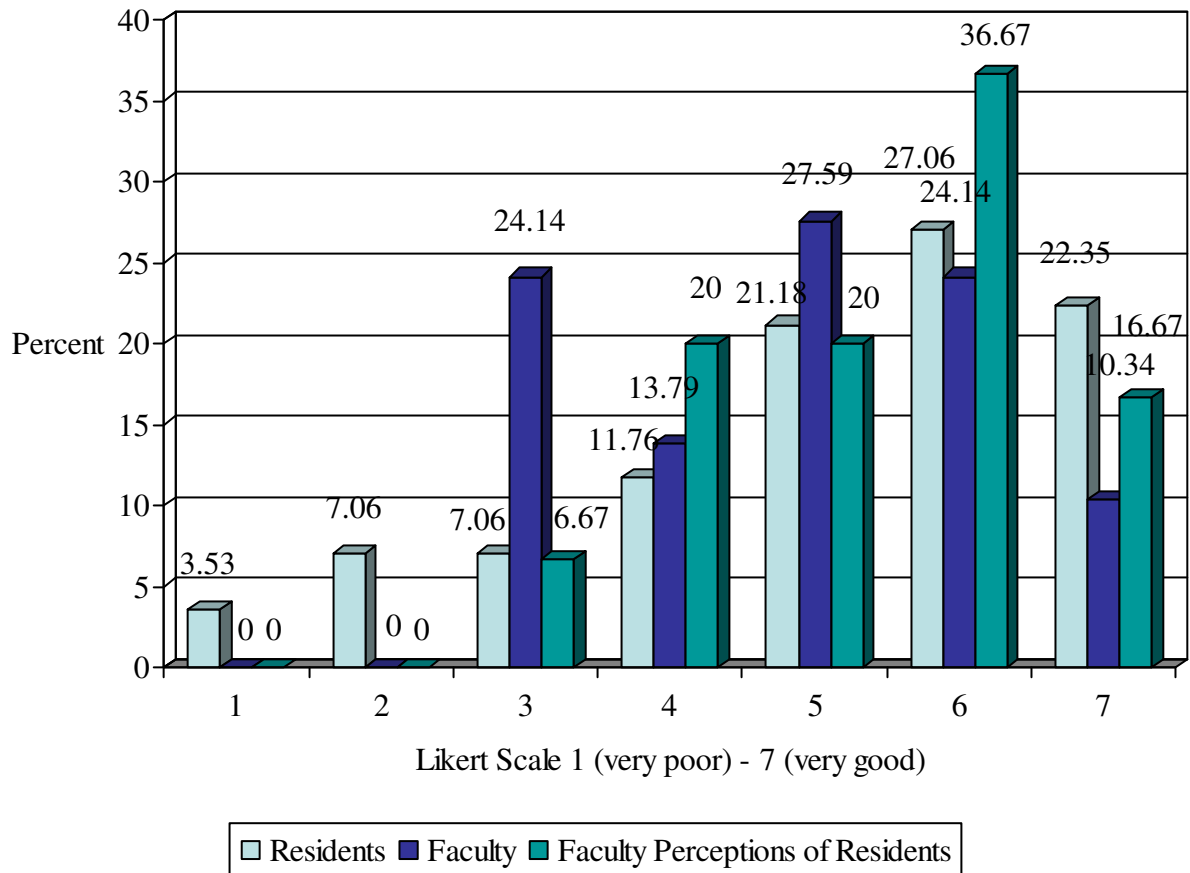
A handwritten signature in black ink, appearing to read "Kenneth E. Olive", written over the word "Sincerely,".

Kenneth E. Olive, M.D., Chairperson
ETSU/VA Medical Institutional Review Board

Appendix L

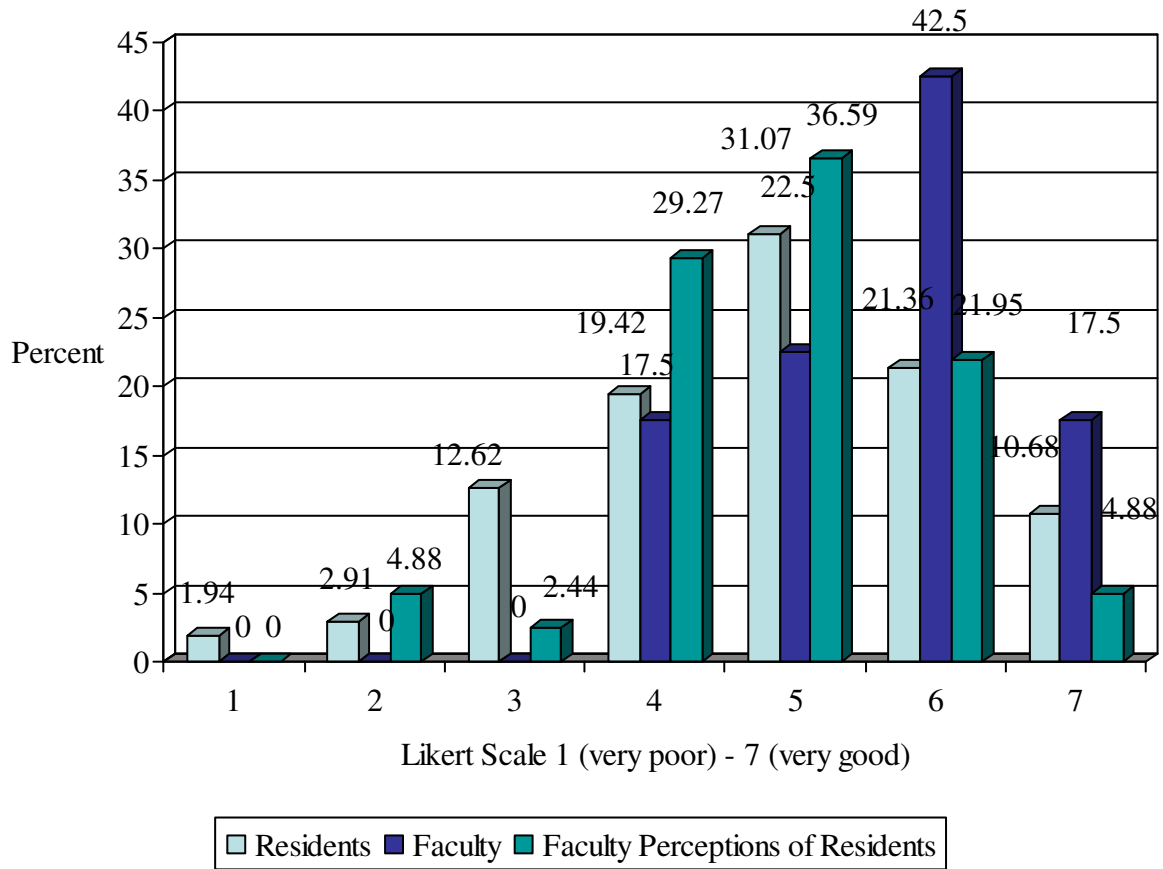
Data Figures

Figure L1



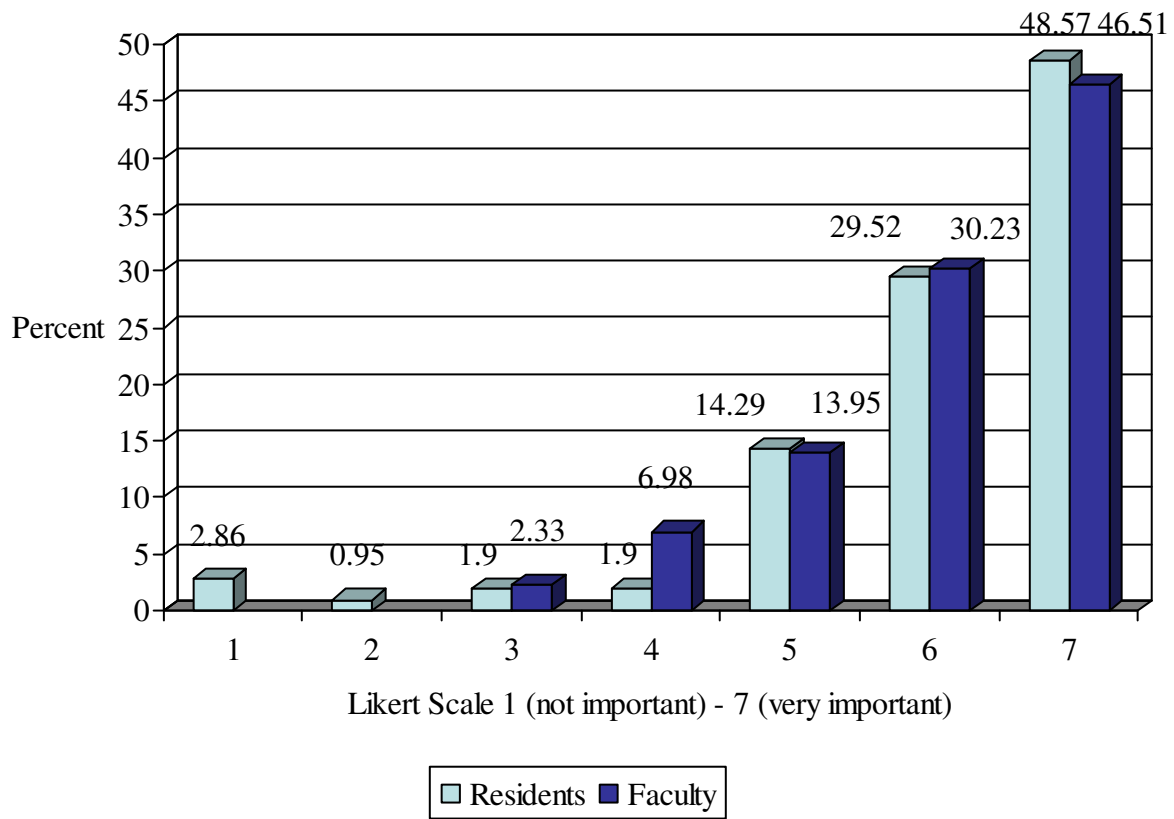
Rating of PDA Skills – Residents, Faculty and Faculty Perceptions about Residents

Figure L2



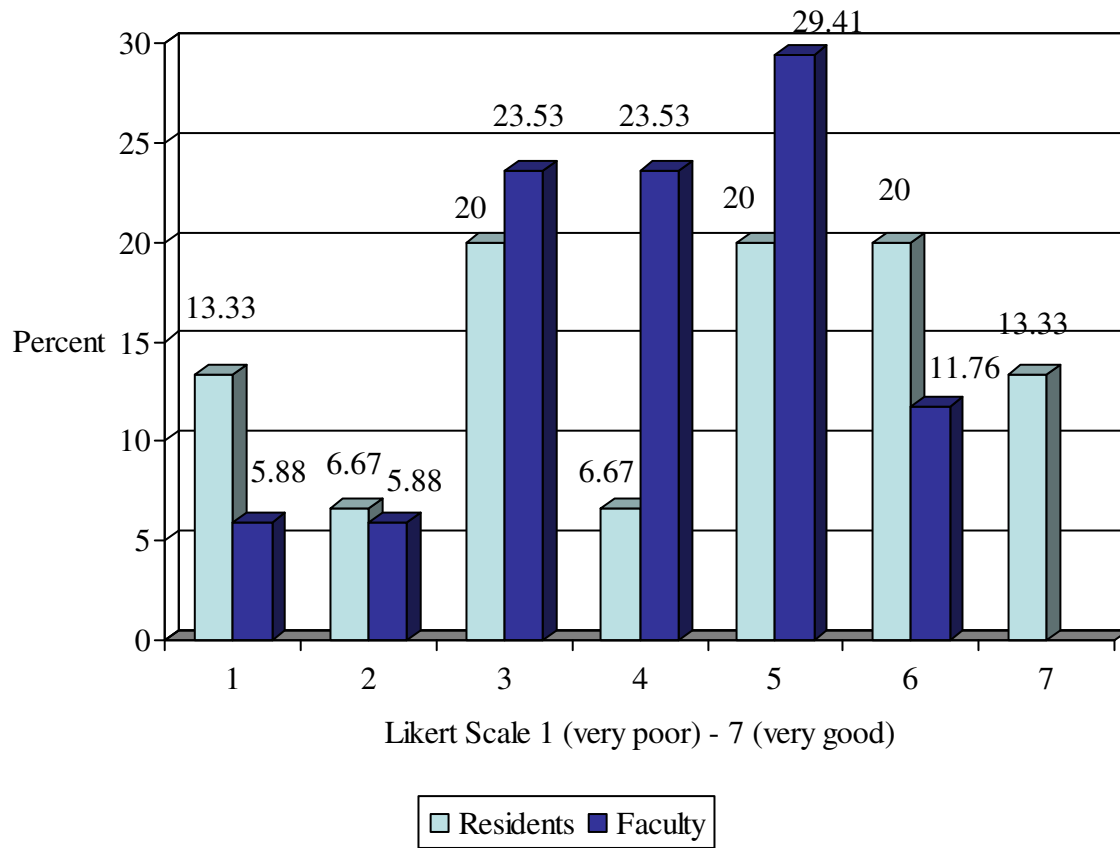
Rating of EBM Skills – Residents, Faculty and Faculty Perceptions about Residents

Figure L3



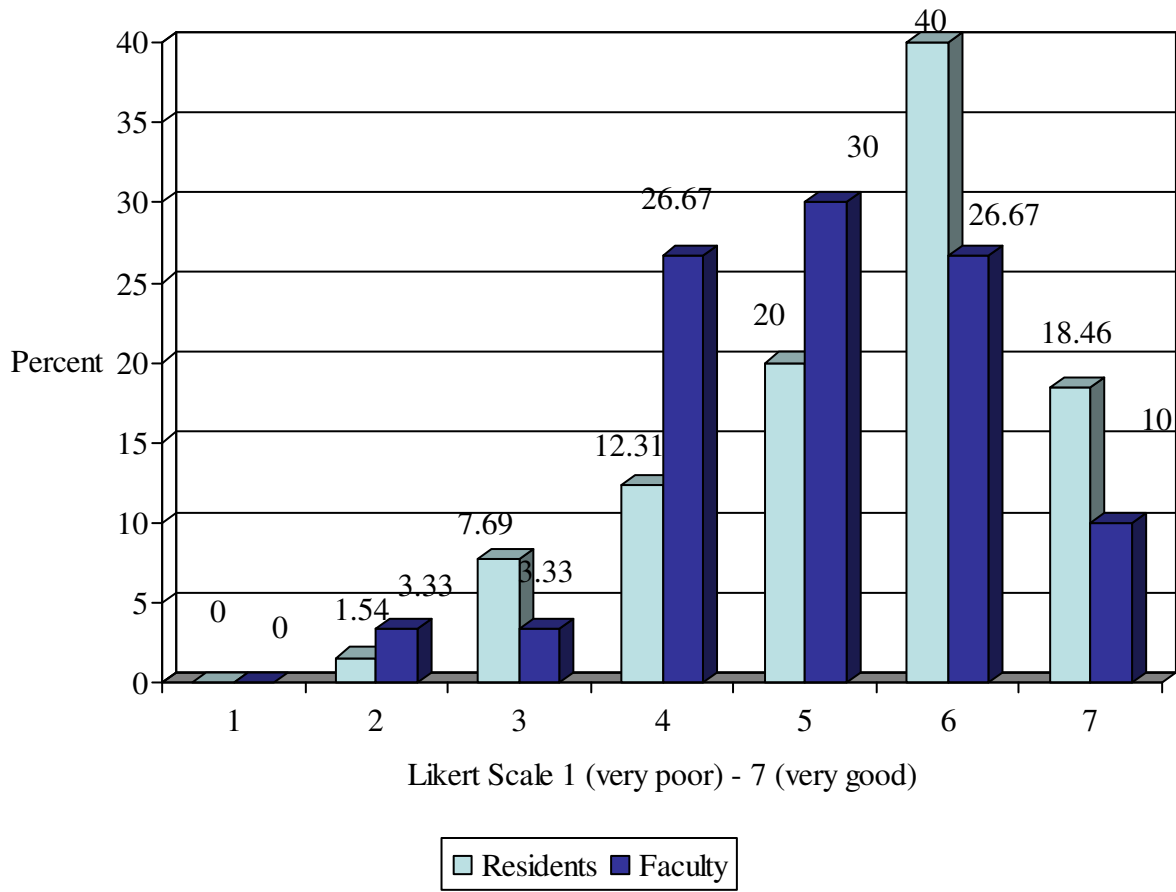
How Important Do You Believe Evidence-Based Medicine is in Providing Optimum Patient
Care?

Figure L4



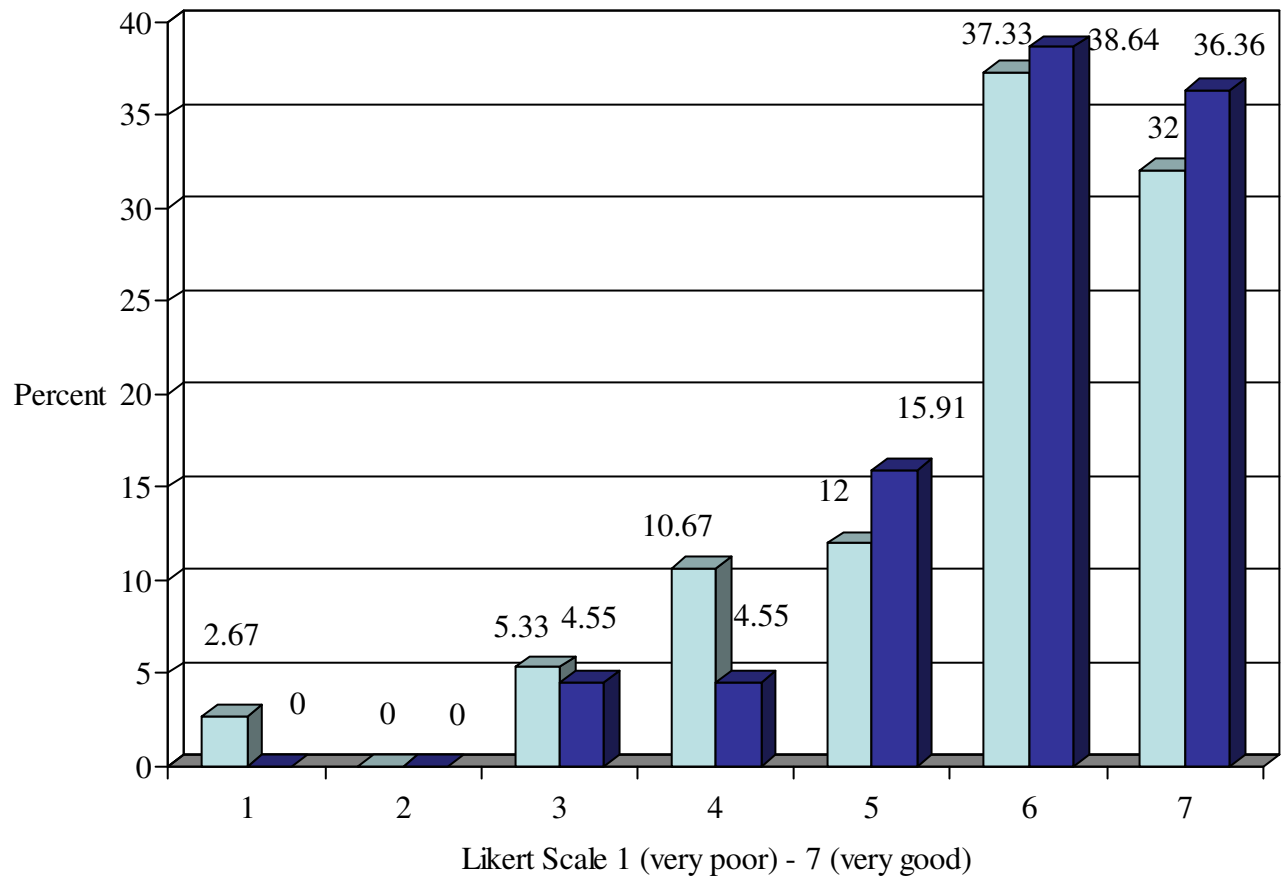
Rate Your Skills in Using Loansome Doc

Figure L5



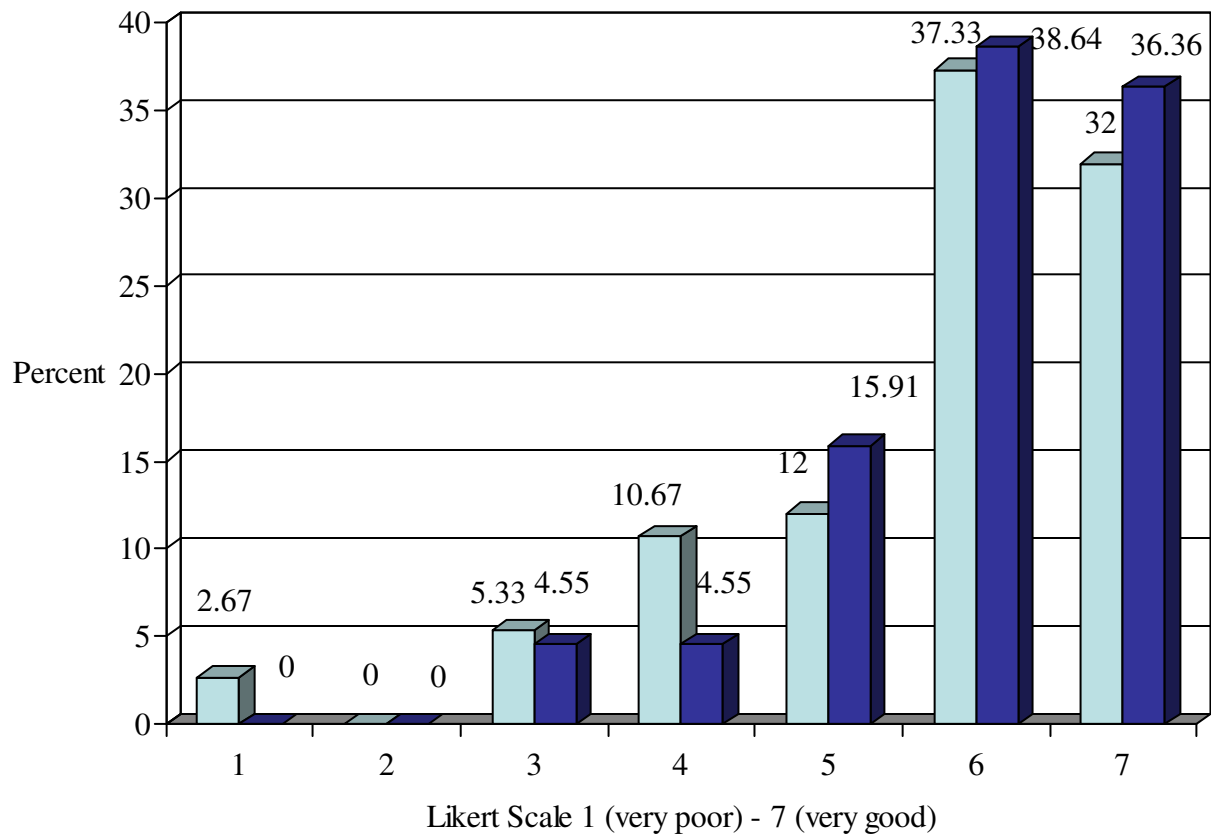
Faculty Rating of Information Training Given to Residents and Residents Rating of the Training

Figure L6



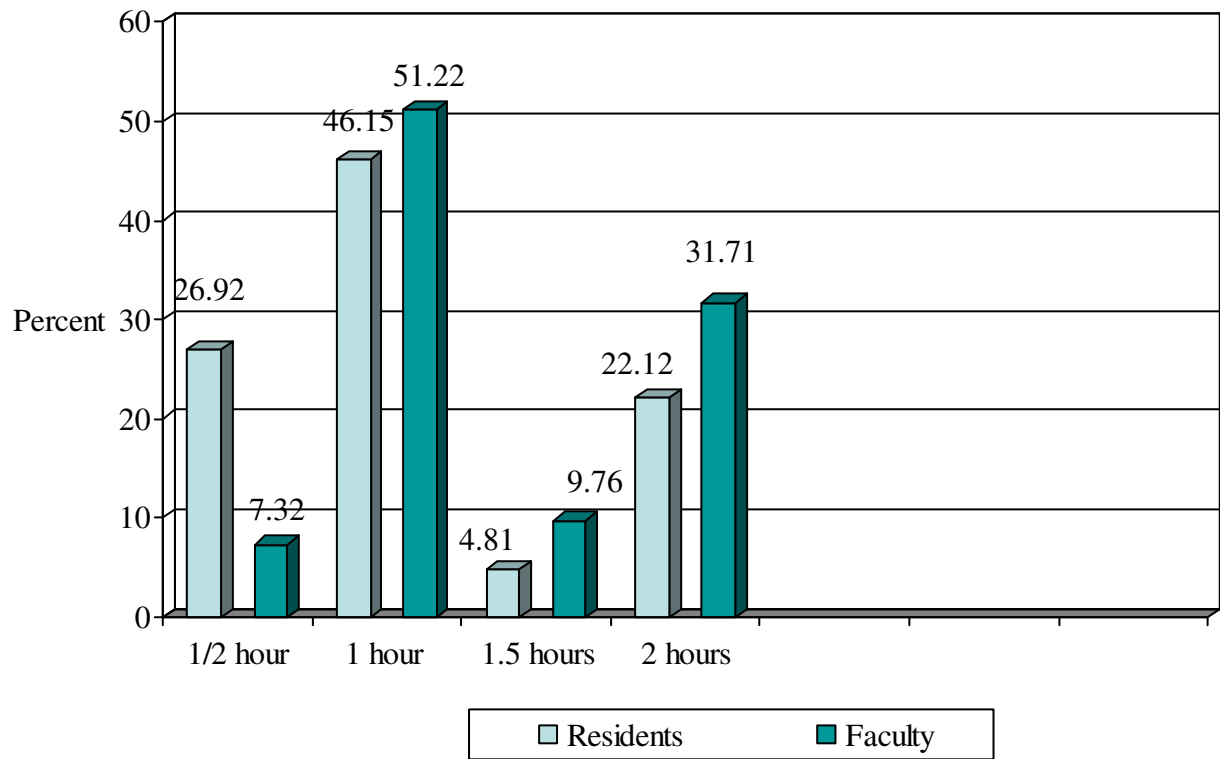
Rating of Information Training Provided By Librarians for Residents

Figure L7



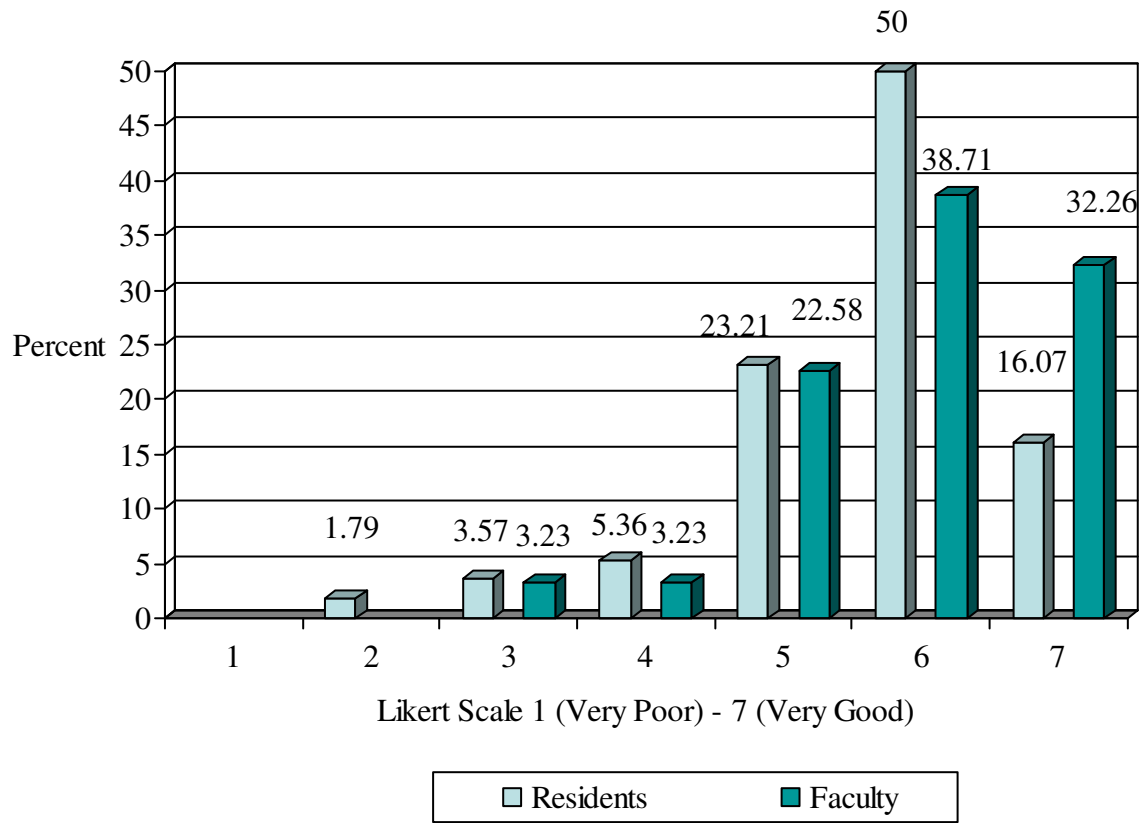
Importance of QCOML Orientation to ETSU Residents and to the Faculty for the Residents and
Their Own Needs

Figure L8



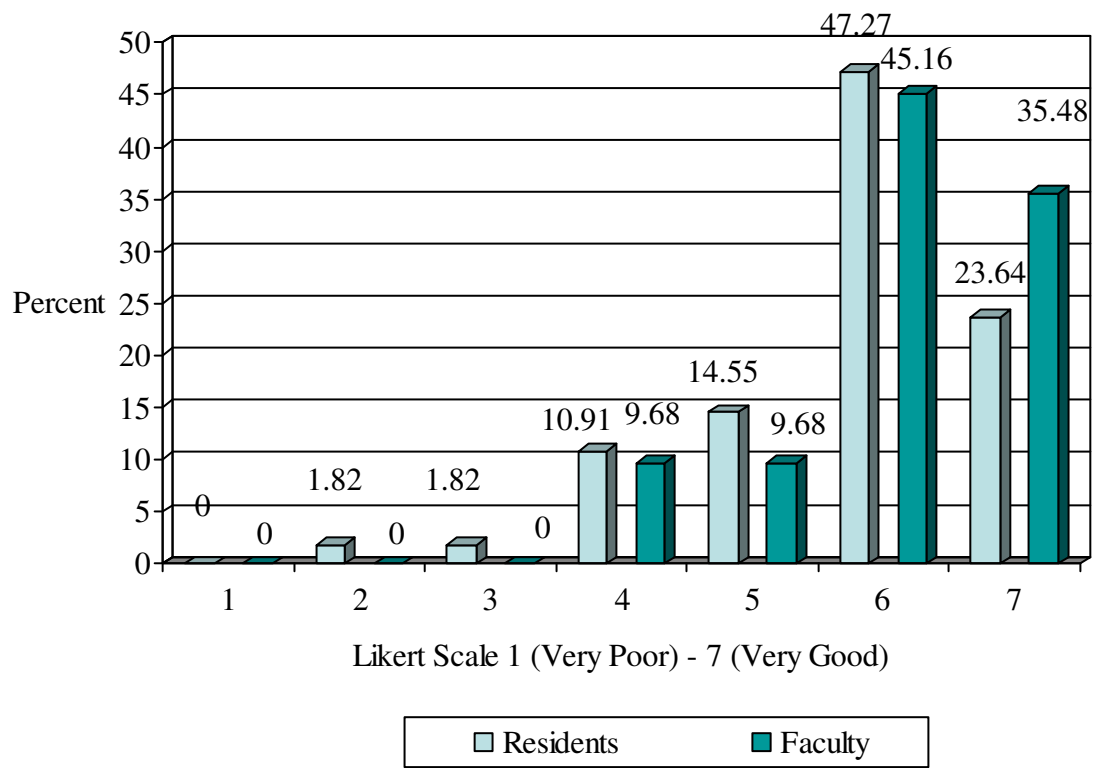
How Much Time Would You Be Willing to Spend on an Orientation?

Figure L9



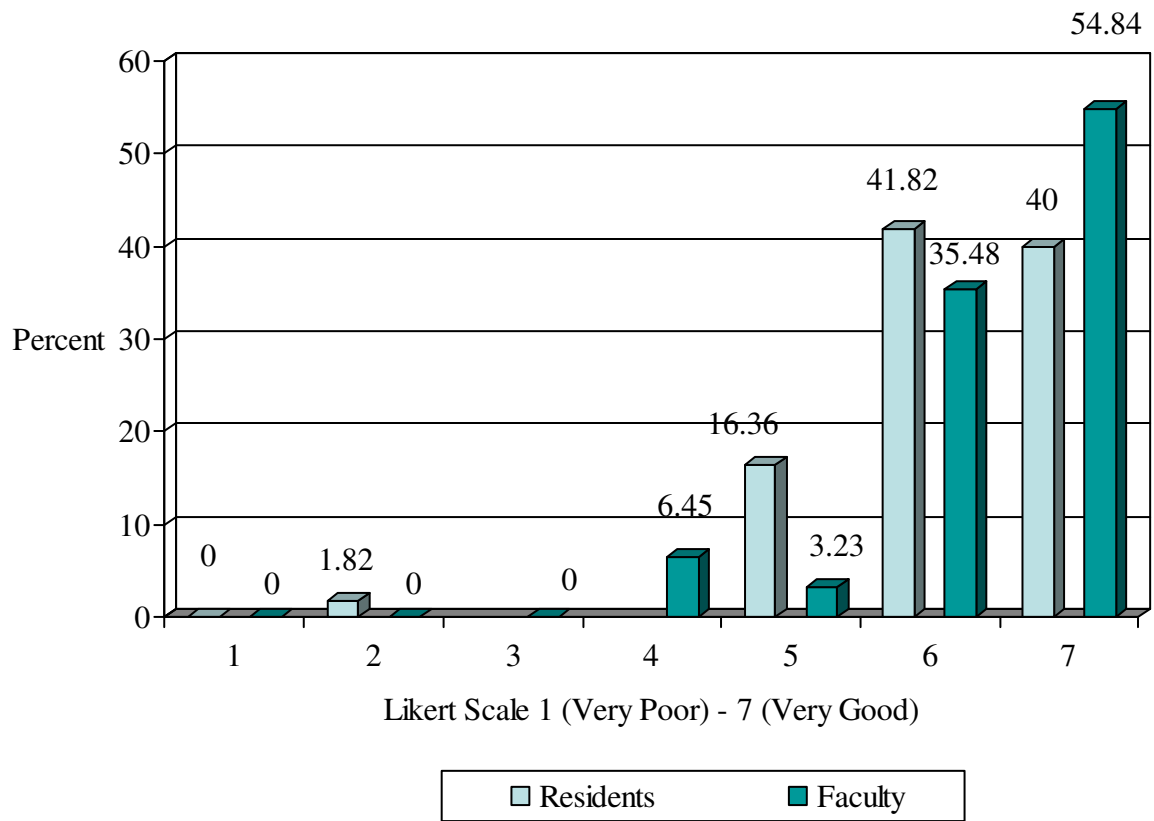
Speed of Service

Figure L10



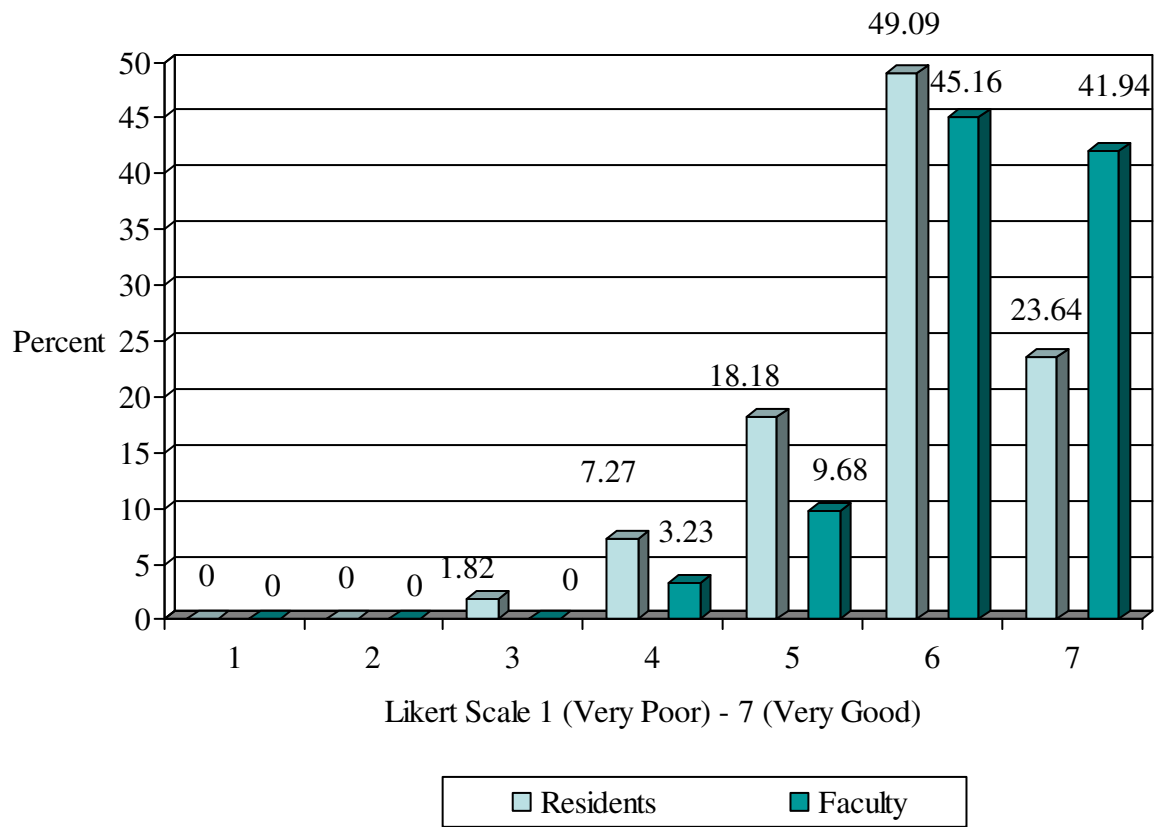
Knowledge and Ability of Staff

Figure L11



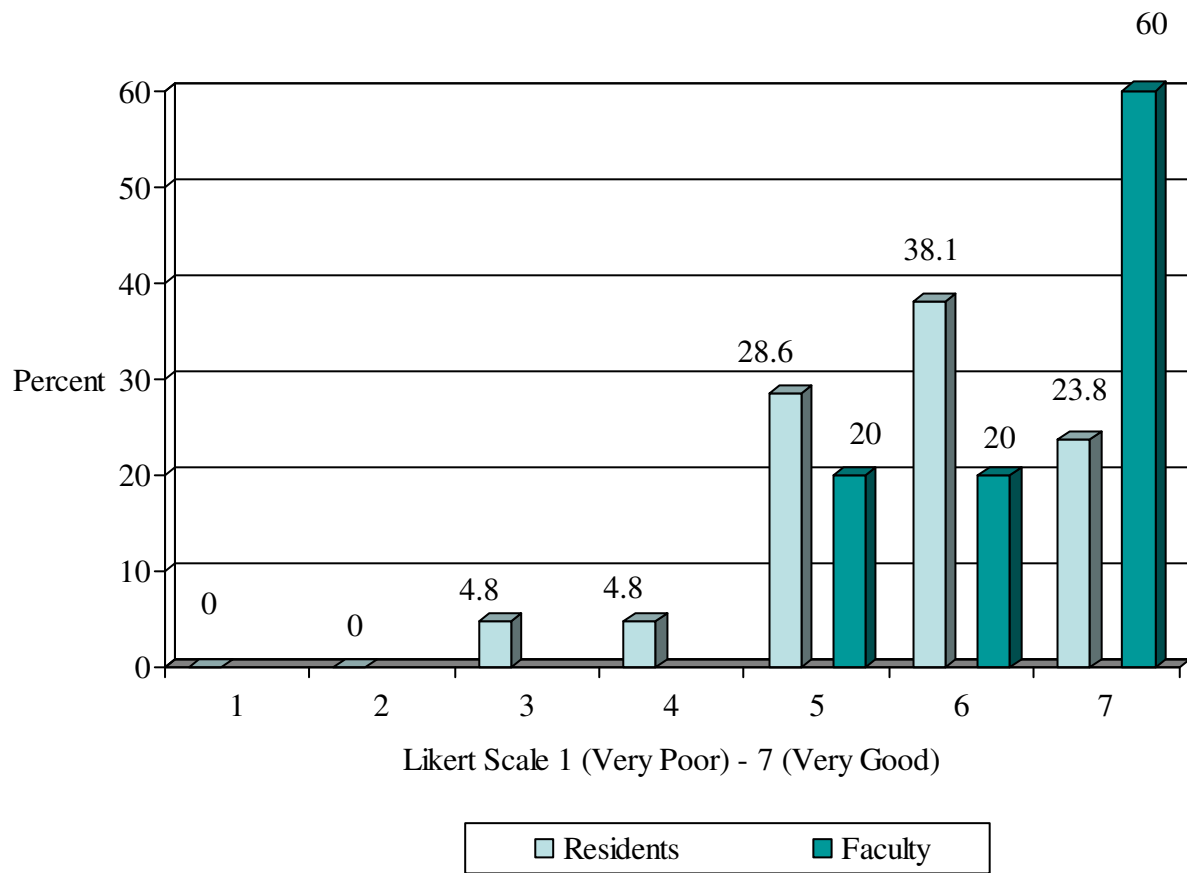
Cooperativeness of Staff

Figure L12



Overall Opinion of Service

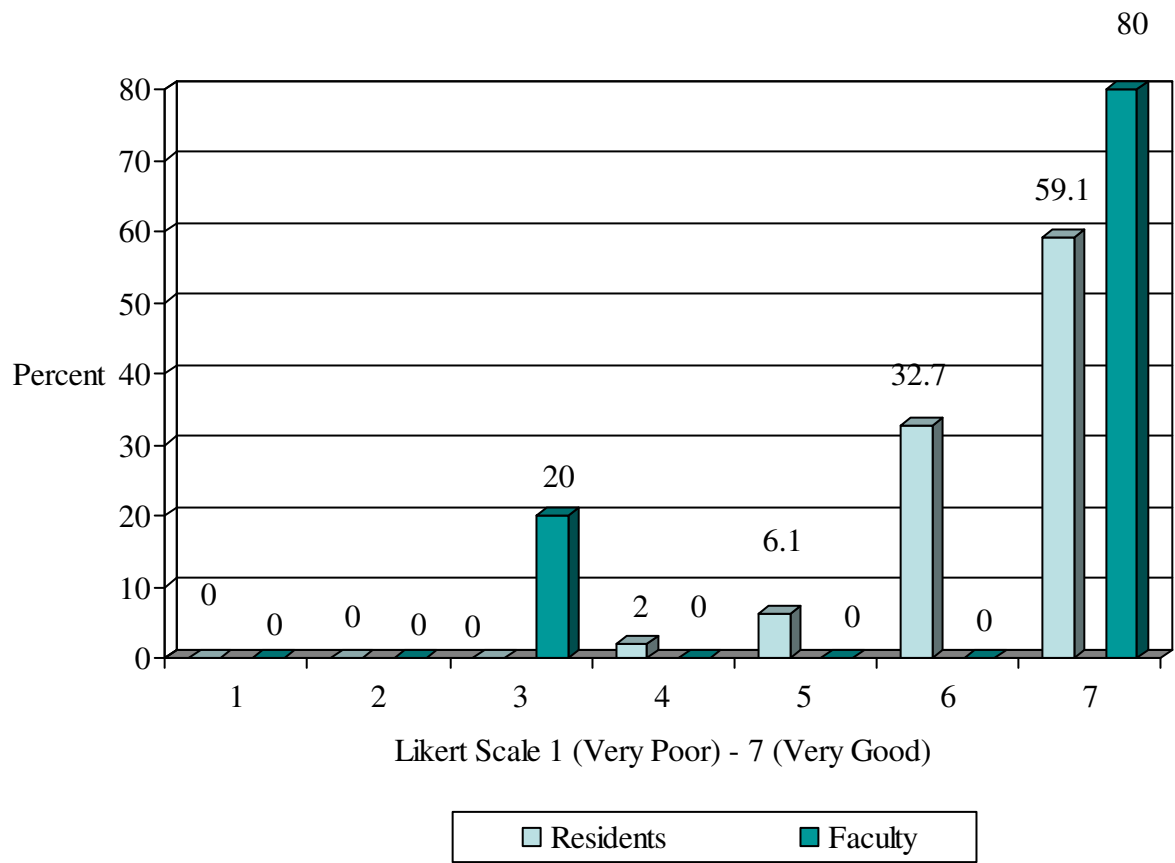
Figure L13



Rate the Information Services Provided by the VA Library

Residents $N = 21$ Faculty $N = 5$

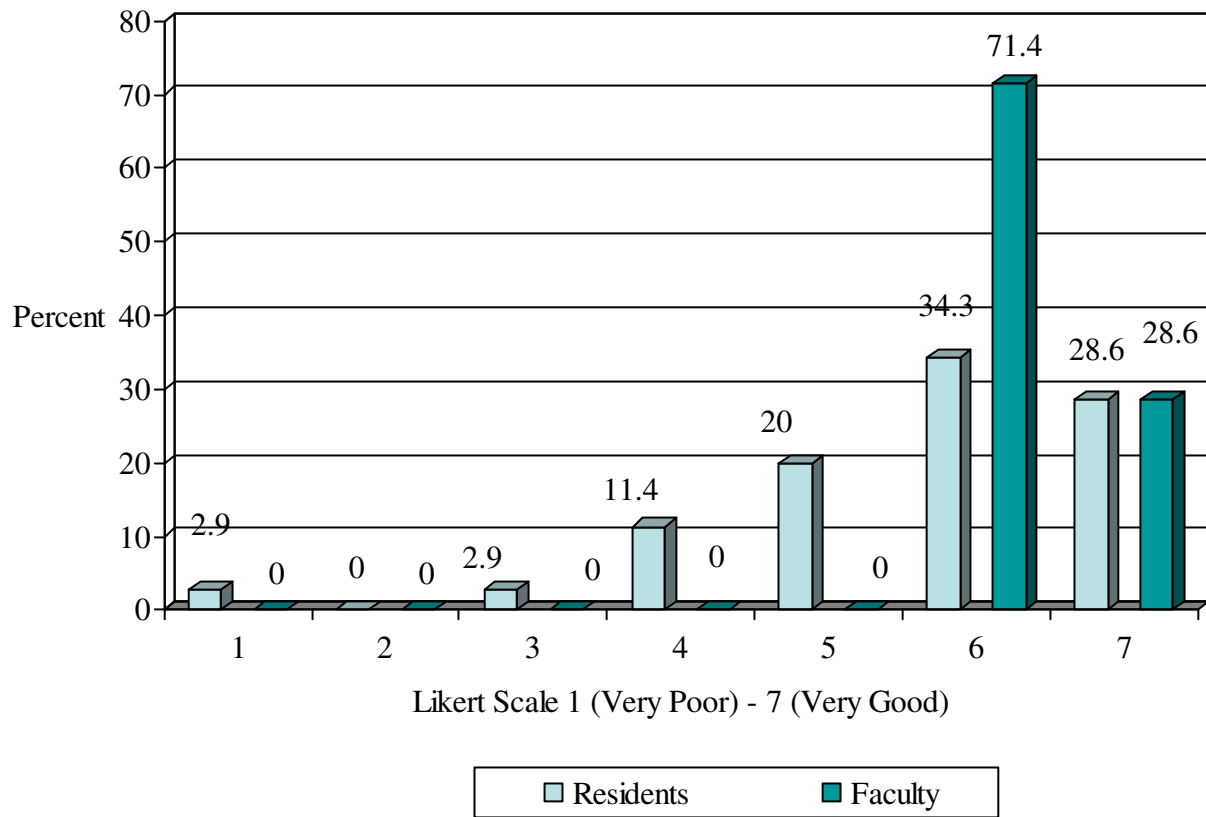
Figure L14



Rate the Information Services Provided by the JCMC Library

Residents $N = 49$ Faculty $N = 5$

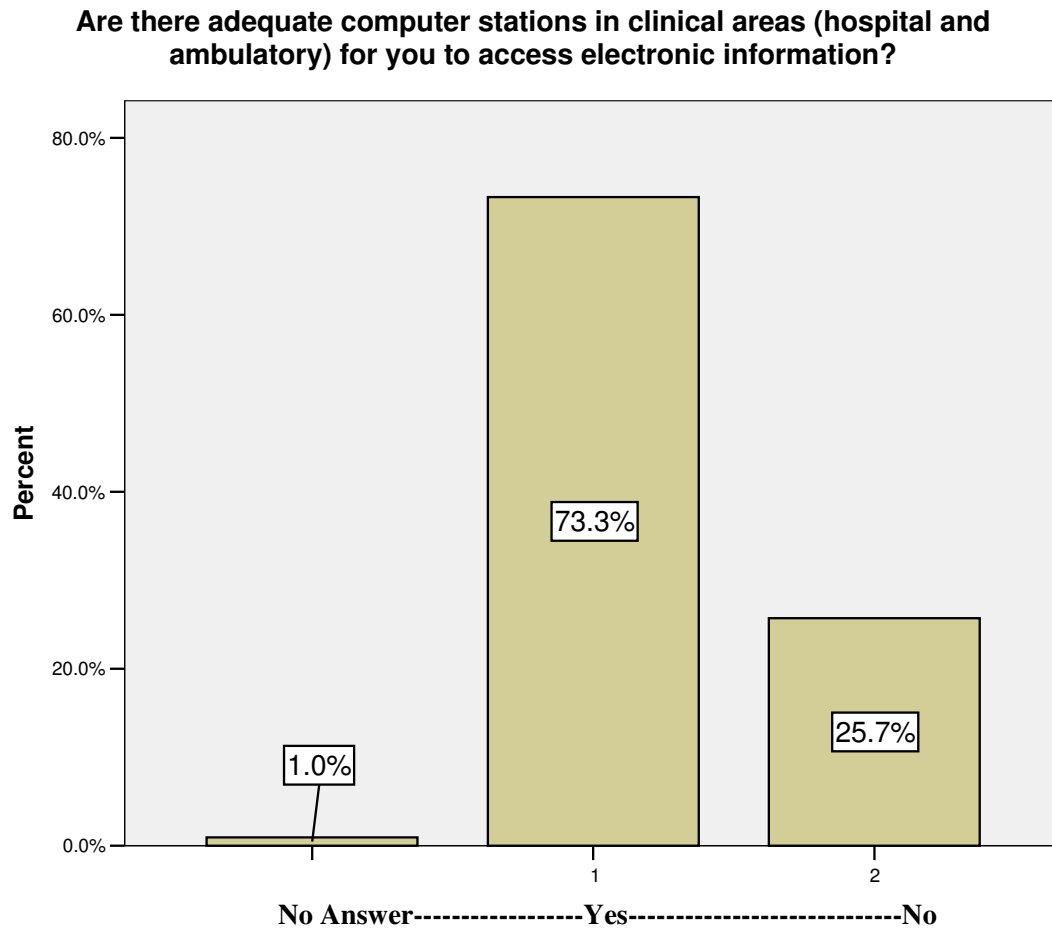
Figure L15



Rate the Information Services Provided by the Wellmont Libraries

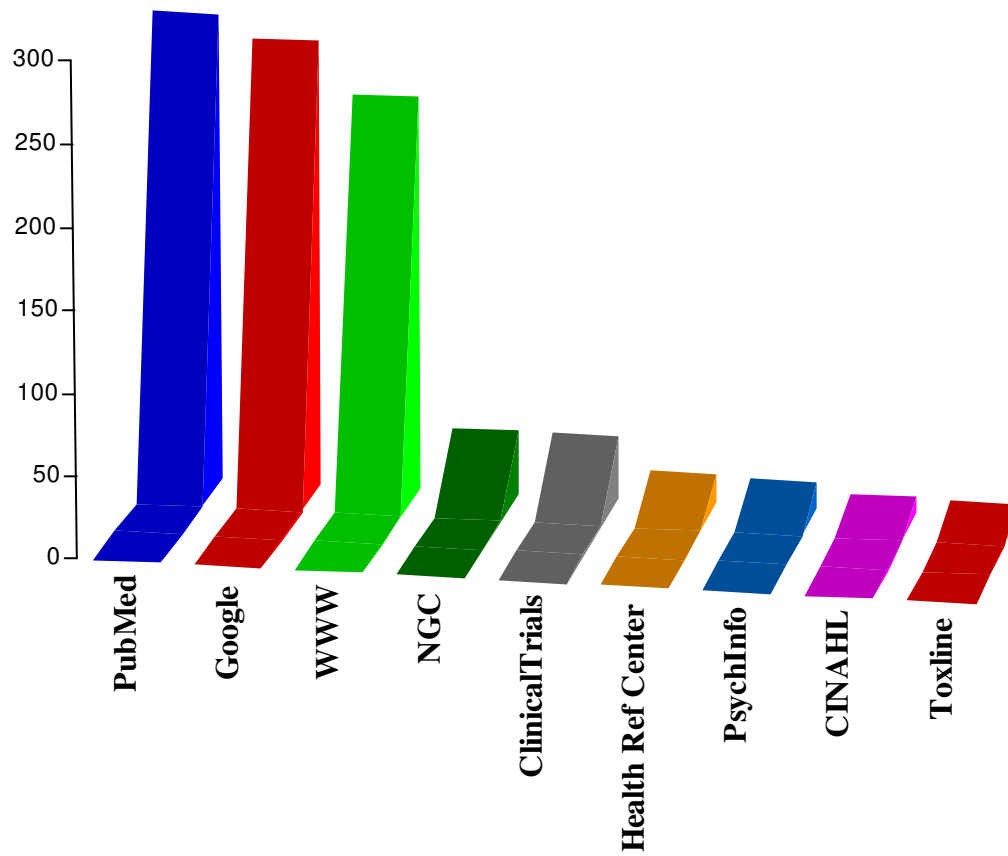
Residents $N = 35$ Faculty $N = 7$

Figure L16



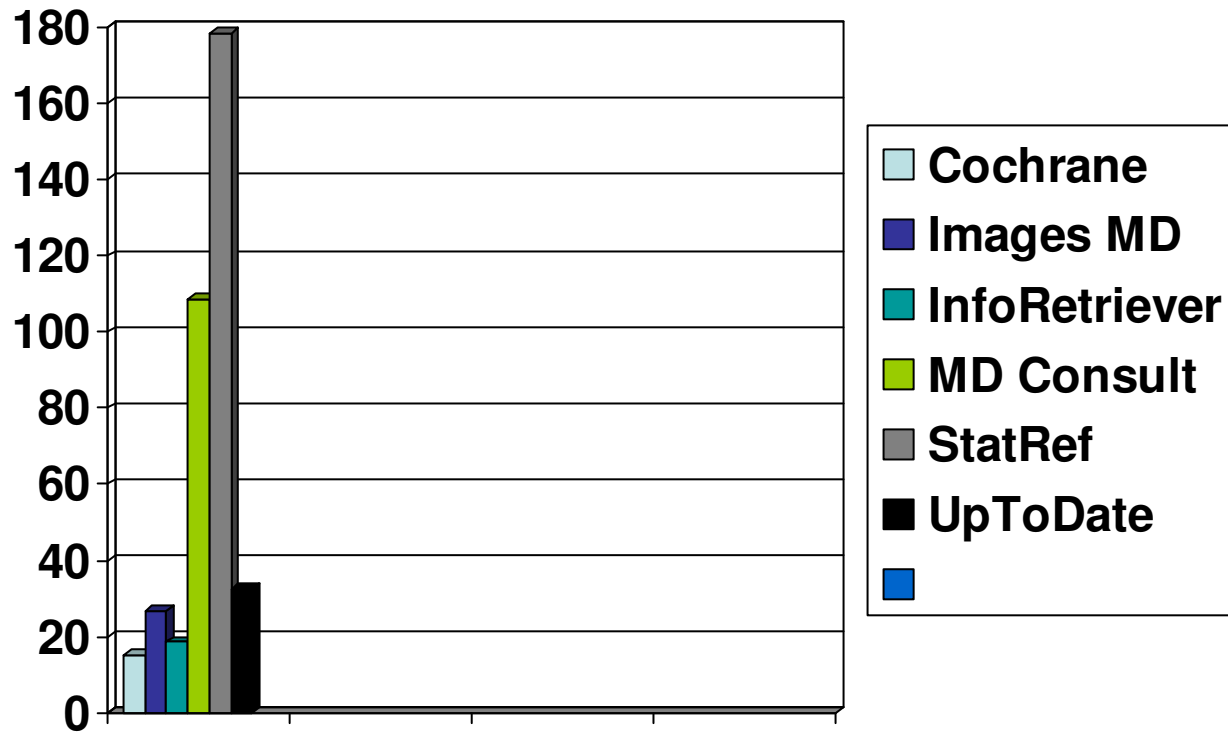
Are There Adequate Computer Stations in Clinical Areas (Hospital and Ambulatory) for You to
Access Electronic Information?

Figure L17



QCOML Free Electronic Resources: Frequency of Use x Clinical Value

Figure L18



Note: Online journals scored 1307.01 and therefore would not fit on the scale.

Paid Electronic Resources- (Frequency of Use x Clinical Value) / Cost

VITA

RICHARD L. WALLACE

- Education: Ed.D. Educational Leadership and Policy Analysis, East Tennessee State University, Johnson City, TN 2007
- M.A., Organizational Management, Tusculum College, Greeneville, TN 1998
- M.S., Library Science, University of Tennessee, Knoxville, TN 1994
- M. Div. Theology, Mid-America Baptist Theological Seminary, Memphis, TN 1990
- M.A., Theology, Columbia Biblical Seminary, Columbia, SC 1982
- Professional Experience: Assistant Director, ETSU College of Medicine Library, 2007-
- Public Services Department, ETSU Quillen College of Medicine Library, 1999-
- Northeast Tennessee Area Health Education Center (AHEC), 1995 - 1999
- Honors and Awards: Award for Research Paper Presentation (3rd place), Southern Chapter/ Medical Library Association, Annual Meeting – 2006

Exemplary Project of the Year, Consortium of Biomedical
Libraries of the South- 2005

Award for Research Paper Presentation (2nd place), Southern
Chapter/ Medical Library Association, Annual Meeting – 2005

Academic Librarian of the Year, Southern Chapter of the Medical
Library Association – 2003

“Mover and Shaker” Award, *Library Journal* – 2002

Exemplary Project of the Year, Rural Health Association of
Tennessee - 2002

Publications:

Boggs, B.D., Stephens, M.M., & Wallace, R.L. (2005). How does
colonoscopy compare with fecal occult blood testing as
screening tool for colon cancer? *Journal of Family Practice*,
54, 996-997.

Fox B.A., Schmitz E.D., & Wallace R.L. (2006). Glucosamine and
chondroitin for osteoarthritis. *American Family Physician*.
73:1245-6.

Holt J, Warren L, Wallace R., & Neher J.O. (2006). What
behavioral interventions are safe and effective for treating
obesity? *Journal of Family Practice*. 55:536-8.

Paden S.L., Batson A.L., & Wallace R.L. (2002). LoansomeDoc
and hospital libraries in the Southeast. *Journal of Hospital
Librarianship*, 2(4):37-47.

- Paden S.L., Batson A.L., & Wallace R.L. (2001). Web-based LoansomeDoc, librarians, and end users: Results from a survey of the Southeast region. *Bulletin of the Medical Library Association*, 89: 263-71.
- Stephenson, P., Green, B. F., Earl, M. F., Orick, J. T., & Wallace, R.L. (2004). Collaboration and co-operation / Partnership working. *Health Information and Libraries Journal*. 21, 20-26.
- Wallace, R.L. (1998). *Information needs of healthcare professionals in rural Northeast Tennessee and the effectiveness of NETAHEC in meeting these needs*. Masters thesis at Tusculum College, Greeneville, TN.
- Wallace, R.L. & Whaley, M. (2004) in Dunham-Taylor, J. & Pinczuk, J. (Eds.). *Health Care Financial Management for Nurse Managers*. Jones and Bartlett. (chapter)