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Identifying informal advisors among neuromuscular specialists

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ABSTRACT

Identifying Informal Advisors Among Neuromuscular Specialists

by

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Quality improvement efforts in healthcare services often center on influencing provider behavior through clinical practice guidelines and research evidence. Passive dissemination of such information has quite limited effects on medical practice. Active implementation strategies focus on translating knowledge into practice, at times recruiting local physicians as "opinion leaders" to act as change agents, champion the adoption of new practice parameters, and promote the diffusion of medical innovation.

This study developed an instrument to identify neuromuscular specialists whose advice is valued by colleagues, thus extending and updating similar work among educationally influential community physicians by Hiss, Macdonald, and Davis (1978). Neuromuscular specialists from across the United States rated the importance of various traits of colleagues whose advice they seek on patient care problems. These traits denoted approachability (pleasant personality), declarative knowledge (factual information), procedural knowledge (clinical skill), and translational ability (making clear how to apply information to clinical practice). As hypothesized, the respondents rated procedural,

practical knowledge as most important. Also as expected, approachability was not as important to the specialists surveyed as it had been to general practitioners surveyed in the Hiss et al. (1978) research. The hypothesized high value of the advisor's ability to translate information, including research findings, into practice was not supported.

Traits highlighting interest in the latest published research were not strongly endorsed. The finding that such interest was not a trait required of informal advisors is examined from the perspective of the cognitive psychology of expertise and experts' use of heuristics. The discussion includes recommendations for incorporating the procedural nature of clinical expertise in quality improvement efforts.

TABLE OF CONTENTS

LIST OF TABLES

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From the University of Toronto, David P. Ryan provided a great deal of help with the introduction. Dr. Ryan's 2002 article (Ryan, Marlow, & Fisher) was the impetus for my project. Robert DeVellis of Duke University helped me by reviewing the wording and classification of items. Indu Ahluwalia of the National Center for Chronic Disease Prevention & Health Promotion assisted me as well. Roland Hiss of the University of Michigan was generous in providing both the development questionnaire for the 1978 instrument for my reference and his astute comments on my replication among specialists. Owen Devine, of the National Center on Birth Defects and Developmental Disabilities, and Ned Silver, of the UNLV Department of Psychology, gave me valuable guidance on statistical considerations. However, my advisors, formal and informal, are not responsible for any errors of design or analysis made in spite of their best efforts to teach me.

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The neuromuscular physicians who served as my key informants and those who responded to the resulting questionnaire gave freely of their time and perspectives. For the most part, the clinics through which they provide care are established and supported by the Muscular Dystrophy Association. The survey participants are valued members of the worldwide community of clinicians and researchers involved in the effort to treat and eliminate neuromuscular disorders. It is a privilege to be associated with them.

CHAPTER 1

INTRODUCTION

Scientific research regarding the cause and cure of illness has experienced exponential growth in recent decades. In order for the practice of healthcare to keep pace responsibly, clinical practitioners must be familiar with relevant research findings and actually apply them appropriately in their day-to-day practice. At any given time, the standard response to a particular clinical condition among providers with similar training may or may not be supported by scientific evidence. Thus, getting research findings into practice has become a focus among medical educators, patient advocacy groups, healthcare system managers, hospital administrators, healthcare policy makers, and practitioners themselves.

The need to move new knowledge into healthcare practice is especially urgent because a quality gap so large as to be termed a "quality chasm" by the Institute of Medicine (2001) exists in United States healthcare today. In any industry the gap on a given measure of quality is defined as the difference between 1) the average score on the measure earned by the top 10% performers and 2) the average of the scores of all other performers on that same measure. In many sectors of the economy the typical quality gap is considerably less than 1% (National Committee for Quality Assurance, 2004). For example, the top performers in the aviation industry might average 92% on a quality measure while the average of all other performers is 91% on the same measure.

Medicine, however, experiences far more variation in quality on many measures, for example hospital morbidity and mortality rates. The overall quality gap could be an estimated 20%, if not wider. The result is that "1,000 Americans or more die each week because the healthcare system regularly fails to deliver appropriate care, and thousands more are hospitalized" (National Committee for Quality Assurance, 2004, p. 7).

A pathway that has evolved in efforts to improve healthcare quality consists of the systematic examination, grading, and synthesizing of evidence, development of practice guidelines based on evidence when it exists, or consensus of expert opinion when it does not, and dissemination of such materials. Increasingly, specific interventions to aid in the implementation of evidence, guidelines, or both, have developed due to the observation that the mere possession of information does not change practice behavior.

Any attempt to improve practice is inherently an attempt to change the professional behavior of clinical service providers such as physicians, nurses, dentists, mental health providers, and allied health professionals. Due to the interconnected system that is modern healthcare, change among providers usually requires supportive change on the part of administrators, managers, insurers, architects, information technology supervisors, and certainly, among patients (Greer, 1995). Thus, there are many pieces to the complex puzzle of improving the quality of healthcare services. The informed opinion on how best to influence providers' behavior is to "attend to many factors and use multiple strategies" (Solberg et al., 2000).

The particular piece of the puzzle considered here is the social influence of physicians whose advice on clinical issues is valued and solicited by their colleagues. Such informal advisors have been variously labeled as informal educators, educationally influential

physicians, or educational influentials, and, if used in formal roles, opinion leaders or champions. The pharmaceutical industry and medical device manufacturers have attempted to utilize them as a cost-effective way of influencing fellow physicians to adopt a product. Health organizations and public health agencies have recruited them in efforts to increase adherence to clinical practice guidelines or otherwise spread best practices.

Earlier research on the nature of the educationally influential physician involved developing an instrument to identify community hospital physicians to whom general practitioners turned for clinical advice (Hiss, Macdonald, & Davis, 1978). Although the Hiss et al. instrument and elements of it have been used among specialists (e.g., Elliott et al., 1997; Young, Hollands, Ward & Holman, 2003; Grimshaw et al., 2006), a comparable questionnaire has never been redeveloped in similar fashion among specialists. This lack motivated the research question behind the study presented here, "What traits are associated with informal clinical advisors among specialist physicians?"

The following review of related literature will examine issues surrounding the development and implementation of clinical practice guidelines. It will summarize efforts to engage informal communication networks within the medical profession to influence clinical behavior toward better practice, including adherence to practice guidelines. The review will also explain the appropriateness of surveying neuromuscular specialists and draw on insights from communication studies and cognitive psychology to describe the role of informal educators in getting research findings into practice. Theory-based hypotheses will be presented regarding the traits of informal clinical advisors expected to be validated by the current research.

Subsequent to the literature review, the methodology of the survey research will be defined. The results will be presented and interpreted in terms of what qualities the specialists surveyed deem most descriptive of colleagues whose advice they trust and seek. The resulting instrument to identify informal clinical advisors among neuromuscular specialists will be offered, fulfilling the goal of the study. The findings generated have implications for the most appropriate role of informal advisors in quality improvement efforts which will be discussed in the concluding chapter.

CHAPTER 2

LITERATURE REVIEW

Clinical Practice Guidelines and Evidence-Based Medicine

One approach to increasing the likelihood that knowledge will influence practice is the development of clinical practice guidelines and interventions to facilitate their adoption. Many guidelines are developed on the basis of expert opinion alone. The best guidelines, however, are created by synthesizing evidence and summarizing systematic reviews of randomized controlled trials of various treatments. A discussion of clinical practice guidelines must be rooted in the context of current healthcare quality problems and the movement toward evidence-based medicine. Also relevant are the various factors that influence whether physicians follow the guidelines' recommendations, and the effectiveness of a number of strategies that have been used to disseminate guidelines and facilitate adherence to them. This review will focus on factors associated with medical doctors' adherence to the clinical practice guidelines relevant to their practice area. One promising strategy, that of utilizing the informal professional influence of particular physicians in order to increase guideline adherence among their peers, will be covered in detail. The chapter will then introduce a research study relating to the identification of educationally influential physicians (informal advisors) among neuromuscular specialists.

Clinical practice guidelines are a primary means of promoting healthcare quality. The Institute of Medicine states that, "Clinical practice guidelines are systematically

developed statements to assist practitioner and patient decisions about appropriate healthcare for specific clinical circumstances" (1990, p. 38). They are also statements of policy (Nutting & Green, 1994) in that they describe what should be done (Muir Gray, Haynes, Sackett, Cook, & Guyatt, 1997). Development of guidelines can be undertaken by specialist medical associations; professional societies; health-related organizations; advocacy groups; Federal, State, or local government agencies; and healthcare or insurance plans (Leape et al., 2003). They are often the result of consensus opinion among experts with considerable clinical experience treating the condition in question.

A guideline can include an algorithm or a decision flowchart, sometimes likened to a recipe, giving rise, when followed blindly, to the pejorative label "cookbook medicine." Yet surveys indicate that the average clinician devotes less than one hour a week to professional reading (Grimshaw, Eccles, Walker & Thomas, 2002). Hence, few doubt the urgent need for abridgment, condensation, and neat packaging of new evidence affecting practice, amenable to rapid unpacking at the time and place of need. Ideally, the content of the guideline is a synopsis of research findings: trial-based evidence describing the treatment or sequence of actions (orders, tests, and decisions) that have been found to be successful for a given clinical condition.

Haynes, Sackett, Muir Gray, Cook, and Guyatt (1997) point out, however, that several characteristics of clinical research, and of the way in which research in general is published, pose obstacles to applying it in practice. Research itself seldom follows a straight path and much time is spent going down blind alleys, with reports being published at all points along the way (Landers, 2006). Many studies are preliminary, few are definitive. Understandably, authors attempt to emphasize, and sometimes overstate,

the significance of their study and the conclusions that can be drawn from it. Publication bias minimizes reporting of negative results (Solomon, Hashimoto, Daltroy, & Liang, 1998) and positive results often suffer from lack of generalizability.

The "gold standard" of treatment assessment is the large randomized controlled trial. When such trials consistently show a treatment or therapy to be effective for a given condition, that treatment can be said to be evidence based or empirically supported. Reports of trials are published in peer-reviewed journals and are subsequently included in reviews and meta-analyses, as well as internet databases.

Entire journals now exist dedicated to selecting, on the basis of sound criteria, research that is ready for clinical application. *Evidence-Based Medicine* and *ACP* (American College of Physicians) *Journal Club* are two examples cited by Haynes et al. (1997). In addition, many medical journals provide supplements devoted to critical appraisal of research (e.g., Medical Journal of Australia, 2004) and regular clinical review sections appear in widely read journals such as British Medical Journal (e.g., Prasad, Assomull, & Pennell, 2004), and the Journal of the American Medical Association (e.g., Sin, McAlister, Man, & Anthonisen, 2004).

A more focused approach to examining evidence arises in response to immediate clinical needs. Various compendia, such as frequently updated electronic sources, fill this need. The Cochrane Library (http://www.cochrane.org/index0.htm) is the foremost example, with numerous other online sources existing for various specialties. McMaster University researchers originated the very popular Users' Guides to Medical Literature that provide clinicians with criteria by which articles can be appraised for validity (www.usersguides.org). They recommend that clinicians' first step in researching a

patient care problem be to consult "a valid overview or practice guideline as the most efficient method" (Guyatt & Rennie, 1993, p. 2097).

Even when studies are definitive, the physician's clinical judgment is essential to proper application of evidence and of the guidelines that summarize that evidence. Rather than mandating slavish adherence to treatments indicated by current research findings, evidence-based medicine combines the best trial-based evidence to date with the physician's clinical expertise to arrive at appropriate medical decisions. Evidence-based medicine involves a process of shared decision making that also respects the patient's preferences and the risk/benefit ratio for each individual in considering interventions (Sackett, Rosenberg, Muir Gray, Haynes, & Richardson, 1996).

In fact, the treatment described in a clinical practice guideline will not be the best option in all situations. Variables such as patient condition (severity, change in condition, comorbidity), local availability of resources required for the recommended procedure, allergies, potential drug interactions, health system inefficiencies, and patient preferences, among other variables, may cause a physician to legitimately deviate from the recommendation of a guideline (Weingarten, Stone, & Hayward, 1995). Research and instructional materials on guideline adherence recognize that fact through statements to physicians such as, "Only you as the primary physician can determine the most appropriate length of stay for your patient" (Weingarten et al., 1994, Table 5) and "The information contained herein should never be used as a substitute for good clinical judgment" (Haynes et al., 1997, copyright notice).

In addition, general practitioners report that gaining a patient's trust to the extent necessary to administer a new guideline-recommended treatment can be a slow,

challenging process, but that the physician can influence preferences by the way they phrase information about the innovation (Freeman & Sweeney, 2001). The concept of successful use of a guideline must therefore encompass, at times, *not* using it. One hundred percent adherence to clinical practice guidelines is not only unachievable, it is undesirable (Norman & Eva, 2005).

In the United States, the Agency for Healthcare Research and Quality of the Department of Health and Human Services, together with the American Medical Association and the American Association of Health Plans, originated the web-based National Guideline Clearinghouse™ (http://www.guideline.gov). The clearinghouse accepts submissions from any interested group, but establishes inclusion criteria for content, and reviews each submission to verify the guideline's documentation, assuring that it is based upon peer-reviewed scientific sources no more than five years old. The review process is delegated to ECRI, Plymouth Meeting, Pennsylvania, a nonprofit health services research organization that maintains its independence through avoidance of any funding sources, such as pharmaceutical or manufacturing industries, that would result in conflicts of interest. Through the National Guideline Clearinghouse™ a physician can consult guidelines that are reasonably up-to-date and have been screened in a systematic manner.

Over the years a plethora of guidelines has been developed, some based on evidence, some on consensus. At present, the National Guideline Clearinghouse™ contains approximately 1875 guidelines (Agency for Healthcare Research and Quality, 2006a) and is examining 115 more that have been submitted for inclusion (Agency for Healthcare Research and Quality, 2006b). Its website permits efficient searching by health condition

and includes summaries of guidelines and downloadable formats for hand-held computers for use at the point of care. Many guidelines also exist apart from those in the National Guideline Clearinghouse™.

However, reaching a consensus or achieving scientific validation of a treatment, encapsulating it in a guideline, and publishing it does not guarantee that evidence-based medicine will follow. For a guideline to influence practice, a clinician must be made aware of its existence, familiar with its characteristics, convinced of its value, competent in its use, enabled by his or her work environment to implement it, and compliant with relevant legal and reimbursement requirements (Freed, Pathman, Konrad, Freeman, & Clark, 1998). In what follows, aspects of guidelines, the people, and the systems involved will be analyzed in so far as they influence the transfer of knowledge to practice. Approaches to dissemination and implementation of guidelines will then be examined, including that of using the social influence of particular physicians to encourage their colleagues to apply guideline recommendations in day-to-day practice. An existing tool to identify educationally influential physicians among general practitioners will be described. The subsequent Method, Results, and Discussion chapters will report on the development of a similar instrument for use among neuromuscular specialists.

Factors Influencing Physician Adherence to Clinical Practice Guidelines

In discussing guidelines it will be helpful to employ the terminology of the Awareness-to-Adherence Model developed by Pathman, Freed, and colleagues (Freed et al., 1998; Pathman, Konrad, Freed, Freeman, & Koch, 1996). First, the clinician must be *aware* of the guideline's existence and know what it recommends. If the physician *agrees*

with those recommendations, he or she may then decide to *adopt* them. *Adherence* follows when the physician regularly and appropriately employs the recommendations in his or her practice. Factors influencing the eventual adherence of a guideline include the characteristics of the guideline, the physician, his or her practice environment, the patient, and the surrounding economic and legal environments.

Characteristics of Clinical Practice Guidelines

Guideline credibility. The authors of a guideline must be considered reliable by physicians who would adopt it. Specialist societies are viewed by some as having a mandate to develop clinical practice guidelines, lending their credibility to the product (Brindis & Sennett, 2003). Leape et al. (2003) found, however, that neither high credibility of the authors nor familiarity with guidelines guaranteed adherence. For the cardiovascular procedures they studied, guidelines based on evidence from randomized clinical trials were more likely to be followed than those not citing such evidence, regardless of source. There are apparently different thresholds at which guidelines are deemed to be evidence-based, however. Among the 235 studies of guideline dissemination and implementation reviewed by British researchers, only three guidelines included in the studies were judged by Grimshaw, Thomas et al. to be "explicitly evidence based" (2004, p. x).

But even when evidence is cited, whether to trust a particular interpretation of it is often the subject of vigorous debate. There are commonly a number of ways to interpret the evidence emerging from a study and a physician may not wish to relinquish to the reviewer his or her right to interpret the evidence personally (Guyatt & Rennie, 1993). Hence, practitioners may be aware of a guideline, but not in agreement with its

recommendations. Although a proportion of influential physicians may disagree with the recommendations of a guideline, focusing implementation efforts on guidelines that are clearly evidence based, rather than those based on expert opinion, should maximize support (Brindis & Sennett, 2003).

Guideline content. Characteristics of the guideline content are crucial to adoption and adherence. In that a guideline is based upon new information (at least to those whose clinical behavior conforms to different, earlier established practice), it is an innovation. The process whereby more and more clinicians adhere to the new procedure recommended by a guideline is one of diffusion. Five elements of content important for the diffusion of any innovation are listed by communications scholar Everett M. Rogers in the fifth edition of his classic text, *Diffusion of Innovations* (2003; see also Sanson-Fisher, 2004). *Compatibility* with existing systems and procedures ensures that a new guideline can be followed without redesigning the environment. The more pervasive the change required by an innovation, the less likely it is to gain adherents. Likewise, the more complex a novel procedure is, the more effort will be required to learn it by a greater number of players. Thus, *simplicity* reduces the energy requirement of a guideline and makes adhering to it possible for a greater number of professionals.

There must be a clear advantage to the innovation when compared to established habits. Without such *relative advantage*, there will be no impetus to overcome the inertia of staying with the "tried and [not necessarily] true." In the case of clinical practice guidelines, evidence serves the purpose of demonstrating a clear advantage when it documents improved patient outcomes when guideline recommendations are followed. In

the case of eventually terminal disorders, enhanced functionality, quality and length of life must be convincingly demonstrated.

The promise of less uncertainty is another energizer of behavior change. Rogers (2003) maintains that a major characteristic of technology is to reduce uncertainty about which choice is best by providing information. Accordingly, clinical practice guidelines, consisting entirely of information, are most likely to be utilized in "grey areas" of medical judgment where the best practice is not widely agreed upon (Lomas, 1994). Guidelines are *recommendations* precisely because there is as yet insufficient evidence to establish a nearly universal, clearly effective treatment (Leape et al., 2003).

The extent to which a new behavior can be tried out (its *trialability)* minimizes its potential cost. Medications that can be dosed on a trial basis or procedures that are reversible, for example, reduce associated risk. Confidence can be gained gradually and the amount of action required when the uncertainty level is high is limited and therefore less of an impediment to adoption and adherence. Both trialability and simplicity of guidelines were associated with greater compliance in a review of 23 studies by Grilli and Lomax (1994).

Whether an innovation will spread, or diffuse, also depends in great part on its *observability* to other potential adherents. Hospital doctors using handheld computers to access guideline information on the ward or in the staff break room is a behavior observable to other physicians. Posters in exam rooms that delineate hand hygiene guidelines are visible, but a staff member engaged in frequent hand washing better exemplifies observable behavior. Grilli and Lomax (1994), however, noted no significant

effect on compliance by the level of observability inherent in the recommendations of various guidelines.

Saillour-Glenisson and Michel (2003) add that a successful guideline must be *adaptable.* Rogers (2003) similarly points out that capacity for reinvention is a defining quality of innovations. Users must be able to, and inevitably will, change a new technology to their particular circumstances or tastes. Heffner (2000) proposes that the summary nature of guidelines encourages "flexible application of recommendations to the unique clinical problems of individual patients" (p. 1S). The need for continual updating as new research is published also mandates that guidelines be adaptable. Waitman and Miller (2004) posit that 90% of successful guideline implementation must be local, that is, adapted to local needs, in large part because of the need to stay up to date. Guidelines provided by professional organizations, Waitman and Miller observe, are seldom updated regularly enough to keep them based on current evidence. In addition, operationalizing a guideline requires seamless coordination among team members in local practices or hospitals. Clinical workflow, equipment, financial resources and expertise vary from one locale to another. Customizing guidelines is therefore necessary, as is reaching a local consensus on which guidelines merit priority.

The impact of a clinical practice guideline will depend upon its authors, the quality and type of its evidence or consensus, and its content characteristics. Just which guidelines are ultimately incorporated in treatment is further dependent on the co-construction of the clinical circumstances by the physician and the patient (Freeman & Sweeney, 2001).

Physician Characteristics

Personal traits. Individual clinicians vary in willingness to try something new. They therefore fall into different adopter categories (Rogers, 2003). A highly innovative person (relative to the norms of the medical social system) may be considered too much of a maverick to influence the professional behavior of colleagues in general. On the other hand, "early adopters," are respected members of the practice community who adopt improvements judiciously, and are those through whom an innovation will begin to spread. Adopter categories range from innovator to laggard, with the majority falling in between, as in a normal distribution.

Traits fostered by medical education. An early, formative environment that has universal impact on physicians is the medical education system. Socialization into a professional or academic discipline typically occurs during graduate education and medicine is no exception. Medical school and residency training are the sources of physicians' ideas about how things should be done. Physician characteristics that affect adherence to clinical practice guidelines owe much to the socialization process. If their education does not develop norms of life-long learning and evidence-based practice, it will not predispose graduates to changing specific treatment processes in the face of new research findings. Ironically, the same developments that have led to the explosion of biomedical research and resulting knowledge have also diminished medical schools' ability to train clinicians who are able to incorporate those new findings in their practice.

Physician and historian of medicine Kenneth Ludmerer (2003) has noted that the classical subject matter student clinicians need as a foundation no longer provides fruitful questions for research that will attract funding or academic honors. As the faculty's

research moves farther away from clinically centered topics, students are left without models of the patient-centered clinician/researcher. Instead, as a greater and greater proportion of faculty's time is consumed by research, and that research does not relate directly to bedside care, third- and fourth-year medical students frequently receive most of their clinical instruction from interns and residents. Also problematic is the fact that hospitals continue to be the site of most clinical instruction, in spite of the fact that an increasing proportion of patients suffer from chronic diseases and are seen in ambulatory care rather than as inpatients (Ludmerer, 2003).

Simultaneously, academic hospitals are depending more and more heavily upon the income generated by patients of clinical "faculty" who do no teaching and are pressured to see so many patients that if students are assigned to them, there is little time (or even any office space) available for discussions (Ludmerer, 1999). Ludmerer emphasizes "that the greatest contribution [any professional school] can make is to provide practitioners the intellectual tools to assess information critically, stay abreast with changing knowledge, [and] adapt to continuous change" (p. 378). Assessing information critically, staying abreast with increasing knowledge, and adapting to continuous change are the essential components of practicing evidence-based medicine. High quality clinical practice guidelines are the product of leading specialists fulfilling precisely those three functions. When medical schools of today are having a difficult time providing students with opportunities to develop those abilities, clinical practice guidelines are ever more necessary and useful tools for their graduates, whether the need they fill stems from less than optimal clinical training or lack of reading time as busy practitioners.

Practice Environment

The practice environment of the physician can either hinder or facilitate guideline diffusion. Since communication is essential for diffusion to occur, and the solo practitioner less likely to observe peers behaving in new ways, diffusion may proceed more rapidly among group practices (Burt, 1987; Coleman, Katz, & Menzel, 1966). The professional networks of physicians are crucial if positive interpersonal communication among peers is to move the diffusion process from familiarity with a guideline's recommendations toward actual behavior change. Doctors may communicate with other doctors while on the job if they practice in company with a number of others at a clinic setting, hospital, or medical group where there is a time and place for face-to-face meeting. For those practicing in relative isolation, the meetings of professional, particularly specialty, organizations provide informal between-session opportunities, as well as formal sessions, to learn about practice improvements from peers.

Coleman et al. (1966) found that the strongest determinants of *socializing* among medical doctors were age, religion, hometown, and having attended the same medical school. However they were most likely to discuss medical issues with those in the same workplace. Slotnick (1999) found that physicians typically consult sources immediately available to them, whether for general updates or specific problem-solving. Those sources included colleagues spoken to frequently and journals available in their offices. Thus, simple physical proximity to promoters of evidence-based practice exerts influence. However, in groups, clinics, or hospitals, the presence of an influential physician who is opposed to an innovation, may retard adherence (Mittman, Tonesk, & Jacobson, 1992).

Staff-model health maintenance organizations (which make up about 10% of HMOs) are in a unique position to mandate adherence to clinical practice guidelines as they normally exercise a greater degree of control over the clinical behavior of staff than possible in other healthcare organizational frameworks. They also can combine standardized healthcare processes with a holistic approach of preventive health promotion for their enrollees. Kaiser Permanente Northern California, for example, proactively fostered provider adherence to guidelines for lower cholesterol goals and beta-blocker prescription after heart attacks in order to reduce heart disease mortality rates. A multifaceted approach combined customized documents (order and discharge sheets), prevention and rehabilitation programs, cardiac champions (opinion leaders who promoted the clinical practice guidelines), outcomes data, and outreach reports with prompts generated electronically at each outpatient follow-up visit. Kaiser Permanente Northern California now reports an adjusted heart disease mortality rate of enrollees that is 30% lower than population rates (Brindis & Sennett, 2003).

Another variable in the practice environment is the utilization of health information technology. Electronic means of delivering guidelines may be especially helpful with regard to weaving the use of guidelines into the clinical workflow. The electronic medical record is increasingly common in hospitals and doctor's offices. Software has been developed to provide automatic reminders of recommended steps when patients' records are accessed at their office visits. The guideline, for example, "encourage smoking cessation efforts for patients with hypertension," is thereby implemented for the physician much as other technological innovations are manufactured, packaged, and delivered to market (Shiffman, Michel, Essaihi, & Thornquist, 2004). Software programs

enable the physician to assess treatment options at the point of care via a handheld computer displaying guideline summaries or the research articles presenting the relevant evidence (Lottridge, Chignell, & Straus, 2004). More elaborate computerized decision support may be essential in implementing complex guidelines that take into consideration the intricacies of clinical medicine (Weingarten, 2000).

Patient Characteristics

Another player influencing the rate of adherence to clinical practice guidelines is the healthcare consumer. Patients, although frequently ignored in considerations of practice variation, are not inert and are often moved by information and influences external to their physician's office. Family members, friends, community attitudes and lifestyle values in general, may result in less than optimal treatment choices (Freeman & Sweeney, 2001; Greer, Goodwin, Freeman, & Wu, 2002). Patient preferences must be considered. Few treatments are without a downside and the same side effect may be intolerable to some patients while going unnoticed by others. Principles of informed consent recognize the patient's right to refuse the medically advised treatment. Direct marketing to patients by pharmaceutical and device manufacturers further complicates matters. When guidelines and marketing hype do not converge, the patient may be convinced by the latter.

There may be instances, however, when the patient's preferences are informed by more recent evidence than that upon which the guideline recommendation is based. Patient and parent advocacy groups have increased the research savvy of their members. Conferences organized by such groups often feature basic science researchers, as well as physicians treating the disorder of concern. At times the advocacy group helps fund

biomedical research, hence regular updates appear on the conference agenda and the group's website. Although the reliability of such information may vary, patients should be considered a potential source of additional evidence regarding appropriate treatment.

The cultural health beliefs of the consumer frequently impact the acceptability of an intervention. Social mores regarding, for example, contraception, abortion, drug use, the relative good of extending life, as well as quality of life issues, may result in consumers and providers holding divergent views. Instances of patients rejecting guideline recommendations on the basis of alternate worldviews of patients should not be viewed as a problem to be remedied.

Economic Issues

It is only reasonable, in most cases, that the clinician tailor treatment to be affordable to the patient. When the payer is an insurance company or a managed care company, there are limitations regarding allowable (i.e., billable) treatments. Formularies, for example, are lists of the pharmaceuticals the physician can prescribe that will be covered by insurance.

Reimbursement policies can have telling effect on the treatments offered at hospitals. For example, because high dose Interleukin-2 is not fully reimbursed by the Centers for Medicare & Medicaid Services (and is very costly), hospitals have stopped offering it to treat metastatic melanoma in Medicare patients. Some hospitals have even stopped offering it to patients who can pay for it personally in order to avoid inequity (National Research Council, 2001). Thus, the costliness of new treatments combines with reimbursement policy to place a major barrier in the path of physicians who desire to deliver best treatment.

Another way in which cost influences guideline adherence is through the resources devoted to implementation strategies. In addition to reviewing 235 implementation studies, Grimshaw, Thomas et al. (2004) interviewed key informants regarding the feasibility of guideline dissemination and implementation activities in the United Kingdom and the resources required. Rarely were such activities supported by institution budgets. Instead, irregular funding for special initiatives was usually required. Most informants reported that only the least expensive methods (passive dissemination or lunchtime meetings) were supported in an ongoing fashion. Unfortunately, those methods also seem to be the least effective (Grimshaw, Shirran et al., 2002). Furthermore, resources used and costs of guideline development, dissemination, and implementation were rarely well described in the studies reviewed. Only four included the economic data called for by the abstraction methods used by Grimshaw and colleagues.

Further highlighting the impact of resource constraints is the fact that several reviews indicate that multifaceted strategies, using more than one intervention, may be more effective than single intervention strategies. As would be expected, multiple interventions are more expensive than single ones (Grimshaw, Shirran et al., 2002; Solomon et al., 1998; Wensing, van der Weijden, & Grol, 1998).

Legal Considerations

Some resistance among physicians to the proliferation of guidelines stems from the sense that they put physicians on the defensive, having to explain any departure from the guideline involved in a particular case (McDonagh & Hurwitz, 2003). However, in malpractice litigation, physicians have traditionally been measured against a standard of care accepted within their profession. Many, if not most, guidelines are developed by the

same people who develop consensus statements and contribute to the development of a recognized standard of care. When a suit is brought, the plaintiff's allegation may be that the physician did not act in harmony with such a standard when he or she should have, or did when it should have abandoned due to the circumstances. Hence, litigation arising vis-à-vis providing or not providing typical care is not peculiar to guidelines. A clinician who has sound reasons for taking or refraining from a particular recommended action has a defense, even in the face of a negative patient outcome. However, if physicians perceive that following guidelines may place them in peril, that perception will discourage adherence.

Guidelines represent what works best in most cases, which is important from the public health perspective. Physicians, however, treat *individuals* and protect themselves by erring on the side of caution, just as many patients will do. Not only does level of comfort with risk vary among physicians and patients, but when something goes wrong there may be zero tolerance in retrospect among patients or their families. In fact, increasing concern about malpractice suits was a motivator behind the intensified research exploring the construct and role of peer educators among physicians in the mid-1970s (Stross, 1996).

Efforts to Disseminate and Implement Guidelines

The numerous barriers to the application of research findings to practice in general, and physician adherence to guidelines in particular, must be overcome in order to improve the quality of healthcare. A number of methodological challenges have faced such efforts.

The diffusion process has been described as non-linear (Rogers, 2003) because of the complex characteristics of the many variables and interactions involved which preclude straightforward analysis and prediction. Efforts to evaluate studies of guideline implementation have been complicated by the many different settings, persons, and problems involved in the contexts in which treatment decisions are made. Hence, generalizability of research on guideline adherence is problematic.

Experimental design in guideline implementation evaluation research is of utmost importance. Grimshaw, Campbell, Eccles, and Steen (2000) note that uncontrolled before-and-after studies cannot rule out the effects of secular trends, sudden changes, or the Hawthorne effect, at times resulting in an overestimation of the success of the intervention. Time series designs require sufficient pre-intervention measurements (rarely attained) to ensure a valid estimate of a preexistent underlying trend in order to assess an observed trend in measured variables after the intervention. They can also be plagued by differences in baseline performance between the experimental and control groups.

Interventions should target areas of practice where there is a clear need for improvement. Not establishing baseline performance through a needs assessment can invite modest results due to high pre-intervention performance levels. In an intervention to encourage neurologists' use of dementia guidelines (Gifford et al., 1999), a high baseline adherence rate of 80% could have accounted for minimal motivation among the neurologists to attend seminars and read supportive material (Stross, 1999).

Non-randomization further limits such trials' estimate of effect. Grimshaw et al. (2000) recommend cluster randomized trials, particularly including baseline performance measurements to detect imbalances when using a small number of clusters.

Randomization does not guarantee a true measure of an intervention's potential, however, because the physicians in the experimental group may not be as personally motivated as those who would use the guideline voluntarily and more effectively in naturalistic settings. Furthermore, in contrast with randomized pharmaceutical trials that typically occur when product development is well advanced, large-scale randomized trials are often attempted early in the evaluation process in the case of interventions to change practice behavior. Many (up to fifty percent) of the studies in the literature suffer from these and other design or analysis flaws (Grimshaw, Eccles, Walker, & Thomas, 2002), making assessing the impact of guideline adherence interventions difficult.

One drawback of medical diffusion research is that it is situated in diverse environments (Cabana et al., 1999). Hospital-based research findings, for instance, may not be generalizable to ambulatory care which, due to the increase of chronic diseases, is the site of much of current medical care. Within small clinics or group practices, diffusion mechanisms may differ across specialties as disparate as pathology and surgery (Wright et al., 2004). The foregoing limitations should be kept in mind while considering the following dissemination and implementation strategies to increase guideline usage.

Dissemination Strategies

Dissemination of a guideline focuses on increasing physicians' awareness of and familiarity with the recommendations. Mass media approaches include print, such as publishing a clinical practice guideline in a peer-reviewed journal article, a health system newsletter, or mailing it directly to health professionals. When particular drugs or devices are instrumental to a guideline, advertisements targeting physicians may be used by industry, thus indirectly promoting the clinical practice guideline. Patient advocacy

groups have produced DVD recordings describing options for care and management of specific disorders (Deafness Forum Limited, n.d.; Parent Project Muscular Dystrophy, 2003). Information technology makes mass communication of a guideline possible through the electronic availability of guidelines on the internet.

Although the passive dissemination approaches of mass media have been shown to improve healthcare utilization by the public (Grilli, Ramsay, & Minozzi, 2002), they have generally not been markedly successful in changing practitioner behavior. For example, in a review of 102 randomized controlled trials from 1970 to 1993, Oxman, Thomson, Davis, and Haynes (1995) found that mailed materials or traditional conferences had little or no effect on provider performance or patient outcome.

However, Grol and Grimshaw (2003) reported a review of four cluster randomized trials that found that the distribution of informational materials did result in an 8% improvement in guideline adherence. One possibility is that passive methods had their effect among early adopters, the physicians prone to change. And since awareness must precede agreement, adoption and adherence, measures effective in increasing awareness set the stage for adherence. Due to the relatively low cost and high feasibility of distribution of educational materials, Grol and Grimshaw observe that it might be a cost-effective strategy when used in combination with other interventions.

Advertising in medical journals by pharmaceutical companies can play a role in moving innovations into practice. The increased use in Canada of ramipril in patients at high risk for cardiovascular events, for example, was facilitated through advertising as well as other marketing by the manufacturer (Davis et al., 2003). The classic study of the successful diffusion of the antibiotic tetracycline (Coleman et al., 1966) emphasized the

role of social contagion, but this has been questioned in view of the aggressive marketing campaigns launched by pharmaceutical companies, each for their own brand of tetracycline (van de Bulte & Lilien, 2001). According to a 1958 Federal Trade Commission report cited by van de Bulte and Lilien, during the first year's effort Lederle alone averaged two direct mailings per week to every physician in the United States. Advertisements were inserted twice monthly in *JAMA* and every month in *Modern Medicine, Medical Economics*, and all state and many county medical journals.

Implementation Strategies

As used above, dissemination refers to mere distribution of a guideline through various media. Implementation, however, includes influencing practitioners to put a guideline into practice once informed of its content. A number of means have been tried in order to help providers accomplish the *application* of new knowledge.

As noted earlier, deviation from recommended treatment might be justified by patient condition or preferences and systemic factors such as available resources. But in cases where clinician behavior is a reasonable target for change, what can facilitate his or her application of new knowledge in the practice setting? That effort has traditionally been within the purview of continuing medical education (CME) where attempts have usually focused on communicating information, with only limited synthesis of information or emphasis on application. Drawbacks have included the irrelevance of many short courses to the individual's practice setting, passive teaching methods, and distant locations requiring travel and time away from one's practice (Stross & Harlan, 1979).

Continuing medical education. The inherent goal of CME has been to update and augment the earlier clinical education of health practitioners. A variety of methods have

been employed by CME professionals in the ongoing attempt to influence practice and thus, in turn, improve healthcare quality. In an overview of systematic reviews of interventions designed to change professional behavior, Bero et al. (1998) found that didactic approaches such as lecturing to large groups and distributing recommendations, whether in print, audiovisual or electronic format, had little or no effect. They observed that the most effective means included meetings with interactive segments (practice or discussion), educational outreach visits, physical or electronic reminders being added to patient charts at office visits, or combinations of interventions. That study's findings confirmed earlier ones of Davis, Thomson, Oxman and Haynes (1995) that identified combination approaches, reminders, outreach visits, use of opinion leaders and patient-mediated interventions to be the most effective CME strategies. Illustrating the problem of "shifting data" (Landers, 2006) in basing practice (in this case, educational practice) upon research findings, a more recent study found that single interventions were as successful as multifaceted ones (Grimshaw, Eccles, & Tetroe, 2004).

Borenstein et al. (2003) found that physicians' perceptions of the effectiveness of education strategies were often at odds with research findings that revealed the limitations of traditional methods. Although confirming the value of peer communication, physicians also believed passive methods such as peer-reviewed articles and CME-accredited materials to be effective. Essentially, doctors believed that those interventions to which they had the most exposure were the most effective. Borenstein et al. suggest that didactic methods may fulfill the earnest physician's desire to add to his or her knowledge even though such methods do not demonstrably result in recall and application of new knowledge in practice. It may also be the case that physicians choose

those interventions they believe to be effective and that are widely (and conveniently) offered by CME sources accredited by the Accreditation Council of Continuing Medical Education which would presumably be offering effective education.

Davis et al. (2003) compared three workshop approaches: continuing medical education, continuing professional development, and knowledge transfer. CME courses were found to contain traditional clinical content, to be largely passive and teacher-driven. Continuing professional development was described as learner-centered with broader content, including professional issues. Only the knowledge transfer approach, the authors contend, encompasses non-physician players such as health system managers, patients, policy makers, psychologists, organizational and adult educators. This enables it to take a holistic systems approach, addressing prevention as well as treatment.

Academic detailing. Originating in pharmaceutical sales, "detailing" refers to one-on-one contact between seller and customer, with an emphasis on informative details regarding the product's use. A similar approach variously termed academic detailing, educational visits, or educational outreach has been adopted in guideline implementation efforts wherein a fellow professional knowledgeable in the details of a medical procedure coaches his or her peers. In one exemplary case, consultations with pharmacists were arranged for physicians to improve prescribing practices (Majumdar & Soumerai, 2003). Similarly, physicians with knowledge of guidelines can visit colleagues in their practice locations with the objective of changing practice (Grimshaw, Eccles et al., 2002). Particularly when the consultation is informal and the advisor is selected by the advisee, the principles of social influence come into play.

Utilizing Social Influence

The central theme of the communication model of diffusion (Rogers, 2003) is that the diffusion process is driven by interpersonal communication with near peers. There is considerable evidence that physicians do rely strongly on consultation with colleagues as a primary source of medical information. Verhoeven's review (1995) of eleven studies from Europe and America published from 1975 to 1992 concluded that family physicians most often relied on colleagues as information sources. Haug's 1997 meta-analysis of twelve studies from 1978 to 1992 concluded that "informal consultation with colleagues plays a vital role" (p. 231) combined with referring to books and journals. The studies, from the U.S. and Canada, included general and family practitioners and specialists. Consultation with colleagues was consistently rated as the second most frequent source of information for clinical problems, while textbooks, the *Physician's Desk Reference*, or journals alternated between first and third choice.

If an innovation works better than the status quo, those who have used it will endorse its use, at least when they are asked by colleagues about the problem it helps solve. People tend to listen to and trust those who are like themselves (Cialdini, 2001). Yet, for a supply of new ideas, persons from dissimilar social networks must communicate (Granovetter, 1973). A balanced mix of heterophily, dissimilarity among actors, and homophily, similarity such as in socioeconomic status and education (Katz & Lazarsfeld, 1955; Lazarsfeld, Berelson, & Gaudet, 1944), therefore, facilitates social influence.

In uncertain circumstances, guideline implementation strategies employing social influence are likely to play a major role in changing practice norms because individuals rely most heavily upon the opinions and practices of their reference group when correct

choices are not clear (Mittman et al., 1992, which draws on Kurt Lewin's work). One category within the reference group that has received much attention is that of opinion leader (Berner et al., 2003; Borbas, Morris, McLaughlin, Asinger, & Gobel, 2000; Farquhar, 1999; Gifford et al., 1999; Soumerai et al., 1998).

The importance of social influence on aspects of the physician's practice was noted in an early study conducted at the Bureau of Applied Social Research of Columbia University. In the now classic *Medical Innovation: A Diffusion Study*, Coleman, Katz, and Menzel (1966), traced the adoption of the new antibiotic tetracycline. Although sharing factors such as religion, age, town of origin, and medical school tended to predict purely social relationships, professional advisor-advisee relations depended much more upon sharing affiliation within a hospital, clinic, or office. Such proximity allows a time and place for face-to-face meeting, if only through "hallway or curbstone consultation." The critical element appears to be the making of professional acquaintances. Such contacts lead to discussing cases and sharing advice. Although Coleman et al. found that formal position, such as specialty and hospital appointment, led most often to being selected as a source of counsel, another telling quality was having local experience in the community. Familiarity with local community mores was a crucial element.

One of the first published studies to specifically examine the effect of informal educators was undertaken by University of Michigan researchers Wenrich, Mann, Morris, and Reilly (1971). Morris had previously completed a doctoral dissertation on the subject, *The Information Influential Physician: The Knowledge Flow Process Among Medical Practitioners* (Morris, 1970). Wenrich, Mann, Morris, and Reilly viewed the hospital attending staff as a social system whose informal education processes could help medical

practice keep pace with the growth of medical knowledge. Within four hospitals in the Midwestern United States, open-ended interviews were conducted with 80% to 100% of physicians with attending privileges. They were asked to identify the three physicians with whom they most often 1) informally discussed cases, 2) called upon for formal consultation, or 3) socialized with, and the five physicians who they felt had the most influence on the practice of medicine in their hospital. The physicians nominated were then ranked according to total score. Those whose score was at least two standard deviations above the mean were considered primary informal educators, while those between one and two standard deviations above mean were named secondary informal educators.

Eighty-two percent of the primary and secondary informal educators identified by their colleagues were either internists or surgeons. Additional data gathered in a 10-page survey revealed that they also spent more hours at the hospital, served on more hospital committees, and belonged to more professional associations than their other colleagues. The informal educators reported relying more on written than on oral sources of communication than others did, in spite of spending slightly less time reading than their colleagues in three of the four hospitals.

Wenrich et al. (1971) concluded that bodies sponsoring continuing medical education should identify informal educators and tailor offerings specifically to meet their educational preferences and needs. Wenrich et al. implied that such education would better equip the influential physicians in their educational role and ensure the translation of new knowledge into practice on the local level. They further speculated on the possibility of assisting such physicians in developing teaching and interpersonal skills,

perhaps identifying them as early as medical school and providing special training for the future role of peer educator. The authors emphasized that peer teaching and learning is highly reciprocal, hence informal educators are simply those who are more frequently performing the teaching role than the majority of their colleagues.

Social network analysis has shed light upon the function of opinion leaders and their potential for influencing change (Cross, Borgatti, & Parker, 2002). Although not necessarily an early adopter of innovation, once the opinion leader does adopt, his or her use of the innovation is likely to spread (Rogers, 2003). Diffusion of innovation theory highlights two problems of physicians' professional networks. Because the physicians in many settings are of similar status, the network is a cohesive one and therefore resistant to intrusion from outside. In addition, because they rely heavily on colleagues similar to themselves for advice, new information will be minimal. Thus, it might be a particularly effective strategy to ensure that those frequently consulted by peers are well equipped with the findings of the latest relevant research. Means of identifying them continued to be a topic of research by scholars at the University of Michigan.

The Hiss et al. Protocol

The traits of educationally influential physicians in Michigan hospitals were investigated by Hiss, Macdonald, and Davis (1978) with attention being given to developing a profile of the physicians being sought out. To develop a tool to identify influential physicians, they presented several providers and consumers of community hospital–based continuing medical education with "the hypothesis that some physicians might have influence on the professional behavior of their colleagues" (p. 283), then asked them to list the characteristics that would distinguish such physicians. A

questionnaire was created based upon the resulting combined lists of characteristics and administered to other community hospital physicians. A group of 300 was asked to rate the degree to which each trait contributed to the influentiality of a colleague to whom they would turn for clinical advice. They were further asked to identify the five characteristics contributing most to the clinical influence of a colleague. A similar questionnaire was administered to a second group of 74 physicians to assess the discriminatory validity of the statements. That is, they were asked to rate the degree to which a random physician (the first colleague seen that day) met the descriptions.

Analyzing the responses, Hiss et al. (1978) identified nine best descriptors of educationally influential physicians in the community hospital context. The nine loaded onto three factors characteristic of those to whom colleagues turn for help: they are willing to answer questions (communication), they are generally up to date on a broad range of issues (knowledge), and when they answer questions they display respect for the questioner (humanism).

An identification instrument comprised of three paragraphs constructed from the nine questionnaire items was then developed. Respondents would be asked to name up to three colleagues who met the description in each paragraph, naming the same person for different paragraphs if applicable (see Appendix I). By use of the instrument, "educational influentials" within the informal communication network of small community hospitals could be quickly and easily identified, whereas previous research methods had necessitated lengthy personal interviews (Stross, 1996).

Subsequent Use of the Hiss et al. Identification Instrument

The identification protocol developed by Hiss et al. (1978) has been utilized in numerous studies. The following summary draws on a 1999 Cochrane Systematic Review of eight randomized controlled trials dealing with the effects of local opinion leaders on professional practice (seven of which used the Hiss et al. instrument). The review by Thomson O'Brien et al. (1999) stated that two studies, by Lomas et al. (1991) and Soumerai et al. (1998), demonstrated a clinically important effect achieved through use of opinion leaders. Other studies that showed some improvement in the experimental groups was subject to detection bias in that the assessors were not blinded to control-experimental group allocation.

The instrument was first used in an intervention aimed at improving the care primary care physicians delivered to patients with rheumatoid arthritis (Stross & Bole, 1979). Estimates were that only 3% of rheumatoid arthritis patients in the study area were being treated by a rheumatologist and that the primary care physicians providing care for the remainder were in small communities with few CME resources or experts to consult. Instructional objectives and a needs assessment preceded development of materials. Materials included a synopsis of research findings, audio-visual demonstrations of care, and a clinical preceptorship at the University of Michigan Arthritis Center. The six communities enrolled were randomly assigned to control or intervention groups in an unspecified manner. The preliminary report (Stross & Bole, 1979) showed that the test scores on knowledge exams of the 12 informal educators identified had increased from 64% to 86%. According to a later report (Stross & Bole, 1980), significant positive process outcomes in the intervention group included reduced use of corticosteroids

accompanied by increased use of aspirin and physical therapy. Even though the incompleteness of medical records prevented assessment of patient outcomes, this intervention was considered successful as it attained its goal of improving the knowledge and skill of physicians who were in the role of clinical advisors to their colleagues. According to Stross and Bole (1980),

> The prime feature of this approach is utilization of the "teachable moment," when one of his [or her] colleagues has a clinical problem that he [or she] could help solve. ... [The colleagues] receive continuing education that meets practically all of the ideal standards for a CME program. The material is directly relevant to patient care; it is timely and convenient; it is practical; it is individually based; it has immediate pay off; it takes a minimum of time; and it costs very little! (p. 848)

Stross, Hiss, Watts, Davis, and Macdonald (1983) employed the Hiss et al. instrument to identify educational influentials among Michigan primary care physicians in 16 community hospitals lacking pulmonary specialists. Basic continuing medical education about chronic obstructive pulmonary disease was delivered to the primary care physicians in all the hospitals. Eight hospitals were randomly assigned to an experimental group, where physicians identified as influential were given more intensive training in treating chronic obstructive pulmonary disease. The charts of relevant patients at all hospitals were audited before and after the intervention to compare the use of appropriate diagnostic and therapeutic techniques. Several positive changes were noted in the hospitals receiving the intervention that were not observed in the control hospitals (e.g., increased intravenous administration of fluids and bronchodilators and use of respiratory

therapy services). The authors concluded that focusing training efforts on educationally influential physicians was an effective means of improving patient care in small communities without teaching hospitals. Thomson O'Brien et al. (1999) note, however, that baseline measurement was not done and that the academic status of the hospitals and concealment of randomization and assessment were unclear.

A subsequent trial focused on increasing use of aspirin and physical therapy while decreasing use of corticosteroids in treatment of patients with osteoarthritis (Stross & Bole, 1985). Aspirin use remained static, but corticosteroid use decreased and physical therapy increased. There was no measurable positive change in patient outcome, however. All of the Stross and Bole trials suffered from unit confusion in that randomization was at the group level but analysis of data at the patient level (Thomson O'Brien et al., 1999).

Hong and Ching (1990) used a different approach reflecting a more formal and hierarchical concept of social influence, with the aim of reducing incorrect urinary catheter practices by ward nurses. The peer educators were selected by their supervisors, not their peers, on the basis of having knowledge, interest, or both, in maintaining good catheter practice and being able to "educate the ward staff" and "effectively influence them to comply" with the new guideline developed (p. 110).

Although veering away from the concept of informal and peer educators consulted on an as-needed basis, the approach is in keeping with the hierarchical nature of nursing culture. The particular structure of social networks common within a profession can affect the manner in which they contribute to behavior change. In comparing clinical directors of medicine (physicians) with nursing directors, West, Barron, Dowsett, and

Newton (1999) found that the physicians' dense social networks, in which most members know what the others know, are less likely to receive new information, but that once a practice innovation is accepted, there is considerable group pressure to conform. Doctors, who operate as independent contractors, find themselves in a less hierarchical social structure than do nurses. The critical element in diffusion of nursing guidelines is a nursing director who believes in the guideline and can mandate its adherence among her or his subordinates. Change among physicians, such as that required to implement guidelines, depends more heavily upon informal peer communication and recommendation (West et al., 1999).

Hong and Ching (1990) found that wards with tutorials taught by a supervisor-designated leader had improved compliance with the new guideline. Having the instructor available in the ward for follow-up questions and reinforcement of lessons was deemed particularly beneficial. Social influence stemming from informal authority was not a salient factor in the intervention since the instructors were not selected by peers on the basis of being already trusted advisors.

Lomas et al. (1991) used the Hiss et al. instrument among both obstetricians and general practitioners in comparing opinion leader, audit and feedback, and no intervention, to encourage vaginal birth after a previous cesarean section (a trial of labor rather than default surgery). They did not use every physician identified as educationally influential, but invited the four named most often to officially lead four groups, thus placing informal advisors in the formal role of "opinion leader." The groups were compared with four audit and feedback groups and eight control groups. In addition to augmenting the leaders' knowledge through a one and a half day workshop, educational

materials were sent with a cover letter from the opinion leader to all physicians in the study. The materials were designed using the principles of pharmaceutical company "detailing" (Soumerai & Avorn, 1990) with eye-catching summary sheets of the evidence for the clinical practice guideline involved, as well as excerpts, full-text versions of the guideline, and letters of endorsement for the guideline and study. The leaders were also to keep a log of their own formal and informal educational contacts and arrange for a credible expert speaker to present the evidence and rationale for the guideline to the physicians.

The intervention period lasted one year, followed by a year of recording variables to determine outcome rates which were then compared with baseline rates determined by chart audits at the outset. The opinion leader group showed increased compliance with the guideline (offering vaginal birth as a reasonable alternative to another cesarean section) as well as increased trial of labor and vaginal birth, in spite of the fact that many patients declined the offered trial of labor. Lomas et al. (1991) expressed concern that the offer of a trial of labor reached no more than 75%. Nevertheless, it was much higher than the control and audit and feedback groups (51% and 56%, respectively).

In assessing the rate of cesarean sections, the authors collapsed the control and the audit and feedback groups because there were no significant differences between them. However, doing so somewhat inflated the advantage of the opinion leader group because there was a higher rate of cesarean section in the audit and feedback group than in the control group. In trials where the audit and feedback strategy has been successful the feedback has been personalized to each physician. In the Lomas et al. (1991) study the participating physicians required that the feedback be generalized to the group.

Personalization, however, is crucial to changing practice through feedback (Soumerai, McLaughlin, & Avorn, 1989). The negative effect on the audit and feedback results might have been balanced by the fact that the results from the opinion leader groups included a group whose leader resigned after six months.

Any attempt to isolate the impact of particular interventions in the healthcare setting is challenging because of the myriad of factors involved in group behavior. Although using informal advisors in the formal role of group leaders, Lomas et al. (1991) attempted to make interventions as naturalistic as possible. They encouraged the opinion leaders to follow certain replicable activities, but also to elaborate upon them in harmony with their own initiative and local circumstances. The overall plan included both advanced training for a few of the informal educators identified in a group and recruiting them to take on the more formal role as "leaders" in multi-faceted projects. A frequent observation is that "we don't really know what it is that opinion leaders do" (summarized in Thomson O'Brien et al., 1999). Much of this perceived ignorance may be due to the many definitions of "opinion leader" and the variety of roles they are asked to assume (Grimshaw et al., 2006; Mittman et al., 1992). The study's limitations include comparing the effectiveness of opinion leaders with an audit and feedback intervention weakened by the feedback being generalized rather than personalized to individual physicians.

Hodnett et al. (1996) referred to their experimental treatment as a "marketing strategy" and compared hospitals' intrapartum nursing practices when local opinion leaders were used, with those of control hospitals receiving no intervention. Twenty hospitals were involved in the well-run, year-long study in which informal leaders promoted clinical practice guidelines. Cited meta-analyses supported the hypothesis that

better support for women during delivery would result in lower rates of epidural analgesia. There was no improvement in any outcome measure (including narcotic analgesia, episiotomy, and cesarean section rates). However, because outcomes were measured rather than the nursing process, the conclusion that the strategy was unsuccessful in changing *practice* appears unfounded.

The study illustrates the difficulty of interpreting the results of intervention studies. Generally, since the overall goal in improving healthcare quality is to achieve better patient outcomes, outcome measures are preferable to process measures. To properly test an intervention's success in such cases, however, it must be clear that the change in the practices targeted does reliably produce the desired change in outcome.

Elliott et al. (1997) report using "a method similar to that described by Hiss et al." (p. 193) to select opinion leader educators in an effort to improve cancer pain management. Rather than hospitals or wards, communities were the unit of interest, including all providers treating active cancer in adults and all cancer patients not in remission, found in six Minnesota communities of similar size. Results did not reach the level of significance, but there were positive trends across clinical variables (physician and nurse knowledge, attitude, and practice behavior, as well as a better cancer pain management index—a measure of goodness of fit between pain level and analgesia provided). Patient outcomes (intensity of patient pain and family knowledge and attitude) declined slightly. The study suffered from focusing on a clinical situation in which baseline performance was already quite good and from a low level of cohesiveness (a wide variety of practice settings in dispersed locations) among the target clinicians. Opinion leader educators were encouraged, following Lomas et al. (1991), to adapt to local needs and culture.

Soumerai et al. (1998) examined the effect of using the physician named most often on the Hiss et al. instrument to lead an intervention at his or her hospital in a large, systematic quality improvement effort (37 hospitals, 5347 patients). They chose the use of medications for acute myocardial infarction (aspirin and thrombolytics in elderly patients, beta-blockers in all patients, and disuse of prophylactic lidocaine) that were widely recommended by guidelines. The opinion leaders were to use their initiative to develop approaches acceptable in each environment. Notably successful in achieving results superior to measurements at baseline and in control hospitals, the intervention groups capitalized on the educational leaders' ability to facilitate change in hospital protocol and standing orders and to help colleagues dispel concerns about beta-blocker use. In instances where the intervention appeared to fail, the physicians had already been applying the guideline appropriately and there was little improvement to make (e.g., comorbidities, late presentation, and extreme age contraindicated use of thrombolytics in the most elderly). The exemplary design of the experiment also revealed when secular trends were in evidence, as in the case of large decreases in use of prophylactic lidocaine in the control group.

Soumerai et al. (1998) anticipated the advice of implementation science meta-analyses to use a combination of approaches (Solberg et al., 2000) by merging use of educationally influential physicians as leaders in organizational change efforts with the provision of feedback to the hospital groups. The dual approach made it more difficult to pinpoint the contribution uniquely attributable to opinion leaders. However, because feedback was mailed to the control hospitals also, the effect of the opinion leaders was isolated to a degree.

Educationally Influential Physicians

An informal peer educator, or "go-to" physician, is influential by virtue of informal authority, rather than the organizational position, power, or prestige characteristic of a high profile opinion leader. While the latter is often selected to deliver formal CME workshops as a champion of particular clinical interventions, doing so leaves unaddressed the problem of getting knowledge into actual practice. In fact, endorsement by a list of high profile orthopedic surgeons (those widely known through presentations at international conferences and publications in prestigious journals) actually lowered response rates to a survey among their peers (Bhandari et al., 2003). An "educationally influential physician" (Hiss et al., 1978) however, is someone other physicians are personally acquainted with, although not usually a personal friend (Kaufman, Ryan, & Hodder, 1990). They consult with him or her at the time of need about current practice problems. The education imparted is immediately relevant and has been requested with the intent to apply it in practice. Such intent to perform, according to the Theory of Planned Behavior, is a strong predictor of behavior (Ajzen, 1991). Furthermore, the advisor is also available for follow-up clarification after an attempt to implement the recommendation.

Intervening Through the Educationally Influential Physician

Choosing an implementation strategy that incorporates an already trusted advisor has several appealing features. Resources for projects to enhance the implementation of research findings in the interest of improving quality are typically scarce (Grimshaw, Thomas et al., 2004). The most cost-effective strategies would likely be those that require effecting the least amount of change in order to succeed. An implementation strategy that

simply utilizes physicians who enjoy staying up to date and are frequently asked by colleagues to share their clinical expertise eliminates any need to create new infrastructure.

Another advantage to involving informal educators is that they are familiar with the local context in which the research findings are to be applied. Even though recommendations for particular changes in clinical practice may be clearly communicated to practitioners through conferences, continuing medical education, or published guidelines, how to apply the recommendations received within the context of local practice is often far from clear (Borbas et al., 2000). Local adaptation, selective use, and "reinvention" is an inevitable occurrence in the successful diffusion of innovations (Rogers, 2003). Rather than offer futile and counterproductive resistance to this fact of life, implementation science must consider the legitimate reasons behind it. Local differences might be found in patient values and preferences, clinical procedures, availability of equipment and medical or social services, as well as task distribution in the medical team. All such variation prohibits wholesale adoption of the same "best practice" in different practice settings (Greer, 1995; Greer et al., 2002). Once one or several local physicians see how knowledge from basic science can be applied in the local context, they can clarify technical information and provide social support for their colleagues and may become "opinion leaders" or "idea champions" (Borbas et al.).

One drawback to recruiting informal advisors as change agents to champion an innovation has been that formalizing an informal behavior eliminates the "as needed" or at-point-of-need character of "situated learning," so may reduce its efficacy (Wenger, 1996). It also recruits physicians that are apparently influential on an interpersonal basis

to a role requiring the ability to persuade a group, skills not necessarily possessed by the same person. Informal authority operates with different dynamics than formal authority even if granted on a limited and temporary basis.

In their study of "rules of thumb" (heuristics) used by general practitioners in Sweden, André, Borgquist, Foldevi, and Mölstad (2002) found that the majority of such tacit knowledge shortcuts were learned through casual word-of-mouth from colleagues. Since this channel has been found to communicate principles of practice, keeping the transfer of knowledge in its natural clinical setting (rather than turning informal teachers into workshop instructors) may be a better strategy for diffusing improved practices. Directing change efforts first toward those most likely to change (identified by their willingness to consult with colleagues they respect) also makes for a cost-effective intervention. Those who go to colleagues with questions are evidently looking for better management tools and are therefore relatively ready to change and act in harmony with the suggestions offered by someone familiar with the relevant evidence (Prochaska, DiClemente, & Norcross, 1992). As the recommended procedure becomes more common due to adherence by the informal educators and their consultands, social comparison among their reference group (Festinger, 1954) can be expected to motivate, in turn, those physicians who are less actively seeking to improve their quality of care. Such a pattern would reflect the S-shaped curve of a successfully diffused innovation wherein the new idea or practice "takes off" once the level of approximately 20% adoption is reached (Rogers, 2003).

Clarifying and Validating the Construct

The construct of opinion leader, or educationally influential physician, is in need of greater specificity. Ryan, Marlow, and Fisher (2002) noted that many studies have used inconsistent definitions of the educationally influential physician or opinion leader. The concept of the role, by whatever name, bifurcates along the lines of formality. Persons might be designated an opinion leader by the researcher or a colleague on the basis of prestige, being "influential" in the sense of wielding power, possessing a high-profile, or a sufficiently forceful or dominant personality to bend others to their will. Or they could be physicians whose influence stems from the fact that others recognize them as having encountered and successfully resolved clinical problems of the sort facing the inquirer. Once identified, the latter might be asked to formally lead a local intervention. Or they might simply be provided with tailored information, training, or both, with which to continue their informal advisorial role.

Even when clearly distinguishing the informal educator from the prominent professional leader, there remain issues to be resolved. Among those who have employed the protocol of Hiss et al. (1978), several have added their own decision rules in the final determination of physicians used in the intervention, usually dependent upon how many groups were to be used in the intervention (Berner et al., 2003; Kaufman et al., 1990; Lomas et al., 1991; Soumerai et al., 1998). Consequently, the effectiveness of educationally influential physicians has appeared variable. Ryan et al. (2002) stress the need to return to the original decision rules, that of being named at least once in all three categories, as well as a need to validate the construct in contexts other than community hospitals. Development of a new instrument that asks for one list of colleagues with a

profile combining a number of different types of traits that specialists have identified as characteristic of informal advisors can help resolve the confusion that results from three different lists of nominees.

Illustrating the formal end of the continuum, Australian researchers (Young, Hollands, Ward, & Holman, 2003) investigated the existence of clinical opinion leaders among surgeons (defined as those who have an influence on the education and surgical practice of colleagues) by asking surgeons how many clinical opinion leaders there were in their hospital, their region (New South Wales), and in Australia. They also asked participants to rate a list of possible attributes of opinion leaders as "very important," "somewhat important," or "not at all important." To the Hiss et al. (1978) attributes (listed one by one, rather than in factor-paragraph form), Young et al. added 12 more items indicating visible professional and academic success. Interestingly, respondents were "asked to rate the importance of each attribute in conferring status as an opinion leader" (p. 786). Thus, in a number of subtle ways, emphasis was placed on opinion leaders as *important, influential* people, persons of status, rather than someone with whom one would have a friendly, collegial chat about ticklish patient care situations. Perhaps this linguistic bias contributed to the median number of "opinion leaders" in one's own hospital being zero.

In spite of such framing, the surgeons surveyed chose as most important the attributes developed by Hiss et al. (1978) in their survey of community hospital physicians. Expertise was considered paramount. The only new item to be highly rated was "familiar with scientific evidence underpinning surgical practice." Ranked next were the descriptors related to teaching skills, then the personable traits that Hiss et al. termed

"humanistic." In further descending order were experience in surgical practice (which overlapped with personal traits), academic contribution, and professional contribution items such as having a high media profile and holding office or committee positions in professional and advisory groups.

Responses to additional sections of the questionnaire (Young et al., 2003) strongly supported the existence of surgeons "who have an influence on the education and surgical practices of their colleagues (p. 786)." Although it is not altogether clear what it means for surgeons to "influence the education" of their colleagues, fully 88% of respondents agreed that "there are colleagues who influence me in such a way that I think of changing my practice (and sometimes do) (p. 790)." Additionally, 79% of participants thought it "highly likely" that they would consult a colleague known personally when uncertain about a difficult or unfamiliar surgical problem followed by textbooks, searching the Internet, consulting journals or professional societies. Consulting a surgical colleague whom they did not know personally was thought "highly likely" by only 10%, but "somewhat likely" by 44%. Taken together with the reticence to name surgeons from one's own hospital, the almost 80% who would consult a colleague with whom they were acquainted, might mean that their informal communication network stretches in many directions to encompass colleagues across the continent with whom they would readily confer.

The Hiss et al. (1978) criteria were also employed prior to an intervention to improve colorectal cancer identification and treatment among surgeons and pathologists in Ontario, Canada (Wright et al., 2004). Respondents could nominate one or two physicians in each of three categories: educator, knowledgeable practitioner, and caring

professional (using the paragraph for each category from the 1978 Hiss et al. study). They also were asked to identify two general surgeons and two pathologists "whose advice you value on colorectal cancer," as well as two designated leaders holding authoritative positions in their professional community. Physicians looked to for advice on colorectal cancer included some who were not named at least once in each of the three categories (the "classic criteria"). The exceptions were termed "domain experts" and Wright et al. hypothesized that when seeking knowledge in a specific area specialists, in comparison with general practitioners, are more concerned with content than personable, considerate delivery. This finding is in harmony with the fact that attributes of expertise and teaching skill outranked personableness in the Australian study (Young et al., 2003).

Focus group research in the U.K. has documented a similar contrast in the perspective of primary care physicians in comparison with that of specialists noting "quite a fundamental difference in approach to clinical practice between primary and secondary care" (Freeman & Sweeney, 2001, p. 3). The findings of Wright et al. (2004) highlight that educationally influential physicians might need to be identified with regard to the planned intervention's topic, rather than assume that a physician identified with Hiss et al. criteria will be looked to regardless of the clinical issue or the specialist/generalist practice of those targeted for quality improvement. Generalists may be concerned with the "humanism" of an advisor in order to avoid the "evidence based mafia" that they feel are "treating diseases rather than patients" (Freeman & Sweeney, 2001, p. 3). Alternatively, specialists might be less likely to exhibit condescension when consulted by a fellow specialist than by a primary care provider, making approachableness less of an issue for specialists when seeking advice.

One survey strategy would be to ask about domain-specific consultants in addition to identifying educationally influential physicians à la Hiss et al. (1978) as did Wright et al. (2004). On the other hand, asking about characteristics that are irrelevant to specialists would make the instrument needlessly detailed and cloud its interpretation. Such considerations recommend the construction of an identification instrument based upon input from the specialists involved.

The present study sought to develop an instrument based on input from geographically dispersed specialists treating neuromuscular disease. A contextual validation study will add to the evidence base informing interventions involving physicians whose advice is sought by their colleagues. After informal advisors are identified, a controlled intervention can be planned to investigate whether enhancing their knowledge of research findings results in better diffusion of the recommended care processes and whether adherence to the offered advice leads to improved health outcomes and quality of life for patients.

What Opinion Leaders "Do"—Insights From Cognitive Psychology

An explanation is needed for (a) the difficulty of bridging the knowledge to practice gap and (b) the reliance of practitioners on collegial advice. Innovation often consists of borrowing an established idea from one field and applying it in another context. The needed theory in this instance might be found in the cognitive psychology literature dealing with expert performance.

The research on expertise has come to focus upon the distinction, albeit at times fuzzy, between declarative knowledge and procedural knowledge. Declarative knowledge

is said to deal with knowing facts, classifying concepts into categories, and understanding principles, while procedural knowledge involves knowing how to do something. At the most basic level it can be described by "if...then" propositions (Anderson, 1983; Ryle, 1949). Rote procedures rely on recall and performance; understanding "why" is often not necessary. They are frequently learned as rules of thumb (heuristics, or shortcuts). While the "if...then" propositions of rote procedures suffice for well-structured problems wherein all elements are known, more is required in ill-structured problems in which some or all of the elements (the initial state, desired goal, operations required, and constraints involved) are not clear. In such cases, other forms of procedural knowledge such as problem solving and troubleshooting, are required, in which knowing the "why" of situations is frequently crucial (Foshay, Silber, & Stelnicki, 2003).

Some healthcare practitioners use the new declarative knowledge presented at conferences to alter the procedural knowledge they use in their practice upon return home. However, the wide quality gap in medicine makes this ability to use new information to change procedures appear relatively rare. Ideally, as declarative knowledge accumulates, a cognitive network is built up that connects facts, concepts, and principles in a mental model of how the system under consideration works. Such a mental model forms the basis for procedural knowledge that transcends rote procedures.

Procedural knowledge involves a different type of learning than does declarative and thus calls for a different instructional design (Marzano, 2000), beginning with modeling by the teacher and followed by numerous practice sessions by the student (Anderson, 1995; Fitts, 1964). A century and a half ago in the United States medicine was taught strictly on the apprenticeship model. More recently, medical education in the

United States has devoted curriculum during the first two years solely to the accumulation of declarative knowledge, "book learning," before moving on to procedures and techniques. Although some schools are now including limited clinical experience in the first years, the bulk of practical teaching still takes place in later years, particularly in residency training.

The reverse of the apprenticeship model, educating a physician solely through print and lecture, has never been deemed worthy of trial, except, unfortunately, in the case of traditional continuing medical education efforts to update the clinical skills of practicing physicians. Having established their basic medical skills through procedural training, they are suddenly asked to continue their learning of procedure through declarative methods. Physicians' usual dependence on colleagues' input to inform changes in practice reflects the fact that they learned their current practice from clinical mentors.

Running parallel to the declarative/procedural knowledge distinction, knowledge is often dichotomized as explicit and implicit. Expertise is characterized by a fund of explicit knowledge (e.g., biomedical facts) being absorbed to the point of automaticity which then powers the "art" of practice that appears inarticulate and intuitive. By definition, such tacit knowledge "cannot be taught explicitly and ... [is] only acquired via direct experience" (Patel, Arocha, & Kaufman, 1999, p. 76).

Procedural teaching promotes direct experience. Informal educators' appeal may lie in their having, to an above average degree, the ability to "back translate" from tacit to explicit knowledge. This ability, combined with the fact that they teach on-site, in the context of practice, and are available for follow-up, might help explain their colleagues' requests.

Attaining expertise makes consciously thinking back to explicit biomedical knowledge unnecessary except when encountering "loose ends in the data" (Patel et al., 1999, p. 95). The mental model acts as a bridge between declarative and procedural knowledge (Foshay et al., 2003). Informal consultants who champion a novel procedure have synthesized new research findings, related them to the way a disease works, and thus revised their mental model of the disorder. They have adapted the new information to apply it in their own clinical environment, putting themselves in the position to teach the new procedural knowledge by modeling it. Those around them, or others in similar environments, can then practice it and occasionally review it with their colleague. "Advances in learning are often dependent on making tacit knowledge explicit and thereby amenable to conceptual change" (Patel et al., p. 79). The fact that continuing medical education, usually in didactic form, has been largely ineffective in changing practice (Davis et al., 2003) is therefore well explained by cognitive and educational psychology research.

Conditions of uncertainty frequently increase the importance of social influence, such as the opinion of respected near peers. However, in many cases where new research findings allow for better management of a condition, clinicians may not sense any uncertainty about the appropriateness of his or her standard approach. When the patient is reacting to standard treatment as expected, there are no loose ends, hence no impetus to consider the findings of basic research in the deliberative manner characteristic of doctors of beginning or intermediate skill. If the clinician feels no uncertainty, there is also little likelihood of informal consultation. There seems to be nothing about which to seek advice. Perceptions of patient response as unsatisfactory in the context of expectations,

therefore, play an important role in motivating the application of new declarative knowledge to clinical situations. Therein lays the importance of publishing outcomes data and of transparency in health systems.

In the case of cystic fibrosis, Cleveland's Dr. LeRoy Matthews created a sensation by making the "preposterous assertion" that among patients at his cystic fibrosis treatment program at Babies and Children's Hospital, mortality was less than two per cent, compared to more than 20% for the rest of the country (Gawande, 2004). By 1964 the hard data collected by the Cystic Fibrosis Foundation and studied by Warren Warwick of the University of Minnesota began to plant uncertainty in the minds of other pulmonologists by documenting that cystic fibrosis patients in Matthews's program had a projected median life span of 21 years, while the national average was a projected three years. Within just two years, as other centers adopted Matthews's treatment protocols, mortality rates around the country dropped dramatically, and have continued to drop ever since.

The conclusions to be drawn from the cystic fibrosis experiences include the importance of publicizing successful management of "hopeless" conditions. Quantifying the success through mortality rates and lung function measures was straightforward, but it was contrary to convention to collect them and publish them.

One crucial ingredient for successful implementation of new practices through informal consultants is an awareness of clinical uncertainty, causing a desire for input from respected colleagues. To spread improved practice, those colleagues must be able to integrate new declarative information into their own clinical procedures, providing a model of the application for others. They further would be able to effectively translate

procedural knowledge back to declarative form when they explain the procedure to others. To compile a more detailed profile of such colleagues is the purpose of the survey research presented here.

Why Neuromuscular Specialists?

Neuromuscular specialists are frequently the physicians who treat patients with Duchenne muscular dystrophy, a disorder that affects approximately 1 in 3500 male newborns (Emery, 1991). A considerable quality gap exists in the care of children with Duchenne muscular dystrophy. It is a disorder for which there is no cure and although some affected by it live into their 30s, the average life expectancy is 19 years (Bushby, Bourke, Bullock, Eagle, & Gibson, 2005).

Duchenne muscular dystrophy results from the absence of dystrophin, a structural protein of the muscle cell membrane. The lack is due to mutations in the genetic code for the protein. Being the largest gene in the human genome, spanning 24 megabases (Amalfitano, Rafael, & Chamberlain, 1997), it presents a very large target for mutagens. In most cases of Duchenne muscular dystrophy, dystrophin is entirely lacking. Without it, the muscle membrane loses stability and deteriorates as damage outruns repair processes (Petrof, Shrager, Stedman, Kelly, & Sweeney, 1993).

The Natural History of Duchenne Muscular Dystrophy

Damage to the muscle cell membrane is present from birth and results in extremely high levels of the enzyme creatine kinase in the blood. In many cases, however, diagnosis is not made before the age of four or five. Only 50% of affected children walk before the age of 18 months, while most healthy babies start walking at 9 to 15 months of age

(http://www.howkidsdevelop.com/developSkills.html). Children with Duchenne muscular dystrophy do all eventually walk, though with a waddling gait, clumsiness, and fatigue. Large calves, a sway-back, toe-walking, difficulty climbing stairs and getting up from the floor are additional signs of the disorder. Speech and cognitive development may also be delayed, perhaps due to the absence of an isoform of the dystrophin gene normally expressed in the brain, whose role is unknown. Wheelchair use follows, generally at the age of 6 to 10 years. Progressive weakness of heart and chest wall muscle eventually results in cardiac failure, respiratory failure, or both (Biggar, 2006).

Therapeutic Approaches

Many strategies are being explored to remedy the basic genetic problem. But even the most promising prospects are years away from use as treatment rather than research. The quality gap at present, therefore, exists in terms of the active management of the numerous secondary conditions pursuant to muscle deterioration. The worst practice is to do nothing, or nothing effective, on the basis that the disorder is inevitably fatal regardless of intervention. Testifying to the possibility of longer life through better coordination of care, professor and physician Kate Bushby (Bushby et al., 2005) of the Institute of Human Genetics and Neuromuscular Centre of Newcastle upon Tyne stated:

> It is no longer appropriate to look on DMD [Duchenne muscular dystrophy] as a condition that is inevitably fatal in childhood as the majority can now be expected to reach adulthood. This profound change in life expectancy has implications for all areas of management from the time of diagnosis onward...(p. 199).

There are strong indications that if efforts are made to prolong ambulation, maximize function and prevent or manage secondary conditions, the length and quality of life of

Duchenne muscular dystrophy patients can be extended considerably (Rahbek et al., 2005).

Ambulation. Corticosteroid administration has been effective in prolonging ambulation, perhaps partially due to reduction of the inflammation that is part of the pathologic process at the muscle membrane. Side effects must be aggressively yet patiently dealt with while an optimal dosage and regime is determined. Ankle-foot orthoses and knee-ankle-foot orthoses can generally delay use of a wheelchair. Power scooters are often used for longer distances while a child can still manage moving about home or school unaided. Physical therapy can help minimize contractures, such as shortening of the Achilles tendon, that make walking more difficult. Swimming helps exercise muscles without putting weight on them and causing more damage (Bushby et al., 2005).

Respiratory issues. Prevention of scoliosis is the primary means of forestalling respiratory failure. Continued ambulation is crucial because prolonged sitting might promote scoliosis as the postural muscles weaken. If boys can be helped to continue walking into the adolescent years when the spine 'fuses,' later wheelchair use might not do as much damage as it might if started younger. While bracing does nothing to prevent curvature and may even promote it, spinal surgery, in which the spine is fused to a metal rod, has been generally successful in halting scoliosis (Cervellati et al., 2004).

By far the most helpful and direct mitigation of respiratory failure is the use of nocturnal ventilation (Eagle et al., 2002). Use of positive pressure ventilation through a nasal mask worn at night can result in better sleep, less fatigue, and fewer headaches by keeping oxygen saturation levels in the blood closer to daytime levels. Non-invasive

ventilation often makes a tracheotomy unnecessary even in advanced stages of Duchenne muscular dystrophy and has resulted in improved survival rates. In the group of patients followed at the Newcastle upon Tyne treatment center, the chance of surviving to at least the age of 25 was 53% among those ventilated, compared with 12% and 7% in the non-ventilated groups.

Cardiac involvement. The left ventricle of the Duchenne muscular dystrophy patient's heart is particularly affected by the repetitive mechanical strain of pumping blood. Dilated cardiomyopathy, a thickening of the heart wall, develops gradually and may go unnoticed due to the lack of physical activity on the part of disabled patients. Since it is an almost universal complication of Duchenne muscular dystrophy, treatment should be started before symptoms appear (American Academy of Pediatrics, 2005). ACE inhibitors and beta-blockers have good safety records and can improve the patient's prognosis (Bushby et al., 2005).

The Quality Gap

To date, there has been no systematic research to assess the extent of variation in Duchenne muscular dystrophy care. An effort to do so is the subject of an ongoing CDC collaborative agreement with the Children's National Medical Center in Washington, DC. The CDC program is based on the observation that "the lack of a uniform standard of care for DBMD [Duchenne/Becker muscular dystrophy] results in a variety of treatment options among providers" (Centers for Disease Control and Prevention, 2004). Furthermore, although some 235 clinics in the U.S. are funded by the Muscular Dystrophy Association, they are under no obligation to report quality measures or adhere

to particular standards for treatment. Therefore management of Duchenne muscular dystrophy currently depends upon what each clinic director chooses to offer.

The fact that there is no cure for Duchenne muscular dystrophy might be responsible for less than optimally aggressive management of secondary conditions. This has been borne out by research on the offer and recommendation of ventilation for children with another devastating muscle disorder, Spinal Muscular Atrophy, Type I. Research regarding spinal muscular atrophy indicates that the doctor's attitude about whether the patient's life is *worth* prolonging correlates with what he or she offers the parent. What the doctor offers in turn affects whether the family decides to use ventilation to keep their child alive (Hardart, Burns, & Truog, 2002). It should be noted that these are not cases wherein the patient is "brain dead." The attitudes may reflect a projection of a low quality of life onto the affected individual (Bach, 2004).

Summary

The research project outlined in the next chapter was designed to identify the traits most characteristic of neuromuscular physicians whose counsel is sought by peers dealing with challenging clinical problems. Such problems are frequently encountered in the treatment of Duchenne muscular dystrophy due to its origin in an incurable genetic defect, its progressive nature, frequent complications, and the wide variation in presentation, management practices, and quality of care delivered. The physicians surveyed were limited to neuromuscular specialists in order to make the result as applicable as possible to the eventual target audience, neuromuscular specialists who treat patients with Duchenne muscular dystrophy.

Hypotheses

In the larger theoretical context of the construct of the educationally influential physician, the investigator hypothesized that among neuromuscular specialists 1) traits designating approachability would be least important, 2) traits denoting procedural knowledge would be more highly rated than those denoting declarative knowledge, and 3) traits indicating the ability to translate between declarative and procedural knowledge would be rated highest. To make such an analysis possible, ten traits included in the 40 items on the questionnaire were phrased to be descriptive of one of each of the four classifications: approachability, procedural knowledge, declarative knowledge, and translational ability.

The expectation that approachability (consisting of some aspects of "humanism" in the Hiss et al. 1978 terminology) would be given the lowest ratings among the trait categories was based on the reasoning that while primary care generalists must often seek assistance from consultants higher in the medical hierarchy (providing secondary or tertiary care), specialists make more "lateral" inquiries. They would therefore be less subject to, and less sensitive to, negative professional elitism than would primary care physicians. The literature also indicates that the way in which information is delivered is of less concern to specialists than the receipt of the information itself (Wright et al., 2004).

The second hypothesis, that procedural knowledge would be more highly valued than declarative knowledge, rests upon the recognition that medicine is a practice, a craft, a profession, rather than an academic pursuit. Although medical training requires an exceptional foundation in basic science and continues building the student's declarative

knowledge of biomedical fact during the first two years, it is clinical experience that turns a student into a physician (Cimino, 1999). The practitioner in any field respects most those peers who go beyond mere intellectual grasp of theory and facts, to the attainment of skill in the application of knowledge to the actual work of the profession, the métier.

The third hypothesis is rooted in the findings of research on expertise indicating that experts often lose access to the declarative knowledge underpinning their expert performance (Patel et al., 1999). The hypothesis is that inquirers would most value the advice of those who have the relatively rare ability to explain why they do things as they do. In the context of moving research findings into practice, this would mean that they could help others apply the new declarative knowledge produced by research within the local environment. Since it has been well documented that intellectual awareness of new approaches, guidelines, or research implications for practice does not assure transfer of that knowledge into practice, physicians who not only accomplish that transfer, but can explain how they do so, should be particularly helpful to their colleagues.

In addition, an identification instrument created from surveying the very specialists among whom it will be used could have greater specificity and relevance than one based on input from general practitioners. A comparison of the resulting profile with that determined earlier by Hiss et al. (1978) among general practitioners will confirm or disconfirm the greater appropriateness of the new instrument for use within at least one specialty, that of neuromuscular physicians.

Application

In subsequent studies, the newly developed instrument can be administered to solicit nominations of neuromuscular specialists fitting the description most widely endorsed by

this study's respondents. Individuals so identified will make excellent candidates for future quality improvement interventions such as mini-fellowships or preceptorships at clinics recognized for delivering exceptional care to patients with Duchenne muscular dystrophy. Such on-site, procedural learning opportunities could maximize the transfer of practice improvements.

When returning to their home clinics, recipients of such fellowships would have additional skills to share with colleagues in informal consultations. In comparison with selecting trainees on any other basis, selecting them on the basis of being viewed as informal advisors would utilize preexisting informal educational networks and the informal advisor's ability to apply information to the local clinical environment, thus maximizing the implementation of better practices.

CHAPTER 3

METHOD

Developing an instrument to identify colleagues viewed as educationally influential by neuromuscular doctors was a three-step process. First, a group of key informants contributed suggestions for questionnaire items and later offered comments on a preliminary version. As the second step, a roster of physicians specializing in neuromuscular disorders was developed and the questionnaire mailed to them. Respondents rated each trait with regard to its salience among peers whose clinical advice they value. Third, an analysis of the ratings identified those items most often considered characteristic of peer consultants. Those items were used to compose the final brief identification instrument.

Participants

Step One

Eight neuromuscular specialists (primarily physicians with training in neurology or physical medicine and rehabilitation, also known as physiatry) who are active in promoting better therapeutics for Duchenne muscular dystrophy were consulted to develop an item pool for the questionnaire. The researcher expanded their suggestions where necessary to obtain 10 items designed to tap each of four areas: declarative knowledge, procedural knowledge, ability to translate declarative knowledge to

procedural, and approachability (see Appendix II). The same experts were asked to review the refined item pool for clarity and completeness. The student investigator was acquainted with these eight clinicians or clinician/researchers through publications, meetings and correspondence.

Step Two

Many neuromuscular patients receive their care at Muscular Dystrophy Association clinics across the United States. These approximately 235 hospital-associated clinics are held periodically and serve patients with any of the 43 neuromuscular conditions covered by Muscular Dystrophy Association funding. The approximately 400 neuromuscular specialists who direct the clinics represent the most appropriate population for this study. The identity of the directors is publicly available at http://www.mdausa.org/clinics /index .html. Further effort was made through an online search to obtain the names of all medical doctors, in addition to the directors, who see patients at those clinics. An additional two physicians associated with Muscular Dystrophy Family Foundation® in Indianapolis, Indiana, were added to the roster. Specific contact information (mailing addresses, phone and fax numbers, and E-mail addresses) for the physicians was obtained using Internet search engines. Sources included the public websites of the hospitals and medical centers and sites such as www.healthgrades.com. In this way a roster of 510 physicians was developed. After eliminating physicians found to have retired and those whose letters were returned to sender, a denominator of 472 remained. Of these, 210 responded after five weeks of follow-up activity, yielding a response rate of 44.5%. Follow-up efforts included electronic messages when E-mail addresses were available, telephone calls to the physicians' university departments, hospitals, or practice locations.

Once contacted, the physician's support staff was alerted to second copies of the research materials arriving by fax and asked to assist by facilitating the physician's participation.

Effect of Selection Bias

Rather than representing a problem, the self-selected nature of the sample may be especially appropriate for a study related to the diffusion of improved medical practice. The identification tool produced by the study will be used to locate specialists who are especially likely to be asked to pass on what they know to those who ask for their opinion. When the quality gap in clinical management practices is considerable, as in the case of Duchenne muscular dystrophy, an appropriate goal is to move improvements first to those interested in improvement, before trying to affect the less enthusiastic learner or the practitioners least interested in quality improvement. Such an approach moves from the top down, or from right (innovators and early adopters) to left through the normal distribution of adopter categories.

The goal of this study was to develop an instrument based on the input of members of the group that will be using it. It seems reasonable to assume that those clinicians most interested in improving their clinical practice through the give and take of informal consultation, would also be those most likely to respond to the questionnaire fielded in this study and to the resulting instrument in future studies. Therefore, the emerging profile of those most often consulted is appropriately based upon input from those most likely to engage in such consultation.

Procedure

Step One

Eight key informants were contacted by E-mail to explain the research study, deliver the consent information sheet and to request a semi-structured telephone interview of approximately ten minutes. The Institutional Review Board of the University of Nevada, Las Vegas, granted a waiver of documentation of consent under 45 CFR 46.117 for both the initial interviews and the subsequent survey. The risk involved was minimal and the only direct identifier on the returned survey would be a signed consent form.

When telephone contact was made, the interviewees were asked to describe as thoroughly as possible the traits characterizing colleagues to whom they and others turn for informal consultation. Basic demographic information (age category, sex, and racial and ethnic identity) and a brief description of their practice (setting, specialty, patient population, and years in practice) were also collected. The cover message, practice and demographic information sheet, and the interview topic guide appear in Appendix III.

The descriptions gathered in Step One informed the creation of 40 statements, such as, "They are familiar with a different literature than I am." Each statement was written to represent as purely as possible only one of the categories of traits hypothesized to contribute to a physician being a trusted source of clinical advice. Procedural knowledge was represented by statements that emphasize behavior, that is, clinical expertise. Having a reputation for excellent patient care, for example, implies procedural knowledge. Declarative knowledge is indicated by possession of information including facts and concepts. Statements emphasizing the delivery of clear explanations and application of factual knowledge within a clinical context represent an ability to translate between

procedural and declarative knowledge, while friendliness or willingness to help embody approachability.

The key informants were asked to provide feedback on the questionnaire before it was sent to the roster of physicians. Their review of the item pool helped evaluate the relevance (face validity), clarity and conciseness of each item, as well as check for omissions (DeVellis, 1991). The draft questionnaire was E-mailed to them and they had the opportunity to offer comments by mail, fax, telephone, or E-mail.

The compiled list of items was arranged in random order and formatted with a Likert-type response scale (0 to 5). Ratings indicating the participant's view of each statement in his or her choice of clinical advisors were anchored at 0 ("Irrelevant") and 5 ("Essential") on the 6-point Likert-type scale. Concluding instructions asked participants to choose and mark the five statements that best described their informal consultant(s).

Each questionnaire and demographic survey was coded with a randomly generated ID number. A single copy of the key linking the participant's name with the code number was kept to track response for the purpose of follow-up efforts.

Step Two

The resulting questionnaire and a demographics survey was submitted to and approved by the UNLV Institutional Review Board, then mailed to the addresses of the physicians on the developed roster, together with a personalized cover sheet and consent information sheet (see Appendix III).

In view of the very low response rates that plague mailed surveys, the following measures were taken to maximize participation (Asch, Christakis, & Ubel, 1998; Barclay, Todd, Finlay, Grande, & Wyatt, 2002; Larson & Chow, 2003; Lensing et al., 2000; Puleo

et al., 2002). Response options included returning the survey by post using the enclosed stamped, addressed envelope or by fax using the private fax line of the student investigator. A token incentive was enclosed with the mailing in the form of a $3.00 gift card to the national Starbucks™ coffee chain. The recipients were encouraged to enjoy their complimentary beverage whether or not they returned the survey.

Where E-mail addresses were known, a message was sent after the first mailing alerting the physician to expect the survey and emphasizing that it involved dissertation research in health services rather than a commercial enterprise. Where no E-mail address was available, a telephone call was made to the office of the physician to briefly explain the purpose of the survey to the department, office or practice manager and ask for his or her assistance in drawing it to the doctor's attention. Intensive follow-up activity occupied five weeks following the postal mailing and included obtaining fax numbers when possible and resending personalized materials by fax machine. The documents (cover letter, questionnaire, and text of reminder E-mail message and phone calls) are included in Appendix III.

Step Three

The statements most often selected among the five most important traits were used to compose the identification instrument, the end product of the present research. To gain more insight into what the ratings imply about informal consultants, a larger number of highly rated items and a corresponding number of the lowest-rated items were subjected to principle component analysis. The tool produced in Step Three could, in future research implementation efforts, be employed to strategically target physicians to receive advanced subspecialty training as part of a plan to promote quality improvement.

Statistical Analysis

Response Format

DeVellis (1991) emphasizes clarity and specificity in the writing of items. Statements should be brief, moderately strong and avoid ambiguity. Choice of wording for anchor points can affect results, as they reflect strength of feeling, and should allow maximum variability. Choices should, therefore, not present very extreme, nor very mild, differences in response. For ease of interpretation, they should be arranged in a logical continuum. Theoretically, the more response categories, the better, but participants have limitations to the meaningful distinctions they can make. The scale used for this study consisted of six categories and did not contain a midpoint. Preventing equivocation and forcing the respondent to consign each trait to one side or the other of neutral contributes to a more clear-cut analysis.

Analytical Procedure

Responses were entered into SPSS to compute the median and mean responses on the 0-5 scale for each item. The results were compared with each item's frequency of selection as one of the top five items. The reliability of each item was assessed by Cronbach's alpha. Items representing translational skills, clinical expertise (procedural knowledge), medical (declarative) knowledge, and approachability were expected to be ranked in that order. The mean scores and the frequency of being named among the top five descriptors were considered in assessing which items should appear on the instrument. An item's frequency among the top five traits was used as the primary indicator of its endorsement by the participants because the ratings were generally high. The forced choice situation of selecting five most important items made a clear

preference for a small number of traits emerge. The items that the neuromuscular specialists indicated as most characteristic of colleagues they consult were combined to create a brief identification instrument

CHAPTER 4

RESULTS

Five hundred ten questionnaires were mailed, with cover letter, IRB-approved consent document, incentive gift card, and stamped return envelope to physicians treating neuromuscular patients. Of those, 38 were returned to the sender due to lack of a forwarding address or retirement, leaving 472 potential respondents. After five weeks of follow-up activity by E-mail, telephone, and fax, 210 responses had been received, an overall response rate of 44.5%. The raw data and response rates by region and sub region are presented in Table 1.

Subregion response rates varied from a low of 32% in New England (Maine, New Hampshire, Vermont, Connecticut, Massachusetts, and Rhode Island) to a high of 65% in the East South Central states of Kentucky, Tennessee, Mississippi, and Alabama. An overall response rate of 44.5% and differences among regions are not a major cause for concern according to a review of the physician survey literature in which few differences between responding and nonresponding physicians were noted (Kellerman & Herold, 2001). Sharing common training and knowledge, physicians form a relatively homogeneous group with regard to attitudes and behavior.

Table 1

Response Rate by Region

Region	Sent	Responded	Response Rate
Pacific	43	19	44%
Mountain	20	10	50%
West—Total	63	29	46%
West North Central	45	22	49%
East North Central	92	46	50%
Midwest—Total	137	68	50%
West South Central	48	19	40%
East South Central	31	20	65%
South Atlantic	100	38	38%
South—Total	179	77	43%
Middle Atlantic	65	27	42%
New England	28	9	32%
Northeast—Total	93	36	39%
Grand Total	472	210	44.5%

Sample Characteristics

Variable N

Participants had been reminded in the consent information that they could omit any questions they did not wish to answer. Due to such omissions and, in all probability, simple oversight, the total number responding to each question varied. Traits to be rated appeared on pages one and two of the questionnaire; page three presented questions concerning demographics, practice setting, and one open-ended question "When you have changed some aspect of your own clinical behavior, what prompted you to do so?" (See Appendix III). Three participants did not answer any of the questions on page three of the survey, but did rate the traits on pages one and two. The question most frequently

omitted by those who answered most of the questions on page three was the open-ended question. The question required reflection and asked for personal information about what prompted changes the respondent had made in the past. Thirty-eight persons offered no response to that question, leaving 172 who offered reasons for past changes in practice.

A total of ten, including the three participants who answered no demographic questions, did not give their age and nine did not specify their race or ethnicity. Nine did not list their sex; however these data were deducible by consulting the respondents' websites. Some of the missing data resulted from respondents misconstruing the demographic questions to refer to their patients rather than themselves, with a number of ages, both sexes, and several races being checked. Eleven participants did not report their year of graduation from medical school. Five did not specify whether they saw neuromuscular patients at Muscular Dystrophy Association clinics, independently, or both.

Demographic Information

Age, education, gender, race and ethnicity. Many years of training are required to become a specialist physician. Assuming an uninterrupted education consisting of a premedical university degree (4 years), medical school (4 years), residency (3 to 5 years), and perhaps a fellowship of 2 years, an age of 29 to 33 might be reached before going into specialty practice. Consequently, while the later census age brackets in Table 2 cover ten years, the first bracket, 34 and younger, covers only one to five years and captures correspondingly fewer physicians (5.5%). Each of the three middle age brackets, 35 to 44, 45 to 54, and 55 to 64, contain over 28% of the respondents, and together account for 88% of the sample. Six and a half percent of participants were over 65 years of age.

Overall, males accounted for 76.7% of participants. Table 2 documents the increasing representation of women in the specialties treating neuromuscular patients over time. Table 3 further reveals that in this sample the increase has intensified in the most recent years. Females accounted for three out of the four participants who were older than 34 yet earning a degree within the past ten years. Thus, the increasing percentage of females among neuromuscular specialists surveyed is best indicated by time of earning a medical degree (Table 3), rather than by age. The percentage of women among the most recent graduates in the sample (43.8%) is close to that among medical school graduates, class of 2005 (47%) (American Association of Medical Colleges, 2006).

Table 2

Age and Sex of Respondents

			Sex		
Age Bracket	Number	(% of Total)	Male	Female	(% ♀ in bracket)
34 and under	11	(5.5%)	7	4	(36.4%)
35 to 44	57	(28.5%)	36	21	(36.8%)
45 to 54	56	(28.0%)	42	14	(25.0%)
55 to 64	63	(31.5%)	55	8	(12.7%)
65 to 74	11	(5.5%)	10	1	(9.1%)
75 and over	2	(1.0%)	2	0	(0.0%)
Total	200	(100.0%)	152	48	(24.0%)

Table 3

Date of Medical Degree and Sex of Respondents

Year earned	Number	(% of Total)	Sex		
			Male	Female	(% ♀ in bracket)
1997-2006	16	(8.0%)	9	7	(43.8%)
1987-1996	52	(26.1%)	34	18	(34.6%)
1977-1986	62	(31.2%)	46	16	(25.8%)
1967-1976	56	(28.1%)	50	6	(10.7%)
1957-1966	11	(5.5%)	11	0	(0.0%)
1947-1956	2	(1.0%)	2	0	(0.0%)
Total	199	(100.0%)	152	47	(23.6%)

Of the respondents who identified their racial or ethnic identity (Table 4), 80.6% classified themselves as White. The largest minority was Asian (12.9%), including physicians from South Asia, e.g., India and Pakistan. Seven participants (3.5%) described themselves as Hispanic or Latino/Latina. Four respondents (2%) indicated Black/African American as their race and two persons (1%) marked American Indian/Alaska Native. None of those responding to the race and ethnicity question identified themselves as Native Hawaiian or Other Pacific Islander.

Practice information. Sixty-one percent of the specialists reported treating neuromuscular patients only at clinic appointments supported by the Muscular Dystrophy Association, as shown in the horizontal Total row of Table 5. Another 27.8% see patients at Muscular Dystrophy Association clinics as well as in other settings, independent of the

Muscular Dystrophy Association. A "clinic" in this context is not a building, but a regularly arranged period of time in which the physician and co-workers see patients with any of the 43 neuromuscular disorders covered by the Muscular Dystrophy Association.

Table 4

Race and Sex of Respondents

			Sex		
Race	Number	(% of Total)	Male	Female	(% ♀ in race)
American Indian/Alaska Native	2	(1.0%)	2	0	(0.0%)
Asian	26	(12.9%)	20	6	(23.1%)
Black/African American	4	(2.0%)	2	2	(50.0%)
White	162	(80.6%)	124	38	(23.5%)
Hispanic	7	(3.5%)	5	2	(28.6%)
Total	201	(100.0%)	153	48	(23.9%)

A Muscular Dystrophy Association representative is on hand to offer general support and to record services rendered. The Muscular Dystrophy Association reimburses the host hospital or practice according to a pre-determined fee schedule for services not paid by patient insurance policies.

An additional two clinics in Indianapolis, Indiana, are supported by the Muscular Dystrophy Family Foundation®. A minority of respondents, 11.2%, treat all their neuromuscular patients independently. Although Muscular Dystrophy Association clinics provide a variety of services, some families opt to visit physicians who are not, or do not continue to be, affiliated with the Muscular Dystrophy Association. Eighty-nine percent

of the physicians in the sample see at least some of their neuromuscular patients through Muscular Dystrophy Association clinics (MDA only, 61%, and MDA and Independently, 27.8%, groups combined). The sampling frame was based on the Muscular Dystrophy Association Annual Report list of clinics. Consequently, non-MDA practice settings (11.2%) are presumed underrepresented.

Table 5

Practice setting

Practice Type	Where neuromuscular patients are treated: MDA Clinic	MDA & Independently	Independently	Total
Solo	10	3	1	14 (6.8%)
Partnership	2	9	2	13 (6.3%)
Group	30	11	6	47 (22.9%)
University hospital	71	30	12	113 (55.1%)
Specialty hospital	10	0	1	11 (5.4%)
Multiple settings	2	4	1	7 (3.4%)
Total	125 (61%)	57 (27.8%)	23 (11.2%)	205 (100.0%)

The vertical Total column of Table 5 shows that most physicians in the sample (55.1%) practice at a university hospital. Group practices account for 22.9% of settings, while specialty hospitals (children's hospitals and private foundation hospitals), solo and partner practices each make up about 6%. The remaining 3.4% of participants practice in multiple settings. Overall, then, the physician participants make up a heterogeneous group with regard to practice setting. Their concentration in urban research university hospitals is a natural

consequence of specialization. Most physicians specializing in rare conditions, such as neuromuscular disorders, will find a sufficient population of patients only in highly populated areas. A patient's geographic location might, therefore, have considerable impact on the type or regularity of care received. Travel to distant medical centers is doubly burdensome for those whose condition affects ambulation and requires specialized transportation such as a customized van.

Fifty-six percent of all the participating physicians see mostly adult patients, 30.7% treat mostly children, while 13.2% described their patient load as "about half and half" children and adults (Table 6). Among physicians treating neuromuscular patients exclusively through

Table 6

Patient Population

Patient Age	Where neuromuscular patients are treated: MDA Clinic	MDA & Independently	Independently	Total
Mostly Adult	61	41	13	115 (56.1%)
Mostly Pediatric	47	8	8	63 (30.7%)
50/50	17	8	2	27 (13.2%)
Total	125 (61%)	57 (27.8%)	23 (11.2%)	205 (100.0%)

Muscular Dystrophy Association clinics, 61 (48.8%) treat mostly adults and 47 (37.6%) treat mostly children. The large number of participants who treat primarily adults was one of the more unexpected characteristics of the Muscular Dystrophy Association clinics. Perhaps Muscular Dystrophy Association's showcasing of children, affectionately known as "Jerry's

kids," on the annual Labor Day Telethon leads to the expectation that more than the 31% to 38% of physicians reported here would treat primarily children.

When physicians who see about half adult and half pediatric patients are added to those treating primarily children, the percentage of physicians to whom children have access totals 51.2% of MDA-only physicians, 44% of MDA-and-independent physicians, and 43.5% of independent physicians. Whether treating adults or children, 88.8% of the respondents treat at least some patients through clinics supported by the Muscular Dystrophy Association.

Medical specialty. Participants could indicate more than one area of specialization. The majority (76%) of neuromuscular specialists had been trained in neurology. Pediatrics (26%) and physical medicine and rehabilitation, also known as physiatry (12%), were common specialty areas. Other training included family medicine, orthopaedics, internal medicine, medical or clinical genetics and neurogenetics. Participant training also took in child neurology and pediatric subspecialties of pulmonology, cardiology, orthopedic medicine, surgery, and physiatry. Additional subspecialties included neuromuscular medicine, neurophysiology, electrophysiology, and electromyography. Areas of expertise such as neurorehabilitation, sleep medicine, spinal cord injury, anesthesia, critical care, geriatrics, and ethics, were also represented.

The considerable variation in subdiscipline of the physicians participating in Muscular Dystrophy Association clinics could derive both from the fact that a number of medical disciplines have the means to address the needs of neuromuscular patients and from the modest support that can be provided to hold neuromuscular clinics. Consequently, in any particular location, *willingness* to serve as clinic physicians and directors is a more prominent criterion than training in a specific medical specialty.

To sum up the demographic responses, the modal participant would be a White male neurologist between 55 and 64 years of age who earned his M.D. between 1977 and 1986. He practices at a university hospital and sees mostly adult neuromuscular patients at an MDA-sponsored clinic.

Qualitative Data

In addition to the structured demographic questions, those surveyed were asked the open-ended question "When you have changed some aspect of your own clinical behavior, what prompted you to do so?" Although the study focuses on informal consultation with colleagues as one means of spreading practice improvements, it is by no means the only influence thought to affect practice. One hundred seventy-two specialists offered responses to the question. A complete listing of the participants' expressions and the researcher's classification of the comments appears in Appendix IV; representative examples appear in Table 7.

The responses to the single open-ended question harmonize well with the procedural orientation of clinicians in their ratings of traits presented in the next section. Comments that spotlighted practical experience outnumbered those in any other category. In addition to 63 comments citing personal experience, participants specifically referred to colleagues' experience 11 times. Experience, then, whether personal or that of colleagues, was mentioned by 43% of the responding physicians as prompting a past change in practice.

In addition to one's own experience with patients, or that of nearby colleagues, another way of communicating the wisdom of experience is through the published page. Twenty-eight and a half percent said that something they read in the medical literature

had motivated them to change an aspect of their practice. Although "literature" could include research data and reports in addition to expert opinion based on clinical

Table 7

What prompted change?

% of 172 (n)	Category	Example expressions
36.6% (63)	Own Experience	patients' response to treatment, personal clinical observation, learning from mistakes, patient needs
6.4% (11)	Colleagues' Experience	mentor examples, clinical colleagues' observations
30.2% (52)	Research	studies, data, clinical research, evidence, findings, advances
28.5% (49)	Literature	reading: articles, peer-reviewed publications, journals
23.8% (41)	Colleagues	collegial suggestions, advice, discussions
20.3% (35)	New Info	new information, knowledge, techniques, medications
12.8% (22)	CME	continuing medical education, conferences, meetings, lectures, courses
5.2% (9)	Patient Input	feedback from patients, patient-driven
2.3% (4)	Legal/Org	fear of litigation, pressure to produce
1.7% (3)	Guidelines	practice parameters, consensus, academy guidelines
1.7% (3)	Learning	professional interest, desire to continually evolve
1.7% (3)	No Change	not applicable (NA), haven't changed much

experience and observation, only those comments using terms such as "research," "data," "evidence," or "studies" were coded as "research." A particular mention of research was made by 30.2% of the specialists responding to the question regarding motivation for

their past changes in practice. Changes stemming from discussions with colleagues were tabulated separately from those originating from the *experience* of colleagues. Suggestions, advice, or recommendations from fellow physicians included under the rubric of "colleagues" were mentioned by 23.8%. In light of the preference for such practice-based traits as medical judgment and clinical management among their informal consultants, many of the references to colleagues in response to the open-ended question about promoters of practice change, such as "discussion with peers," probably also refer to learning from clinical experience of others.

Other factors less frequently credited with changing the physicians' clinical behavior are also noted in Table 7. The open-ended style of the question allowed for a certain amount of vagueness, as demonstrated by remarks such as "new information" or "new knowledge" without mention of its source. Just over 20% of the responses to the question were accordingly labeled "new information." However, most responses did refer to more specific means through which the specialist came to improve his or her practice. The prime sources driving practice change according to self-report were, therefore, clinical experience (either one's own or that of peers), research findings, reading the medical literature in general, and communicating with medical colleagues.

Mentioned less often (in 12.8% of the comments) were various forms of continuing medical education, including courses, meetings, and conferences. There may be considerable overlap in categories, since medical literature includes articles specifically designed as CME modules, as well as reports of research and evidence-based recommendations. Notably, specific references to practice parameters, consensus documents, and clinical practice guidelines were rare, however, being cited only three times, or in 1.7% of the comments.

Since CME in general, and guidelines in particular, have been considered the primary tools available to improve practice, these findings justify the concern about their effectiveness outlined in the introduction.

Although fear of litigation is thought to be a powerful instigator of practice changes (Brilla, Evers, Deutschländer, & Wartenberg, 2006, , in press; Gabale, 2003; Studdert et al., 2005), only one comment of the four classified as legal or organizational concerns specifically mentioned it. Another referred to an "angry letter" as having brought about a change in practice. Others referred to the pressure to produce or to improve efficiency.

Fewer than 2% of those addressing the subject of motivation for past changes indicated that they had not changed. However, being unaware of having made any changes might have been the reason for some to leave the question unanswered (17% of the 210 returned surveys). When acknowledged, however, change seemed most often to be attributed to one's own and others' clinical experience, to learning from research, the medical literature, and communication with colleagues.

Rating of Variables

The questionnaire asked neuromuscular specialists to rate 40 different traits on the basis of how important each was in their choice of informal clinical advisors. Choices on the Likert-type scale ranged from the low anchor of 0-Irrelevant to the high anchor of 5-Essential. The six-point scale was intended to avoid mid-point, neutral responses. "Irrelevant" and a zero rating gave the respondents an opportunity to express the judgment that the trait in question had nothing at all to do with whether they chose to consult with a particular colleague. "Essential," on the other hand, would indicate that

they would not consult with anyone who did not possess that trait. The instructions read, "You have colleagues whose advice you value regarding unfamiliar or difficult patient care problems. Please rate each characteristic below. How important has each been in your choice of informal consultants? Has it been irrelevant, essential, or somewhere in between?" Each item described a potential trait of the informal consultants whose advice the participant might seek, in terms such as "They welcome the opportunity to help."

The 40 traits had been selected from an item pool of traits generated with the help of key informant neuromuscular specialists. Each item was crafted to describe one and only one trait. Each of the 40 traits represented one of four classifications following the rationale presented in Chapter 2 under the heading "What Opinion Leaders 'Do'— Insights From Cognitive Psychology." The traits, by classification, appear in Appendix II. One category contained ten items denoting declarative knowledge ("knowing that"), e.g., information, facts, and concepts. Another ten traits described procedural knowledge ("knowing how"), e.g., clinical expertise (Sternberg, 2003). The remaining traits represented translational ability (the capacity to explain how particular facts should affect practice, helping others transform declarative knowledge into procedural knowledge), and approachability (being respectful of inquirers, kind, patient, friendly, and so forth).

The classification of traits facilitated the testing of the research hypotheses. The hypotheses were that 1) traits denoting approachability would not be considered essential to specialists, 2) those indicating procedural knowledge would be rated more highly than those representing declarative knowledge, and 3) traits indicative of the ability to translate between procedural expertise and its declarative knowledge foundation would be the most highly rated overall.

The comparison of the means of Likert-type scale values must be viewed with caution. Since the values on Likert-type scales are subjective and not measurably equidistant, they cannot be considered interval scales. With that caveat and in view of the fact that many researchers nevertheless use mean data from such scales, the differences among the means were evaluated. The mean rating for each trait appears in the quantitative results chart in Appendix IV. The ratings for the four types of traits were entered into a one-way ANOVA revealing a significant effect for type of trait [$F(3, 8369) = 43.59$, $p < .01$]. The Bonferroni *t* test indicated that the mean rating of Procedural items (4.04) was significantly higher than that of Translational items (3.83), Approachability items (3.76) and Declarative items (3.73). The mean of Translational items was significantly higher than that of Declarative items. Although the distribution of scores for most traits was skewed rather than normal, ANOVA is robust to violation of the assumption of normality.

The comparison of means, therefore, indicates that procedural traits were more highly valued than approachability (and declarative knowledge) which were the lowest rated trait categories, partially supporting Hypotheses One and supporting Hypothesis Two. Translational traits were not the most highly rated, disconfirming Hypothesis Three. The alternative analyses that follow bear out the similar conclusions, more fully supporting Hypothesis One. In the following text, questionnaire items will be identified as numbered on the original survey which appears in Appendix III. The letter D, P, T, or A will follow the item number in the text which to remind the reader of the classification of the item, whether indicative of Declarative or Procedural knowledge, Translational skills, or Approachability.

Selection of Five Most Important Traits

The overall high ratings given most traits indicated that the respondents were taking an idealized view of a collegial advisor. The range of responses was restricted as participants rated most of the items as 3, 4, or 5. In future versions of the questionnaire, a less extreme lower anchor, such as "optional," in place of "irrelevant" and a lowest rating of "1" instead of "0" should be used in order to pull scores downward, and thus mitigate the restriction of range evident in the scores (DeVellis, 1991). Another improvement needed is an assessment of test-retest validity by including a check box on the first questionnaire for participants to volunteer to respond to a duplicate in two weeks time.

No items received a median score of 0, 1, or 2 on the 6-point scale (0-irrelevant, 1, 2, 3, 4, 5-essential). The items chosen when the limitation was imposed of identifying only the five most important traits were therefore a valuable assessment of what mattered when, as in reality, one could not "have everything." Of the 210 participants, 157 (75%) responded to the instruction, "Please circle the item numbers of five traits that are probably MOST important to you."

There was a close correspondence between how frequently each item was included in the top five traits and how high its mean rating was on the Likert-type scale. Although the respondents who did not indicate the five traits they considered most important did consistently give higher ratings to all traits, a Chi square test revealed that the difference was generally not significant. For the sake of clarity, then, the following discussion will be based upon the items' selection among the five most important traits. However, a complete summary, arranged by item number, appears in Appendix IV where the number

of times the trait received each rating (0-5), the median, mean, and confidence interval are noted.

The bar chart in Figure 1 on the following page presents the item number of each of the 40 items on the x-axis with the number of times each was named among the five most important qualities on the y-axis. In a straightforward visual inspection of the data seven traits named as most important by 40 or more participants are clearly apparent (solid black columns). Table 8 displays the most strongly endorsed items in order of times chosen among the five most important traits.

Table 8

Items Frequently Named Among Five Most Important Traits

Item number and text		Times named
1-P	They demonstrate admirable medical judgment	96
26-P	They are skilled in the clinical management of disorders I ask about	68
22-D	They have a wealth of knowledge on the specific issue I'm apt to ask about	49
3-D	Their explanations are logical and well-reasoned	47
15-A	They recognize the limitations of their expertise	45
18-P	They have a reputation for excellent patient care	44
10-P	They excel at the art of medicine, not just the science	43

By far the most commonly selected trait (96 times) was Item 1-P "They demonstrate admirable medical judgment." Another trait selected much more frequently than others was Item 26-P "They are skilled in the clinical management of disorders I ask about" (68

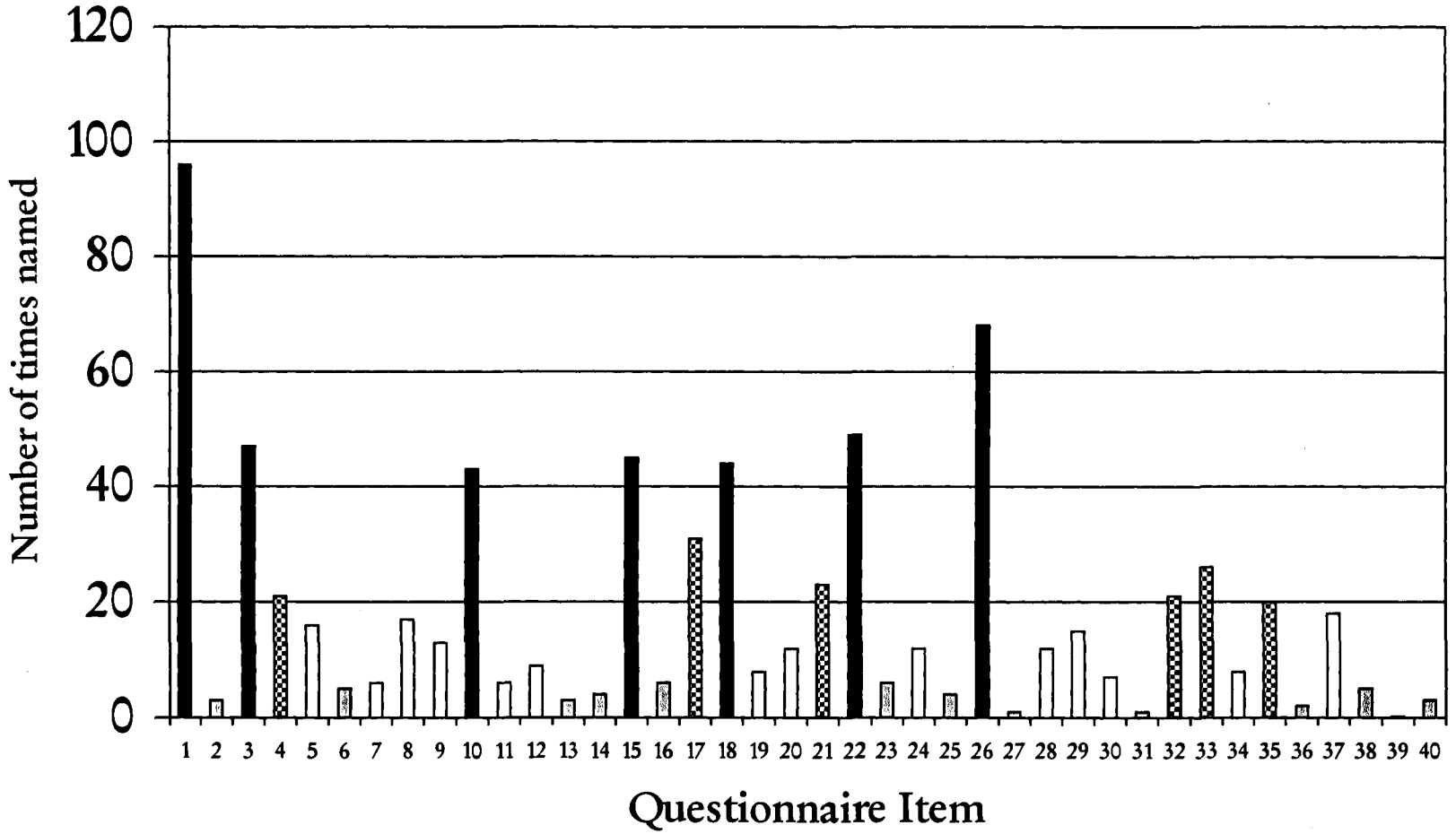


Figure 1 Times named among the five most important traits: ≥ 40 times; 20 to 39 times; 7 to 19 times; 0 to 6 times

times). Being procedural items, they emphasize clinical experience. Medical judgment, acquired from experiencing many scenarios and their outcomes, refers to the ability to select the best approach in the midst of many competing medical considerations. Item 26-P not only highlights skill, but focuses that skill on the disorders of interest to the inquirer, indicating the topic-oriented needs of specialists.

Others named 40 times or more (with number of times selected in parentheses) appear to group with one or the other of the top two items. Item 18-P "They have a reputation for excellent patient care" (44), and Item 10-P "They excel at the art of medicine, not just the science" (43) are closely related conceptually with exercise of medical judgment. Item 22-D "They have a wealth of knowledge on the specific issue I'm apt to ask about" (49) is specific to the topic of inquiry as is Item 26-P. Item 3-T "Their explanations are logical and well-reasoned" (47) and Item 15-A "They recognize the limitations of their expertise" (45) appear to add additional dimensions.

An instrument to identify specialist physicians who possess the above seven traits associated with trusted advisors could be created in an uncomplicated manner. Presenting to a population of specialists an appropriately formatted call for nominations of physicians possessing the seven traits, customized to the disorder of interest, would generate a list of informal advisors identified by their colleagues. First, however, further inspection of a larger number of traits most-often endorsed through use of principal components analysis will bring into clearer view the meanings and implications of the preferences expressed by the participants. A corresponding number of traits at the bottom of the list reveals which traits were considered most irrelevant in participants' selection of informal advisors. Identifying the traits highly correlated with one another through an

analysis of components or factors provides an empirical grounding to the interpretation of the traits that were rated most and least characteristic of informal consultants among neuromuscular specialists.

The traits *least* frequently chosen among the top appear in Table 9, starting with the least often endorsed item. Four traits contain reference to scholarly or academic

Table 9

Items Seldom Named Among Five Most Important Traits

Item number and text	Times named
39-D They recall pertinent information quickly	0
27-D They are familiar with a different literature than I am	1
31-T They show how to adapt knowledge to local settings	1
36-T They give good verbal descriptions when I am not present to observe them	2
2-D They publish in peer-reviewed journals	3
13-D They are avid readers of important journals	3
40-A They take my asking for advice as a positive sign of my interest in quality practice	3

approaches to medicine, dealing as they do with "journals," "cite," "reference," and "literature." All four denote declarative knowledge, specifically that based upon professional publications.

The interpretation of the ratings will be further developed by means of the principal components analysis as in the case of the highest-rated traits. However it is quite apparent that items with a common theme occupy the lowest rung on the trait ladder from the viewpoint of the clinician participants. Item 39-D "They recall pertinent information quickly," Item 27-D "They are familiar with a different literature than I am," 2-D "They

publish in peer-reviewed journals," and Item 13-D "They are avid readers of important journals" all emphasize declarative rather than procedural knowledge. Item 31-T, "They show how to adapt knowledge to local settings," and Item 36-T "They give good verbal descriptions when I am not present to observe them" highlight the type of explanation hypothesized to be desired by inquirers. The low rating of Item 40-A "They take my asking for advice as a positive sign of my interest in quality practice" reflects specialists' self-confidence with regard to their professional image.

In expanding the number of items for analysis, those named 20 times or more among the top five were selected. The rationale for selecting 20 as the cut-off level was that the mean number of times an item was selected was 19 (the median was 12). Thirteen items appeared among the top five 20 times or more, i.e., above the mean number of times. Expanding the group of items to include the thirteen items endorsed at least 20 times and a corresponding number from the bottom of the item ranking provides for a richer appraisal of the factors involved.

Principal Component Analysis

Several items were clearly judged to be the most descriptive of informal advisors. In considering the most useful analysis of the collected data, a principal components analysis of highest and lowest rated traits can provide insight into what the ratings tell us about informal advisors. Each component consists of a constellation of traits receiving similar ratings and is one element of several contributing to an overall mental concept or construct. In this case, the construct is the medical colleague trusted as an informal advisor. Constructs elude direct measurement, but can be studied by measuring responses

to questions relating to their constituent elements or components (termed "factors" in other versions of the technique called factor analysis). By comparing matrices of correlations among the ratings on the items, the statistical program (in this case, Statistical Package for Social Sciences, or SPSS) can reduce the data to a small number of components that combine the items contributing to or "loading on to" the component or factor. In the present example, the thirteen highest-rated traits can be reduced to two components and the thirteen lowest-rated traits to three components.

A label is given each component based on the subjective judgment of the researcher. The number for each item in the columns of Tables 10 and 11 refers to the correlation of that item to all the other items in the component. A loading of 1.00 would mean that it received exactly the same ratings as all the others. The closer it is to 1.00, therefore, the better. Generally, loadings must reach .400 for the item to be considered belonging to that component. Items usually load to some degree on more than one component. For ease of reading, loadings of .350 and less are omitted from the tables.

Interpretation of principal component analyses can be improved through rotation of the components. Rotation refers to bringing the axes representing the components closer to plotted groups of variables; in the present case, the Varimax rotation was employed. The eigenvalue statistic (lambda, λ) indicates the amount of variance in the set of variables analyzed that is explained by a particular component. Eigenvalues over 1.00 will be reported for the rotated analyses in Tables 10 and 11. The variance accounted for by each component, expressed as a percentage, will be noted in the text.

Highest-rated Traits

The analysis of highly rated traits included all items named among the top five 20 or more times. Table 10 presents those 13 traits in two columns, one for the items loading onto Skilled Clinician/Teacher and one for those loading onto Domain Expert. The items appear in order of the strength of their correlation with other items in the component. Taken together, the traits loading onto the first component, Skilled Clinician/Teacher, present an image of a "doctor's doctor," a master at the art and craft of medicine. To "excel at the art of medicine, not just the science" (10-P) refers to the humanistic abilities of physicians that augment their technical abilities and enable them to treat the whole person and thereby foster health (Smith, 1988). Appropriately, therefore, "A reputation for excellent patient care" (18-P) is linked with the foregoing traits.

Table 10

Component Loadings for Highest-Rated Traits

	Derived Scale - Eigenvalue (λ)	
Item	Clinician/Teacher-3.58	Domain Expert-3.54
10-P Excel at art of medicine, not just science	***.744***	
15-A Recognize limitations of their expertise	***.728***	
3-T Explanations are logical & well-reasoned	***.672***	
4-P Apply information from many sources	***.656***	
21-T Can explain why they do things a certain way	***.613***	
1-P Demonstrate admirable medical judgment	***.563***	.417
18-P Have a reputation for excellent patient care	***.432***	.371
22-D Have a wealth of knowledge on the issue		***.778***
32-D Have a reliable fund of knowledge		***.730***
26-P Skilled in clinical management of the disorder	.369	***.717***
33-P See many patients with the problem of concern		***.708***
17-D Know the facts	.548	***.601***
35-D Know the literature pertaining to my question	.395	***.589***

Note: The highest-rated seven traits appear in bold font. Values < 0.35 omitted.

When one depends upon others' counsel it is crucial that those consulted recognize the limitations of their expertise so as not to give incorrect or incomplete advice. The trait "They recognize the limitations of their expertise" (15-A) is therefore characteristic of both good clinicians (who will seek advice for the sake of their own patients) and good teachers (who will refrain from venturing out of the area in which they are truly qualified to assist others). Teaching ability is also evident in "Their explanations are logical and well-reasoned" (3-T) and "They can explain *why* they do something a certain way" (21-T). These elements are translational if they link declarative, factual knowledge to procedural, practical knowledge through explanations. Such explanations might include the pathophysiology of an ailment and how the recommended treatment addresses it effectively, but could also refer solely to clinical procedures.

Those whose advice is sought also demonstrate "admirable medical judgment" (1-P). "Medical judgment" typically refers to the clinician's ability to combine many different interacting considerations in determining the best treatment for a patient. The introductions to published practice guidelines, for instance, frequently begin with the qualifier that no guideline can substitute for expert medical judgment (Haynes et al., 1997, copyright notice; Weingarten et al., 1994, Table 5) . Many mediating considerations such as the patient's age, cultural or religious beliefs, degree of social support, comorbidities, or tolerance for particular medications, must all be weighed in considering the optimal treatment.

The reliability measure, Cronbach's alpha, for the seven variables making up the first component is .821. The Cronbach's alpha statistic is the average of the correlations between a number of items. It measures internal consistency, or the extent to which

responses to the items involved are similar. For example, participants who felt it was essential that their informal advisor "excel at the art of medicine, not just the science" were likely to also say it was essential that they "demonstrate excellent medical judgment." If they *always* said both, the alpha would be 1.00. The average inter-item correlation of the Skilled Clinician/Teacher component of .821 is a fairly strong reliability coefficient and indicates that the items involved are describing aspects of the same underlying construct. With an eigenvalue of 3.58, the Skilled Clinician/Teacher component accounts for 27.6% of the variance among the 13 items.

The last two items load on both the first and second components. The dual loading is possibly explained by the fact that superior medical judgment and excellent patient care are strong contributors to clinical expertise, both in general (Skilled Clinician/Teacher) and specific to an issue of interest (Domain Expert). A domain expert is a clinician with special knowledge (whether declarative or procedural) regarding the particular question at hand (Wright et al., 2004). Four out of six of the traits loading onto Domain Expert emphasize knowledge or skill related to the problem prompting the request for clinical advice.

"They have a wealth of knowledge *on the specific issue I'm apt to ask about*" (22-D) is a case in point and illustrates the effect of medical culture. The model of career-long peer supervision that prevails in clinical psychology is not found in medicine (D. Lollar, personal communication, January 9, 2006). It is quite rare, therefore, for a physician to seek out a colleague's advice without a specific clinical question prompting the contact. In the preponderance of cases, then, even the next trait "Having a reliable fund of knowledge" (32-D) might be understood as referring to knowledge relevant to a particular question. However, the perception of having a fund of knowledge in general, evidenced also by inclusion in the

same component of "They know the facts" (17-D) could contribute to a clinician's advance identification of the colleagues he or she is most likely to turn to when a future need arises.

Another need-specific item, 26-P "They are skilled in the clinical management *of the disorders I ask about,*" was the second most widely endorsed trait overall. The items "They see many patients *with the problem that concerns me*" (33-P), and "They know the literature *pertaining to my patient care question*" (35-D) also confirm that inquiries from peers are likely to be motivated by a specific patient problem. When Wright et al. (2004) used the generic criteria of the Hiss et al. identifier, they found it necessary to create the category of medical domain expert to account for those colleagues whom others would ask for advice regarding colorectal cancer, but who had not been nominated for each of the three generic categories of educationally influential physician. The label of Domain Expert is therefore appropriate for the second component, the reliability of which is .793. The variance accounted for by the component Domain Expert is 27.2% ($\lambda = 3.54$), bringing the total variance explained by the two components to 54.8%.

The two components of the highest-rated items, those of Skilled Clinician/Teacher and Domain Expert, were nicely expressed in a supplementary written description one participant offered of a collegial advisor, "a good doctor with special understanding of a problem." The first is largely a combination of procedural knowledge (four items of the seven included in the first component) and two translational elements with a rational slant, emphasizing explanation. The item language makes no mention of research findings or evidence-based knowledge. Rather, it stresses reason and logic, the process of good decision making, not source of the data such reasoning manipulates. The item representing approachability, Item 15A, was originally composed in order to positively

express "They are not arrogant." However as noted above, recognizing the limitations to one's area of expertise is crucial to excellent patient care and to giving and seeking advice from peers. Therefore it denotes far more than humility as a personality trait.

The component Domain Expert, consists mainly of declarative and procedural knowledge *related to the issue of concern.* Four declarative knowledge items are combined with two procedural items, with no translational or approachability elements involved. The common element of the six items is that of a physician who possesses expert knowledge that will be useful to the inquirer.

Lowest-rated traits

To draw a clear distinction between traits reported as most important and those considered definitely less important, the 13 items least often named among the five most important characteristics were used as a contrast to the group of highly rated items. These lowest-rated traits were selected as the inverse of the 13 highest-rated traits. Because the twelfth through fifteenth lowest-rated items (23, 16, 11, and 7) were all named six times, the two with the lower means (23 and 7) were used to break the "tie." Table 11 presents the 13 items. There are three columns this time, with the loading of each item in the column for the relevant component, Warm Teacher, Scholar, or Translator.

The first component, "Warm Teacher," primarily combines traits categorized as approachability and translational indicators. Traits that are characteristic of personable, warm-hearted teachers appear here. "They treat me as an equal even though it is clear they are helping me" (38-A), and "They take my asking for advice as a positive sign of my interest in quality practice" (40-A) are both traits that spare the feelings of the inquirer. Practitioners who frequently face professional elitism and are sensitive to it

Table 11

Component Loadings for Lowest-Rated Traits

Item		Derived Scale - Eigenvalue (λ) Warm Teacher-3.59	Scholar-2.18	Translator-2.00
38-A	Treat me as an equal when helping[a]	***.823***		
40-A	**Take questions as a positive sign of my interest in quality**	***.777***		
23-T	Make time to teach in clinic	***.737***		
14-T	Understand perspective of one with less experience	***.726***		
36-T	**Give good verbal descriptions when I am not present to observe**	***.647***		
39-D	**Can recall pertinent information quickly**	***.521***	.435	
13-D	**Are avid readers of important journals**		***.759***	
2-D	**Publish in peer-reviewed journals**		***.727***	
27-D	**Are familiar with different literature than I am**		***.658***	
6-P	Patients have low complication rate			***.755***
25-P	Once they adopt a new approach, my respect for it increases	.394		***.638***
7-P	Put quality research findings into practice promptly		.478	***.621***
31-T	**Show how to adapt knowledge to local settings**	.504		***.532***

Note: The lowest-rated seven traits appear in bold font. Values < 0.35 omitted

[a] Item 38-A from Hiss et al. (1978)

might especially gravitate to such advisors. Item 38-A is the one item taken from the Hiss et al. (1978) questionnaire and was highly rated by the general practitioners surveyed in that study. The current study population, however, is comprised of clinicians trained in specialties or subspecialties who would likely be making more lateral inquiries of other specialists. They are not of a "lower echelon" seeking help from someone higher up the professional ladder.

The next three lowest-rated traits included in the component Warm Teacher emphasize a special desire to teach and a particular sympathy with the learner. Such colleagues "make time to teach others when in a clinical setting" (23-T) and "understand the perspective of someone with less expertise in the area" (14-T). It would take less ego strength to approach such colleagues with questions because the inquirer will likely be received graciously. Item 36-T "They give good verbal descriptions when I am not present to observe them" would appeal especially to doctors who consult long distance. In view of the high ratings given the similar items "Their explanations are logical and well-reasoned" (3-T) and "They can explain why they do something a certain way" (21-T), the low estimation of Item 36-T may indicate that most informal consultations take place in person. Also, having the time to observe a colleague practicing may be a luxury few can afford in today's busy healthcare environment, therefore irrelevant to the participants responding.

The last attribute loading on the component Warm Teacher also contributes to the next component (Scholar) with which it seems to have more in common. Item 39-D "They recall pertinent information quickly" would, however, be a quality that a physician with much teaching experience might reasonably have. Absolutely no one, however, considered it as one of the five most important qualities. Its loading on, or level of correlation with, Warm Teacher is .521 and on Scholar, .435. The item's emphasis is on declarative knowledge; having such a grasp on "information" that it can be quickly recalled signals mental sharpness and speed. The respondents indicate in their low rating of this item that they are not seeking a rapid-fire reply of factual input. The reliability of

the component describing a warm, personable teacher is .853. It accounts for 27.6% of the variance among the 13 lowest-rated traits, having an eigenvalue of 3.59.

The quality of scholarliness dominates the second component of features selected least often as the five most important traits. "They are avid readers of important journals" (13-D), but this alone does not inspire eagerness for their input. If informal advisors are consummate clinicians who see many patients, they may be too busy to be "avid" readers. Physicians also may have no way of knowing how much another reads. Or the participants might not expect medical journals to contain articles applicable to practice. If so, the problem may lie with the topics researchers choose to study. If no input is sought from clinicians to guide research, a natural consequence might be that it is not, or does not appear to be, relevant to practitioners.

The impression that scholarly pursuits are irrelevant continues with "They publish in peer-reviewed journals" (2-D). That item was selected among the top five a mere three times and received the lowest mean score of any item, reinforcing the appearance of a lack of interest in seeking out a clinician/researcher for clinical advice (or the scarcity of such colleagues). And although it seems logical that if one required new insights on a condition that a likely resource would be someone "familiar with a different literature than I am" (27-D), such is not the case; it had the second lowest mean of the 40 items. Being familiar with a different literature (Item 27-D) combines with items 13-D and 2-D for a second component reliability of .633. The component Scholar accounts for 16.8% of the variance in the set of variables ($\lambda = 2.18$).

The component Scholar is composed of three items of declarative knowledge, all dealing with enthusiasm for medical literature. In fact, such items received some of the

lowest ratings in three ways. First, advisor traits emphasizing knowledge of research findings had low mean ratings on the Likert-type scale in comparison to traits of clinical expertise. Second, research-oriented traits were seldom named among the five most important traits even by those who rated them more highly than most respondents. Third, participants who completed the qualitative portion of the survey mentioned clinical experience as the motivator behind past changes in their practice more often than research findings. Scholar and Warm Teacher combine to account for 44.4% of the variance among the lowest-rated traits.

Continuing with the lowest-rated items, the first that appears in the component labeled Translator is Item 6-P "They have a low complication rate among patients they treat." It gave rise to some of the few comments written in on the survey. A participant pointed out that it would be quite rare for other physicians to know the complication rate among their colleague's patients. Possibly because of difficulties in responding to the item, there seems to be little connection between it and other items in Translator.

The remaining three items, however, all relate to qualities of a practitioner who moves research into practice and influences others to do so. Item 25-P "Their judgment is such that once *they* adopt a new approach, my respect for it increases," although originally classified as denoting procedural knowledge, is strongly translational due to the influence on colleagues it implies. Further indicating a reclassification from the category Procedural knowledge to Translational ability, if physicians adopt an approach while it is new, they are early adopters from the viewpoint of diffusion theory. If their example raised the esteem others have for what they adopt, they would be opinion leaders, also an integral part of the diffusion, or translation, of innovation.

Little interest in Item 7-P "They put quality research findings into practice promptly" further denotes the peripheral role that application of research plays in the respondents' assessment of a colleague's clinical advice. When asking for clinical advice, they apparently do not have in mind getting ideas on how to move knowledge into practice because Item 31-T "They show how to adapt knowledge to local settings" is also among the traits considered least important.

The specialists participating do not particularly look for input from colleagues known to adopt new approaches (including approaches which would derive from research) since attributes describing an early adopter of innovation were among the lowest rated. The reliability coefficient of the component describing a translator of research into practice is .700. The component Translator ($\lambda = 2.00$) accounts for 15.3% of the variance, bringing the variance explained by the three components to 59.7%.

By way of overall summary, the two principal components that capture the attributes most highly rated by respondents are those labeled Skillful Clinician/Teacher and Domain Expert. The Skillful Clinician/Teacher combines the traits epitomizing the craft of medicine, such as admirable medical judgment and excelling at the art of medicine and patient care, with the ability to apply information and explain matters to others. The Domain Expert combines traits denoting a solid foundation of empirical knowledge in general, but particularly with regard to the specific clinical problem prompting the request for advice.

Identification Instrument

The goal of the present study was to create a new tool to identify specialist physicians having traits associated with being trusted advisors to colleagues. Forty items were rated by the participants. Seven items (1-P, 3-T, 10-P, 15-A, 18-P, 22-D, and 26-P) were clearly more indicative of the traits of valued collegial advisors than the remainder of the 40 traits. The traits combine to form the following profile. "They demonstrate admirable medical judgment and have a reputation for excellent patient care. They have a wealth of knowledge about the topic of interest and are skilled in its clinical management, yet they recognize the limitations of their expertise. They excel at the art of medicine, not just the science. Their explanations are logical and well-reasoned."

The fact that many of the more strongly endorsed traits tied the advisor's expertise to the specific patient care issue of concern highlights the focused nature of specialist's consultations. The set of generic characteristics developed by Hiss et al. (1978) in small community hospitals of Michigan was not topic related precisely because the original purpose was to identify general practitioners who could serve as advisors to other general practitioners on a topic in which they would be trained *after* their identification. Generalists, particularly in non-urban settings, will by definition be confronted by a wide variety of clinical conditions and the knowledgeable peers available to them will be limited in number. The criteria for the colleague-consultant were, therefore, more generic and less tied to the particular problem at hand. The use among specialists of an instrument developed among and for generalists to identify educationally influential physicians created the need for a new category, the "domain expert" (Wright, et al., 2004).

The redevelopment of an identification tool among specialists themselves eliminates the need to add on "expertise in the clinical area of interest" as an afterthought. The responses of neuromuscular specialists reveal that knowledge and clinical skill with regard to the current, specific need is a core requirement and determinant in their choice of collegial advisors. When physicians seek advice from colleagues, they are interested in consulting with a skilled clinician with expertise in the specific area of concern.

In the almost 30 years since its development, use of the instrument has expanded to include medical specialists, with only limited revalidation of the construct of the educationally influential physician (Grimshaw et al., 2006; Wright et al., 2004; Young et al., 2003), or put more simply and clearly, an informal advisor. The instrument presented here was developed using a similar methodology among a population of neuromuscular specialists. Instead of asking for nominations of colleagues meeting each of three separate descriptions, the new identifier recognizes that a physician seeking advice does not call together a committee of colleagues, each displaying perhaps only one of three types of desirable qualities plus another who has expert knowledge of the specific problem. In naturalistic decision making, qualities considered essential in experts must be combined in one individual and experts must be domain-specific to be effective (Mieg, 2001). Grimshaw et al. (2006) refer to informal opinion leaders as "monomorphic" (specific to a particular disorder or condition) which suggests that identification needs to be customized to the disorder as is the identifier presented here.

The profile will be preceded by instructions to nominate up to three specific colleagues that respondents believe fit the description presented. The following example of the identifier is customized to Duchenne muscular dystrophy. The name of another

neuromuscular disorder of interest could be substituted, depending upon the research context. The profile is formatted to enhance readability and recipients are assured of the confidential nature of their nominations.

Do You Know These Physicians?

Call for Nominations

We are offering advanced training opportunities to neuromuscular specialists who frequently advise their colleagues on patient care issues related to Duchenne muscular dystrophy. Recent research among neuromuscular clinicians indicates that typically these informal advisors...

- demonstrate admirable medical judgment
- are skilled in the clinical management of Duchenne muscular dystrophy
- have a wealth of knowledge about Duchenne muscular dystrophy
- can explain matters in a logical, well-reasoned way
- recognize the limitations of their expertise
- have a reputation for excellent patient care and
- excel at the art of medicine, not just the science.

Please nominate up to three of your colleagues who fit the above description of respected clinical advisors.

Physicians named will be eligible for a subspecialty mini-fellowship at _____[site] offered by _____[sponsor].

Please return your nominations (which will be kept confidential) to: _____[address] by _____[date].

Physician's name: _____

Affiliation, City, State: _____

Physician's name: _____

Affiliation, City, State: _____

Physician's name: _____

Affiliation, City, State: _____

CHAPTER 5

DISCUSSION

The study had three main hypotheses regarding the relative importance of advisor traits denoting approachability, procedural knowledge, declarative knowledge, and the ability to translate declarative knowledge into practice. The first hypothesis was that approachability would be of least concern to the specialists surveyed. The second was that the procedural knowledge of advisors would be of more concern to inquirers than their declarative knowledge. The third was that the most highly valued traits would be those indicating an ability to translate declarative knowledge into practice (procedural knowledge).

The study results supported Hypotheses 1 and 2, but disconfirmed Hypothesis 3. In accord with the first hypothesis, traits related to approachability were less often selected as most important than traits denoting declarative and procedural knowledge, as well as translational ability. Specialists did value procedural over declarative knowledge, confirming Hypothesis 2. Contrary to Hypothesis 3, however, traits denoting the ability to translate from declarative knowledge to procedural knowledge were not the most highly valued. The implications of each finding and the informal advisors' role in moving research into practice will be discussed. What the results have to say about the ways in which informal advisors can best be utilized in practice improvement programs and the

results' implications for clinical practice guideline development and implementation will be considered.

Approachability

Hypothesis 1, that traits designating approachability would be rated lowest by specialists, was confirmed by the ranking of traits most-often and least-often named among the five most important. Approachability was not an important issue to most respondents. In particular, Item 38A "They treat me as an equal even though it is clear they are helping me" and Item 40A "They take my asking for advice as a positive sign of my interest in quality practice" placed in the lowest-rated group. Both statements imply that it is important to the inquirer to have the consultant think well of him or her. The specialists responding did not strongly endorse these items.

Item 38A "They treat me as an equal even though it is clear they are helping me" was the one item of the survey that also appeared on the Hiss et al. (1978) instrument. Although the Hiss et al. data on specific item ratings are not available, the fact that the phrase appeared on the identification tool indicates that it was highly rated by the general practitioners surveyed in that study. As proposed earlier, general practitioners might encounter a degree of professional elitism when consulting with secondary or tertiary care providers. In addition, the population sampled by Hiss et al. was not primarily urban, while neuromuscular specialists are generally urban of necessity. For community hospital physicians, being in small towns creates another possible source of discomfort when consulting with their big-city colleagues, possibly explaining the importance to them, but not to specialists, of respectful collegiality. Not only would specialists experience less

potential for discriminatory attitudes, they would have the professional standing to more easily disregard any they did encounter.

Thus, the samples and corresponding populations (general practitioners compared with specialists) may differ in dependence upon peer approval. Indeed, physicians of one specialty may differ from those of another. Attitudes, such as the low importance placed on approachability, may not be consistent across specialties.

The only Approachability item among the highest rated items was 15A "They recognize the limitations of their expertise." The item was originally conceived as a positively framed version of "They are not arrogant" (and are therefore humble and approachable). But expertise itself is strongly procedural in nature; hence there are elements of procedural knowledge contained within recognizing limits to one's expertise. And as previously discussed, recognizing limitations motivates advice seeking and keeps advisors from getting out of their depth. Rather than be a highly rated Approachability item, this result may indicate that the item was misclassified.

Procedural Versus Declarative Knowledge

Hypothesis 2, that specialists would value procedural knowledge (clinical wisdom gathered from experience) over declarative knowledge (information, including new information from research) was confirmed. The two most strongly preferred traits "They demonstrate excellent medical judgment" (1P) and "They are skilled in the clinical management of the disorders I ask about" (26P) are both indicative of procedural knowledge. The knowledge required in professional activities is a different kind than that required in basic science and academic activities. (Mieg, 2001).

A clinical knowledge base is more central to the treatment of patients than is extensive knowledge of basic science. Certainly a thorough acquaintance with the pathophysiology of the disease or syndrome at hand could equip a physician with the general principles needed for expert medical decisions arrived at through deductive reasoning. But participants' rating of the 40 traits presented to them emphasizes the desire to tap into clinical expertise directly. The psychology of expertise has identified accessing expert advice as a time-saving heuristic (Mieg, 2001). When physicians consult peers, they are employing such a shortcut, bypassing the laborious acquisition of declarative knowledge.

Cognitively, gaining expert advice obviates the time-consuming process of knowledge compilation (Anderson, 1982) in the intermediate stage of skill acquisition that lies between having information about the skill and expert performance of the skill (Fitts, 1964). By seeking out an informal advisor, physicians acquire practice knowledge directly by learning procedures from clinicians experienced in solving the patient care problem of concern. Reasonably, if the goal of informal consultation is practical advice for specific clinical problems, then expounding on extensive knowledge of recent research is not appropriate, while offering action-oriented, to-the-point instruction is. Seeking informal advice is a way of using the specific experience of others to find a solution to a patient-care problem and save the time and effort involved in going back to textbooks, or more laborious still, searching for reliable evidence, then trying to interpret it wisely and apply it appropriately.

Much of the basic function of informal consultants, therefore, can be described as sharing "rules of thumb." Rules of thumb are generally passed by word-of-mouth from

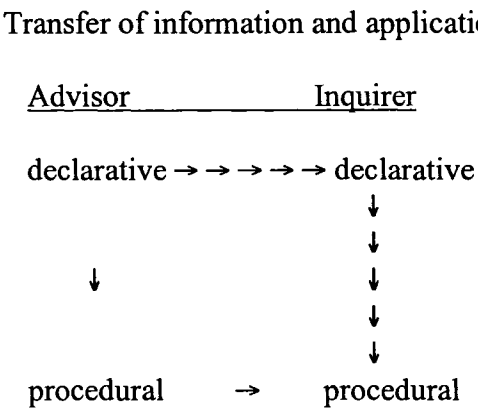
one colleague to another. They are an efficient means to link theory to practice (André, Borgquist, & Mölstad, 2003). André et al. (2002) noted that rules of thumb tend to be axiomatic with no reference to the details of the disease process. Such rules must be simple even when the underlying knowledge base is not, and expressing them "often requires abandoning scientific rigour" (p. 621). One item on the Hiss et al. identifier, "They...provide practical information first and then an explanation or rationale if time allows," alluded to this process. (Hiss et al., 1978, p. 286).

The inventory of traits most often selected among the five most important supports the expected emphasis on procedural knowledge in the form of clinical expertise. What was less supported was the notion that inquirers would be interested in seeing peers engaged in the process of transferring declarative knowledge into practice, such as in directions on how to apply research findings in local circumstances.

Translational Ability

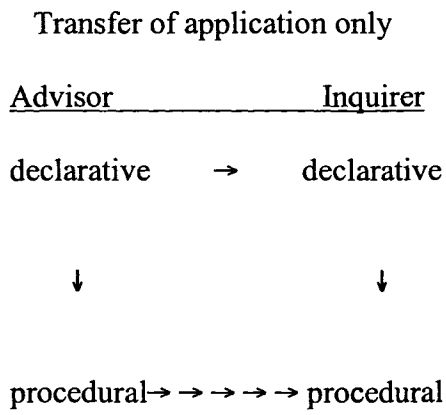
Hypothesis 3 was not confirmed. It stated that advisor traits indicating the ability to translate between declarative knowledge and procedural knowledge would be rated higher than traits relating to approachability or procedural or declarative knowledge. One tacit assumption of the study was that physicians were seeking from collegial advisors not just the clinical application of knowledge, but the knowledge (information) itself and guidance on how to apply it in practice. The questionnaire items that epitomized such a process, however, were not widely endorsed. There was no confirmation that physicians value peers as advisors based on an ability to "back translate" from procedural to declarative knowledge. Rather, the emphasis was on clinical skills.

The hypothesis tested here can be represented as a model in which a transfer of declarative knowledge takes place, accompanied by explanation of how to apply it in practice:



In this model, the inquirer questions a practitioner he or she perceives as successful in order to gain the knowledge that informs the successful behavior. The advisor must then access and transfer information and help the learner see how to apply the facts to patient care. To do so, the expert must be able to access the facts that underlie the behavior, e.g. the pathophysiology of a disorder. However, part of the nature of expertise is that such details no longer need to be actively used after a skill becomes automatized (Schmidt, Norman, & Boshuizen, 1990; Sternberg, 2003) and a "dropout of verbal mediation" (Anderson, 1982, p. 369) occurs. Furthermore, the step-by-step process by which a skill is first learned is laborious and is discarded as greater skill develops (Fitts, 1964).

The insight gained from neuromuscular specialists is that the process may look more like this:



The accumulated practical wisdom of the experienced clinician is what an inquirer is interested in rather than the information on which the advisor's practice might be based. Both models assume that the advisor's procedural knowledge was, at some point in the past, informed by declarative knowledge.

The transfer of clinical expertise in the form of heuristics, rather than through the declarative knowledge with which the expertise was developed, is compatible with the push for parsimonious learning. The simplest, most direct and energy-efficient route is the naturally occurring one (Gigerenzer & Todd, 1999). Particularly within the hurried context of medical practice, shortcuts are valuable and preferable when one can feasibly dispense with time-consuming analytic thinking. When seeking clinical advice from colleagues, the professional may be engaged in an intuitive search for procedural, rather than declarative knowledge and for practical, rather than didactic approaches. Indeed, focus group research with physicians indicates that heuristics function in precisely this way, serving "as a link between theoretical knlwledge and practical experience and were used ...in an act of balance between the individual and the general perspective" (André et al., 2003, p. 514).

An assumption of the study was that physicians seek advice from colleagues who are eager to discover and apply research findings in their practice. The utilization of collegial advisors to spread better practice based on research findings rests upon that assumption. The results of the present research challenge that notion. It is, after all, the advice-seeker who determines who will be the advice-giver. Therefore the traits advice-seekers indicate as characteristic of colleagues they consult should be a reasonable estimate of the qualities the advisors possess. Although the participants' high regard for Item 21T "They can explain why they do things a certain way" may indicate that there is at least some interest in the scientific underpinnings of expert practice, the items that emphasized awareness of research and application of it in practice did not fare as well.

Research and Scholarship

A further aspect of the data deserving consideration is the apparent low opinion the respondents expressed specifically regarding research and scholarship. Even though items representing procedural knowledge were considered paramount, there was, nevertheless, considerable support for Items 17D "They know the facts," 32D "They have a reliable fund of knowledge," 22D "The have a wealth of knowledge on the specific issue I'm apt to ask about," and to a lesser extent, 35D "They know the literature pertaining to my patient care question." However, the items specifying gaining such knowledge from research placed in the lowest-rated group. Items 13D "They are avid readers of important journals," and "They are familiar with a different literature than I am" were among the lowest-rated traits. Item 2D "They publish in peer-reviewed journals" had an outlier mean 2.8 standard deviations below the mean of the mean ratings of all items. Whether a

colleague had published was deemed "Irrelevant" far more often than any other item (by 19 participants, compared to an average of 2.5 participants for the 18 other traits considered irrelevant at least once). Item 7P "They put quality research findings into practice promptly," also ranked in the lowest-rated group of traits. The fact that the item specified *quality* research findings makes the low rating especially interesting.

The low ratings given the items calls into question the accuracy of the self-report of practice changes motivated by literature and research. It is possible that the neuromuscular specialists turn to informal advisors for help with problems whose answers they believe lie in clinical experience rather than in what might be gained through literature or research. However, previous qualitative research has signaled a generalized skepticism about research findings and their applicability to clinical practice among physicians.

A report based upon structured interviews over a period of 10 years with physicians in the United States, the United Kingdom, and Canada (Greer, 1988) declared that "the universal skepticism of practicing physicians regarding the utility of the scientific literature is startling" (p. 9). Although the study is dated and involved few physicians in teaching hospitals, it nevertheless sheds light upon the attitudes described above. The skepticism involved two factors: viewing journal articles as primarily a product of academic pressure on university researchers to publish and authors' failure to include information the clinician needs to apply the findings in practice.

Interviewees compared academics to advertisers in having vested interests, the desire of one being to sell an idea, of the other to sell a product. They noted that journals seldom report negative findings and that studies that do get published make exaggerated claims,

adding that "You have to go to your colleagues to hear about the bugs" (Greer, 1988, p. 9). Other sources of concern included the inability of researchers to be objective about the results of projects they've spent years on and the observation that studies reach contradictory conclusions. The clinicians' observation is that research articles are typically written by researchers, for researchers.

The lack of clinically relevant topics and the omission of details needed for clinical application of the findings was another concern of physicians interviewed by Greer (1988). Practitioners were especially interested in knowing details about the condition of patients who did not do well on the intervention tested, as well as risks, complications, and indications for use. They felt that such aspects were seldom addressed in articles. Another concern was that procedures and facilities were often not described in sufficient detail for clinicians to feel confident in applying the methods themselves.

The reservations voiced twenty years ago continue to be relevant. A recent example of the complexity of drawing conclusions from research concerns the recommendations stemming from the Women's Health Initiative. It is estimated that following the suspension of one arm of the study and the subsequent media coverage, 40% to 83% of women using hormone replacement therapy stopped doing so (Haimov-Kochman & Hochner-Celnikier, 2006). But controversy has surrounded the appropriate clinical response to the research, particularly because the research subjects involved were not typical of those for whom hormone therapy would be prescribed, being older and in higher risk groups (Burger, 2003). Highlighting the disconnect between research and clinical practice, Burger's report on a world meeting of 25 expert hormone therapy clinicians described randomized controlled trials as scientific tools for a group of research

participants that should not be confused with medical management of individual patients. That statement is not unfounded because the cost/benefit ratio of therapies can only be assessed in relation to individual circumstances. A lack of sufficient description of participants in trials for clinicians to assess the similarity of their patients to the sample (Cimino, 1999) also plagues the reporting of research (Greer, 1988).

Due consideration of the core differences between research and practice puts the apparent disregard for research findings in a perspective more favorable to the clinician. It also spotlights the need to increase the clinical relevance of research agendas. Since the problem is embedded in the structure and priorities of the research university, however, it presents a considerable challenge.

Using a similar questionnaire among a group of physicians specializing in treating a different patient population will help ascertain whether the traits important to neuromuscular specialists are valued by specialists in general. This study should be repeated with a different group of specialists to determine whether similar traits emerge. A suitable group would be those treating individuals with spina bifida, such as pediatric urologists and orthopedists. Similar to persons with Duchenne muscular dystrophy, those born with spina bifida are vulnerable to a number of life-threatening complications. Wide variation exists across the United States in the measures taken to prevent or treat such complications, as well as maximize functioning. The patient-parent communities are at comparable stages of organization, having recently begun efforts to establish care recommendations, disease registries, and expanded clinical trials. Life expectancy in both populations is beginning to be extended, presenting the challenge of improving transition from pediatric to adult care.

Informal Advisors' Role in Moving Research into Practice

What do the study findings mean for implementation science, the effort to move research findings into practice and implement best practice in the clinical setting? Two aspects are involved: 1) the insights provided regarding the basic reasons that information alone so seldom changes practice and 2) the best way to leverage informal advice-giving toward the goal of practice improvement.

Recall that a fundamental part of expertise is the automatization of processes (Anderson, 1982). Automatic behaviors, like tacit knowledge, are less susceptible to influences that would change them than are conscious, thought-controlled behaviors (Patel et al., 1999; Verplanken, Aarts, van Knippenberg, & Moonen, 1998). Rules of thumb relieve the mental load of activities by simplifying thought; they work, in fact, to "save one from thinking" (André et al., 2002, p. 618). Importantly, clinical expertise is "a prerequisite for applying the rules" (p. 619). The endorsements of medical judgment and the art of medicine by participants in the present study provide a suitable counterbalance to the use of rules since they emphasize patient-centered medicine and viewing each patient as a unique individual. They add a context of caution to the act of giving and receiving encapsulated advice.

It may be that consulting colleagues is an avenue that is reserved particularly for occasions when the solution is felt to lie in clinical experience. Or, that having seen many patients with similar disorders will have led the advisor to relevant research findings ("they know the facts") which he or she no longer needs to access consciously. Thus the consultation can take place on a strictly procedural plane.

The elements classified as Translational were hypothesized to function as links between factual information and improved practice. However, there was little interest in traits making explicit the transfer of research findings to clinical practice (e.g., Items 31T "They show how to adapt knowledge to local settings" and 7P "They put quality research findings into practice promptly").

The effort to improve the quality of healthcare includes many approaches to a variety of problems. No single intervention provides the whole answer (Dopson, FitzGerald, Ferlie, Gabbay, & Locock, 2002; Oxman et al., 1995). But the rationale behind each approach, including the attempt to utilize social influence to move research findings into practice, must be sound if it is to fulfill its potential in contributing to quality improvement.

The present research began with the premise that the quality improvement interventions most likely to succeed are those which, by harnessing natural environmental processes, require the least amount of change from the fewest people. Collegial consultation is one such naturally occurring phenomenon in the practice of medicine that, far from requiring change, represents the status quo. Eliciting physicians' own description of the colleagues whose advice they solicit represents an attempt to observe, analyze, and understand the players and processes involved with a view to establishing their utility in efforts to implement medical advances.

Implications for Clinical Practice Guideline Implementation

The purpose of clinical practice guidelines and heuristics is the same, to guide decision making under conditions of uncertainty and time constraint (Gigerenzer & Todd,

1999). Both are merely decision aids, with the caveat that their use must be accompanied by sound medical judgment (Weingarten et al., 1994, Table 5; Haynes et al., 1997, copyright notice). Specialists tacitly assume extensive enough clinical experience in their peers to enable enlightened contextual use of a rule of thumb (André et al., 2002). The irony is that physicians typically bridle at being presented with rules in the form of formal care guidelines to the point of "guideline wars" breaking out in healthcare settings (Berwick, 1999). Yet, the use of rules (of thumb) are the stock and trade of clinical practice (Cimino, 1999). Clinical practice guidelines, however, seldom have the structure of heuristics and, of course, are not transmitted by word of mouth. Expert-to-expert communication presumes extensive background knowledge and can therefore take certain liberties, abridging explanations or presentation of evidence. Guideline authors, on the other hand, fear to do so, since they have no possibility of judging the expertise of the actual user.

Clinical practice guidelines may be viewed as coming from "management," from outside the clinical family, even when written by physicians, while rules of thumb are from one member of the family to another. Williams, Faulkner, and Fleck (as cited by Mieg, 2001, p. 4) emphasize that expert standing is socially dependent and that "what is judged is not so much the content of the evidence or advice, as the credibility and/or legitimacy of the person giving that evidence or advice." Evidence regarding treatment effectiveness that meets the highest standards of quality has been shown to be convincing regardless of source in at least one study (Brindis & Sennett, 2003). However, such evidence is quite rare; in the majority of cases the credibility of the source will have considerable bearing.

Although medicine is popularly seen as the ultimate expression of science, work-a-day clinical practice cannot operate at rarefied levels of biomedical sophistication. As a focus group research participant put it, "The textbooks have certainly complicated our lives enormously....But over the years you learn that it doesn't work to practice that way...you are forced to work based on shortcuts from you own experience" (André et al., 2002, p. 619). But rather than shortcuts, CME and guideline materials typically give extensive background declarative knowledge in an effort to respect the clinician's right to know the details and avoid the offense of offering "cookbook medicine." A good cook isn't expected to need a recipe from a cookbook. But many practice guidelines do take the form of a recipe, i.e., an algorithm (Margolis, 1999). Algorithms give excruciatingly step-by-step instructions, quite the opposite of shortcut rules of thumb and expert performance that operates from highly condensed, or compiled, knowledge organized into cognitive structures termed variously "schemes" (Mandin, Jones, Woloschuk, & Harasym, 1997), or "scripts" (Schmidt et al., 1990). Abbreviating or condensing published guidelines or evidence does not solve the problem, however. Using a quick reference (whether an outline card that fits in a lab coat pocket or a hierarchy of evidence referred to on a hand-held computer) might be seen by one's patients or co-workers as indicative of inadequate knowledge or competence.

Optimal Use of Informal Advisors

An emphasis on practical solutions based on the clinical experience of other physicians emerged from the research. When that insight is combined with an understanding of the nature of expert thought processes, the optimal use of informal

advisors surfaces. It is this: the procedural knowledge of identified advisors should be updated and expanded so that the practice they pass on to others reflects the latest scientific knowledge. For *their* practice to change, education must take place through experiential, rather than didactic, means at facilities where the desired changes have been implemented and are well-integrated. Data collection facilitated by online disease registries can help identify practice that results in improved outcomes and rouse uncertainty and awareness of the possibility of improvement in others. "Political" barriers to identifying the superior treatment centers must be dealt with (Gawande, 2004) in order to generalize their treatment protocols. A "model" clinic, so named because it models best practices, would provide a venue for directly transferring procedural knowledge to visiting clinicians who observe it in action and participate in its processes during a brief training period.

This would be the converse of one of the most successful diffusion processes in American history, that of the agricultural extension program (Rogers, 2003). Similar to the extension agent visiting farms and ranches on outreach visits, pharmaceutical representatives have detailed their products to physicians in their offices. Health quality interventions have adapted the same method, labeling it "academic detailing" (Soumerai & Avorn, 1990). But in the opposite arrangement, members of the healthcare unit with quality problems or desirous of improvement would visit the setting where best practices and better outcomes are firmly established. The natural resistance to a visit by an "all-knowing outsider" would thus be avoided. Training as a team would help avoid the situation of a solo visitor returning home only to become a lone voice calling for reform, all too easily ignored. Funding for trials of this sort could be built into awards of

excellence to establish the expectation that outstanding programs have a role to play in spreading their best practices through providing opportunities for procedural, practical knowledge transfer. But a means of providing continuous, long-term support will also be needed.

To test the process with the fewest confounding variables, an intervention should be selected that is supported by convincing evidence, delivered in a healthcare area experiencing a serious quality gap, and justified by a local needs assessment indicating considerable room for improvement. The target should consist of a problem solvable primarily through provider behavior change without the necessity of major systemic changes (Soumerai et al., 1998).

Once identified, how should the informal consultants be utilized? The central lesson of this study is that clinical methods are spread through procedural rather than declarative knowledge transfer. Those nominated as informal consultants must be exposed, along with members of their own neuromuscular clinic team, to clinics who are having excellent results in maximizing function and extending life expectancy and can pass on their successful treatments via heuristics transferred by word-of-mouth in the practice environment, replacing former rules of thumb with ones that reflect better practice. Neuromuscular clinic physicians, for instance, may be used to thinking, "When forced vital (lung) capacity drops to 50%, it is time to think about ventilation." If better results were to be achieved when starting noninvasive ventilation earlier, e.g., when forced vital capacity drops to 75%, the old rule of thumb would need to be replaced by a new one. In-person communication during a training visit on rounds or chart review could inculcate the new version of the rule of thumb.

The essential nature of the practice of medicine is the delivery of healthcare services tailored to each unique individual in need. Although the amount and specificity of information about both patients and treatments have grown exponentially in recent years, the medical profession is still one of practical, applied knowledge. Clinicians still look to colleagues who know what will most likely work in the context of an extensive set of variables unique to a given patient. They have much less interest in knowing what has worked under the strictly controlled, perhaps dissimilar, and probably poorly described circumstances found in research reports.

While a small number of physicians have more clinical success than their peers, whether by transforming the declarative knowledge of research into procedural knowledge of practice, implementing clinical practice guidelines, or through intuitive leaps of their own, they are not necessarily the colleagues that others are willing or able to seek out for advice. Specialist physicians and their teams performing in an outstanding manner must be identified and utilized to provide procedurally based training that will transfer their advances to the informal advisor. If and when those practices become part of the informal advisor's procedural knowledge, he or she will be well equipped to assist peers by means of clinical heuristics in the course of a hectic day.

APPENDIX I

HISS ET AL. (1978) IDENTIFICATION INSTRUMENT

Permission to Use Copyrighted Material

University of Nevada, Las Vegas

I, Roland G. Hiss, holder of copyrighted material entitled "EI Identification Instrument" appearing in "Identification of Physician Educational Influentials (EI's) in Small Community Hospitals" authored by Roland G. Hiss, Roderick Macdonald, and Wayne K. Davis and originally published in *Proceedings of the Annual Conference on Research in Medical Education, 17,* 283-288, hereby grant permission for the author to use the above described material in total or in part for inclusion in a doctoral dissertation at the University of Nevada, Las Vegas.

I also agree that the author may execute the standard contract with Bell & Howell Information and Learning for microform reproduction of the completed dissertation, including the materials to which I hold copyright.

Roland G. Hiss, M.D. 6/12/06

Signature Date

Roland G. Hiss, M.D.

The three paragraphs that follow are an attempt to describe the behavioral characteristics of physicians as they interact with their colleagues on an informal basis during the course of a typical day in practice. These characteristics have been derived from a survey of over three hundred Michigan physicians. Most physicians demonstrate these characteristics throughout their careers. However, as with any human interaction, some physicians demonstrate such behavior more often and more consistently than others. What we would like to learn from you is which physicians(s) in your hospital best fit the descriptive paragraphs that follow.

Please read each paragraph carefully and indicate the name(s) of the physician(s) that best fit each description. You may write the names of up to three physicians for each paragraph. The same physician may be named in more than one paragraph. Remember all information on this survey is strictly confidential.

Paragraph A

They convey information in such a fashion as to provide a learning experience. They express themselves clearly and to the point—provide practical information first and then an explanation or rationale if time allows. They take the time to answer you completely and do not leave you with the feeling that they were too busy to answer your inquiry. They enjoy and are willing to share any knowledge they have.

NAME _____

NAME _____

NAME _____

Paragraph B

They are individuals who like to teach. They are current and up to date and demonstrate a command of medical knowledge. They demonstrate a high level of clinical expertise.

NAME _____

NAME _____

NAME _____

Paragraph C

They are "caring" physicians who demonstrate a high level of humanistic concern. They never talk down to you; they treat you as an equal even though it's clear they are helping you.

NAME _____

NAME _____

NAME _____

Note. From "Identification of physician educational influentials (EIs) in small community hospitals," by R. G. Hiss, R. MacDonald, and W. K. Davis, 1978, *Proceedings of the Annual Conference on Research in Medical Education, 17*, 283-288. Copyright 1978 by R. G. Hiss. Reprinted with permission.

APPENDIX II

ITEMS BY CLASSIFICATION

ITEMS BY CLASSIFICATION

Procedural knowledge

1. They demonstrate admirable medical judgment.
4. They apply knowledge gained from many sources to their practice.
6. They have a low complication rate among patients they treat.
7. They put quality research findings into practice promptly.
10. They excel at the art of medicine, not just the science.
18. They have a reputation for excellent patient care.
25. Their judgment is such that once *they* adopt a new approach, my respect for it increases.
26. They are skilled in the clinical management of disorders I ask about.
33. They see many patients with the problem that concerns me.
37. Their own practice evolves in response to new information from research.

Declarative knowledge

2. They publish in peer-reviewed journals.
13. They are avid readers of important journals.
17. They know the facts.
19. They can often cite or reference the source of their information.
22. They have a wealth of knowledge on the specific issue I'm apt to ask about.
27. They are familiar with a different literature than I am.
29. They understand the theory and concepts involved in the topic of my questions.
32. They have a reliable fund of knowledge.
35. They know the literature pertaining to my patient care question.
39. They recall pertinent information quickly.

Ability to translate declarative knowledge to procedural knowledge

3. Their explanations are logical and well-reasoned.

9. They explain clearly how they apply information to patient care.

11. They can put into words what they do intuitively.

14. They understand the perspective of someone with less expertise in the area.

16. What they write or say helps me see how to put information to practical use.

21. They can explain *why* they do something a certain way.

23. They make time to teach others when in a clinical setting.

30. They always get back to me as promptly as possible when I ask for input.

31. They show how to adapt knowledge to local settings.

36. They give good verbal descriptions when I am not present to observe them.

Personableness

5. Their attitude makes me glad I asked for their opinion.

8. They welcome the opportunity to help.

12. They are patient.

15. They recognize the limitations of their expertise.

20. They are kind.

24. They have a personality I enjoy working with.

28. They are happy to answer my questions.

34. They are friendly.

38. They treat me as an equal even though it is clear they are helping me.

40. They take my asking for advice as a positive sign of my interest in quality practice

APPENDIX III

RESEARCH MATERIALS

University of Nevada, Las Vegas

Department of Psychology

INFORMED CONSENT—STEP 1

TITLE OF STUDY: Identifying Informal Educators Among Neuromuscular Specialists
INVESTIGATORS: Jane Karwoski, MSW, MA; Douglas Ferraro, PhD
PROTOCOL NUMBER: 0506-1631

Purpose of the Study

You are invited to participate in a research study. The purpose of this study is to develop a brief questionnaire to quickly identify those physicians in the neuromuscular practice community to whom colleagues typically turn for advice on clinical issues.

Participants

You are being asked to participate in the study because you have patients with neuromuscular disorders.

Procedures

If you volunteer to participate in this study, you will be asked to take 10 to 15 minutes in an informal telephone interview to do the following:

- List traits that you feel characterize physicians whose advice on patient care issues is valued and sought by colleagues.
- Briefly describe your practice.

Your suggestions and those of others will be used to draft a questionnaire which will then be sent to you for review. The time required to review it will depend upon the comments you wish to make regarding its clarity and completeness, however 10 to 20 minutes should suffice.

Benefits of Participation

There may be no direct benefits to you as a participant in this study. However, we hope the results will help facilitate the exchange of clinical expertise among those treating patients with very challenging neuromuscular conditions.

Risks of Participation

There are risks involved in all research studies. This study includes only minimal risks. You could conceivably become uncomfortable when answering some of the questions. Although we have taken precautions to make a breach of confidentiality very unlikely, it could occur.

Cost /Compensation

There will be no financial cost to you to participate in this study.

- The study will take 20 to 35 minutes of your time.
- You will not be compensated for your time.

Contact Information

If you have any questions or concerns about the study, you may contact Ms. Karwoski at **(404) 518-9261**, or Dr. Ferraro at **(702) 895-0189.** For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted you may contact **the UNLV Office for the Protection of Research Subjects at (702) 895-2794.**

University of Nevada, Las Vegas

Department of Psychology

INFORMED CONSENT—STEP 1 (continued)

TITLE OF STUDY: Identifying Informal Educators Among Neuromuscular Specialists
INVESTIGATORS: Jane Karwoski, MSW, MA; Douglas Ferraro, PhD
PROTOCOL NUMBER: 0506-1631

Voluntary Participation

Your participation in this study is voluntary. You may refuse to participate in this study or in any part of this study. You may withdraw at any time without impact on your practice or prejudice to your relations with the university. You are encouraged to ask questions about this study at the beginning or any time during the research study.

Confidentiality

All information gathered in this study will be kept completely confidential. No reference will be made in writing or speech that could link you to this study. Information you contribute can be linked to you only through a code number. We will store the data without names. One document (hard copy only) will connect the data code number to your name so we will know when you have been interviewed. It will be kept locked in a cabinet other than the one containing the data and will be shredded at the conclusion of the study.

All survey records will be stored in a locked cabinet in a secure facility for at least three years, after which time they will be destroyed.

Documentation

If you wish to document your involvement with the study, simply date and keep this two-page information sheet.

STEP ONE COVER LETTER (E-MAIL)

To: <E-mail address/name>
From: Jane Karwoski (karwoski@unlv.nevada.edu)
SUBJECT: Improving the mgmt of neuromuscular disorders (dissertation research)

Dear Dr. ---

Will you help with a special phase of my CDC-supported dissertation project?

TOPIC: The informal ways neuromuscular physicians continue to improve their clinical practice after completing their medical education.

PURPOSE:

- Develop a means of identifying (in future studies) the informal educators who coach their colleagues in the use of new therapies as they become available.
- Maximize the impact informal educators make on quality of care.
- Maximize the quality and the length of life for patients with progressive neuromuscular disorders.

GOAL: Generate a large pool of items to be rated by specialist physicians treating patients with neuromuscular disorders. This involves brainstorming about the traits of those physicians whose advice you value and who might influence the clinical practice of others.

REQUEST: 10 to 15 minute phone call (you pick the time). Later, I will send you a compiled list of items for you to check for clarity and completeness.

NEXT STEP: I will be calling your office to schedule a phone contact with you.

TO EXPEDITE: You could call me at (404) 518-9261 or E-mail me at karwoski@unlv.nevada.edu to let me know when you'll be able to talk.

CONSENT: Please examine the attached document. It contains details relating to informed consent for this phase of the study. You do not need to sign or return it.

Sincerely,

Jane Karwoski, MSW, MA
karwoski@unlv.nevada.edu

Department of Psychology
University of Nevada Las Vegas
Box 455030
4505 Maryland Parkway
Las Vegas, NV 89154-5030

Douglas P. Ferraro, PhD
Principle Investigator and Academic Advisor
ferraro@unlv.nevada.edu

STEP ONE KEY INFORMANTS TELEPHONE INTERVIEW GUIDE

I'm glad we could get together, Dr.----. I'd appreciate getting your thoughts on the traits *you* think characterize a physician whose advice on patient care issues is valued by colleagues.

I will take notes as we talk, but as we indicated in the E-mailed consent information, none of your comments to me will be identified with you personally in formal or informal communications. Also, we are not interested at this point in the *names* of those you consider to be good clinical advisors, only in as many of the characteristics that you can think of that lead others to consult them.

"Think about a colleague you asked about a clinical issue whose answer helped or even led to your changing an aspect of your practice. Try to describe their traits, personal or professional."

"Perhaps you are more often the one others approach—what do you think encourages them to do so?"

Possible probes for specifics if answers are very general:

"Think about the last informal consultation. What was good about it and why? If you would consult the same person again, why? [If not, why not?]

"Are there any activities in or out of work settings that they usually take part in?"

"Are there subdivisions of [concept mentioned] you are referring to that matter?"

"How did you find out they had that characteristic?"

"Are there traits that 'invite' others to consult them?"

"Are there traits in entirely different dimensions or domains?"

"What happens before/while/after the question is posed that makes a difference?"

"Can you express that in any other way?"

"Can you look at that from any other angle?"

We're just about out of time, so I'd like to conclude and thank you for your help with this. Would you like to receive a summary of the study's results when it is completed? [Mark the roster accordingly.]

If you think of anything you'd like to add, you're welcome to contact me and I'll add it to the notes.

University of Nevada, Las Vegas

Department of Psychology

INFORMED CONSENT

TITLE OF STUDY: Identifying Informal Educators Among Neuromuscular Specialists
INVESTIGATORS: Jane Karwoski, MSW, MA; Douglas Ferraro, PhD
PROTOCOL NUMBER:0510-1757

Purpose of the Study
You are invited to participate in a research study. The purpose of this study is to develop a brief questionnaire to quickly identify those physicians in the neuromuscular practice community to whom others typically turn for advice on clinical issues.

Participants
You are being asked to participate in the study because you have patients with neuromuscular disorders.

Procedures
If you volunteer to participate in this study, you will be asked to take 10 to 20 minutes to do the following:

- Rate how important various traits have been to you in choosing informal consultants (physicians whose advice you value on patient care issues).
- Briefly describe your practice

Benefits of Participation
There may be no direct benefits to you as a participant in this study. However, we hope the results will help facilitate the exchange of clinical expertise among those treating patients with very challenging neuromuscular conditions.

Risks of Participation
There are risks involved in all research studies. This study includes only minimal risks. You could conceivably become uncomfortable when answering some of the questions. Although we have taken precautions to make a breach of confidentiality very unlikely, it could occur.

Cost /Compensation
There will be no financial cost to you to participate in this study.

- The study will take 10 to 20 minutes of your time.
- You will not be compensated for your time.
- Please enjoy the beverage card whether or not you choose to participate.

Contact Information
If you have any questions or concerns about the study, you may contact Ms. Karwoski at **(404) 518-9261**, or Dr. Ferraro at **(702) 895-0189.**

For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted, please contact **the UNLV Office for the Protection of Research Subjects at (702) 895-2794.**

University of Nevada, Las Vegas
Department of Psychology

INFORMED CONSENT (continued)

TITLE OF STUDY: Identifying Informal Educators Among Neuromuscular Specialists
INVESTIGATORS: Jane Karwoski, MSW, MA; Douglas Ferraro, PhD
PROTOCOL NUMBER: 0510-1757

Voluntary Participation
Your participation in this study is voluntary. You may refuse to participate in this study or in any part of this study. You may withdraw at any time without impact on your practice or prejudice to your relations with the University of Nevada, Las Vegas, or the investigators. You are encouraged to ask questions about this study at the beginning or any time during the research study.

Confidentiality
All information gathered in this study will be kept completely confidential. No reference will be made in writing or speech that could link you to this study. Do not put identifying information on the materials you return (any indirect identifier, such as your institution's fax header, will be removed upon receipt). The survey can be linked to you personally only through a code number. We will store the data without names. One document (hard copy only) will connect the data code number to your name so that we can know when you have responded. It will be kept locked in a cabinet other than the one containing the data. All survey materials will be stored in locked cabinets and be kept for a minimum of 3 years after the completion of the study, then shredded.

Documentation
If you wish to document your involvement in the study, simply date and keep this two-page information sheet.

By completing and returning the questionnaire, you are consenting to participate in this research project.

UNLV

December 19, 2005

Identifying Informal Educators Among Neuromuscular Specialists

Dear Dr. _____:

Will you make a valuable 10- to 20-minute contribution to a CDC-supported research project? I will very much appreciate your help on this, my doctoral dissertation research.

TOPIC: Identifying traits characteristic of informal physician educators.

PURPOSE:

- Develop a means of identifying (in future studies) the informal educators who coach other neuromuscular physicians in the use of new therapies as they become available.
- Maximize quality and length of life for patients with progressive neuromuscular disorders.

REQUEST: A list of potential traits has been generated in consultation with neuromuscular physicians. Now we request your help in assessing the importance of each characteristic.

REPLY OPTIONS:

1. Mail the completed survey in the enclosed addressed, stamped envelope.
2. Fax the completed survey to (404) 728-4374 (private line).

CONSENT: Please examine the attached document. It contains details designed to ensure that your decision to participate is an informed one. You do not need to sign or return it.

A thank you gift is enclosed for considering participation in this research project.

Jane Karwoski, MSW, MA
karwoski@unlv.nevada.edu

Douglas P. Ferraro, PhD
Principle Investigator and Academic Advisor
douglas.ferraro@unlv.edu

Please return questionnaire to:
MS. JANE KARWOSKI
2329 NESBITT DRIVE NE
ATLANTA, GA 30319-3933

or to fax number:
(404) 728-4374

Identifying Informal Educators – Research Questionnaire **CODE #**

You have colleagues whose advice you value regarding unfamiliar, or difficult, patient care problems. How important has each item below been in choosing colleagues as informal consultants? Has it been irrelevant, essential, or somewhere in between?

Circle a number from 0 to 5 to indicate your answer:

Item	How would you rate each item in your choice of colleagues when you seek advice?	Irrelevant 0	1	2	3	4	Essential 5
1	They demonstrate admirable medical judgment.	Irrelevant 0	1	2	3	4	Essential 5
2	They publish in peer-reviewed journals.	Irrelevant 0	1	2	3	4	Essential 5
3	Their explanations are logical and well-reasoned.	Irrelevant 0	1	2	3	4	Essential 5
4	They apply information gained from many sources to their practice.	Irrelevant 0	1	2	3	4	Essential 5
5	Their attitude makes me glad I asked for their opinion.	Irrelevant 0	1	2	3	4	Essential 5
6	They have a low complication rate among patients they treat.	Irrelevant 0	1	2	3	4	Essential 5
7	They put quality research findings into practice promptly.	Irrelevant 0	1	2	3	4	Essential 5
8	They welcome the opportunity to help.	Irrelevant 0	1	2	3	4	Essential 5
9	They explain clearly how they apply information to patient care.	Irrelevant 0	1	2	3	4	Essential 5
10	They excel at the art of medicine, not just the science.	Irrelevant 0	1	2	3	4	Essential 5
11	They can put into words what they do intuitively.	Irrelevant 0	1	2	3	4	Essential 5
12	They are patient.	Irrelevant 0	1	2	3	4	Essential 5
13	They are avid readers of important journals.	Irrelevant 0	1	2	3	4	Essential 5
14	They understand the perspective of someone with less expertise in the area.	Irrelevant 0	1	2	3	4	Essential 5
15	They recognize the limitations of their expertise.	Irrelevant 0	1	2	3	4	Essential 5
16	What they write or say helps me see how to put information to practical use.	Irrelevant 0	1	2	3	4	Essential 5
17	They know the facts.	Irrelevant 0	1	2	3	4	Essential 5
18	They have a reputation for excellent patient care.	Irrelevant 0	1	2	3	4	Essential 5
19	They can often cite or reference the source of their information.	Irrelevant 0	1	2	3	4	Essential 5
20	They are kind.	Irrelevant 0	1	2	3	4	Essential 5

Please return the questionnaire and demographic information sheet to:

Jane Karwoski
2329 Nesbitt Drive NE
Atlanta, GA, 30319-3933
or fax to (404) 728-4374.

Identifying Informal Educators – Research Questionnaire **CODE #**

Item	How would you rate each item in your choice of colleagues when you seek advice?	Irrelevant 0	1	2	3	4	Essential 5
21	They can explain *why* they do something a certain way.	Irrelevant 0	1	2	3	4	Essential 5
22	They have a wealth of knowledge on the specific issue I'm apt to ask about.	Irrelevant 0	1	2	3	4	Essential 5
23	They make time to teach others when in a clinical setting.	Irrelevant 0	1	2	3	4	Essential 5
24	They have a personality I enjoy working with.	Irrelevant 0	1	2	3	4	Essential 5
25	Their judgment is such that once *they* adopt a new approach, my respect for it increases.	Irrelevant 0	1	2	3	4	Essential 5
26	They are skilled in the clinical management of disorders I ask about.	Irrelevant 0	1	2	3	4	Essential 5
27	They are familiar with a different literature than I am.	Irrelevant 0	1	2	3	4	Essential 5
28	They are happy to answer my questions.	Irrelevant 0	1	2	3	4	Essential 5
29	They understand the theory and concepts involved in the topic of my questions.	Irrelevant 0	1	2	3	4	Essential 5
30	They always get back to me as promptly as possible when I ask for input.	Irrelevant 0	1	2	3	4	Essential 5
31	They show how to adapt knowledge to local settings.	Irrelevant 0	1	2	3	4	Essential 5
32	They have a reliable fund of knowledge.	Irrelevant 0	1	2	3	4	Essential 5
33	They see many patients with the problem that concerns me.	Irrelevant 0	1	2	3	4	Essential 5
34	They are friendly.	Irrelevant 0	1	2	3	4	Essential 5
35	They know the literature pertaining to my patient care question.	Irrelevant 0	1	2	3	4	Essential 5
36	They give good verbal descriptions when I am not present to observe them.	Irrelevant 0	1	2	3	4	Essential 5
37	Their own practice evolves in response to new information from research.	Irrelevant 0	1	2	3	4	Essential 5
38	They treat me as an equal even though it is clear they are helping me.	Irrelevant 0	1	2	3	4	Essential 5
39	They recall pertinent information quickly.	Irrelevant 0	1	2	3	4	Essential 5
40	They take my asking for advice as a positive sign of my interest in quality practice.	Irrelevant 0	1	2	3	4	Essential 5

Now please circle the item numbers of five traits that are probably MOST important to you.

Please return the questionnaire and demographic information sheet to:

Jane Karwoski
2329 Nesbitt Drive NE
Atlanta, GA, 30319-3933
or fax to (404) 728-4374.

Practice and Demographic Information CODE

Please briefly describe your practice for us.

1. Where do you treat patients with neuromuscular disorders? (check both if appropriate)

__At a clinic supported by Muscular Dystrophy Association or by Muscular Dystrophy Family Foundation
__Independently—not affiliated with either organization

2. Which of these best describes your practice(s)?
__Solo __Partnership __Group __HMO __University Hospital __Other: _____

3. Which of these best describes your patients?
__Mostly pediatric
__Mostly adults
__About half and half

4. In what year did you receive your MD or DO?_____

5. In what specialty areas are you trained?

__Pediatrics
__Neurology
__Physical Medicine/Rehab or Physiatry
__Orthopaedics
__Medical or Clinical Genetics
__Other (include subspecialties): _____

6. When you have changed some aspect of your own clinical behavior, what prompted you to do so?_____

It is always helpful in data analysis to have the following demographics:

7. Age: __34 and under __35-44 __45-54 __55-64 __65-74 __75 and over

8. Sex: __Male __Female

9. Race/Ethnicity (check all that apply):
__American Indian or Alaska Native
__Asian
__Black or African American
__Hispanic or Latino
__Native Hawaiian or Other Pacific Islander
__White

__**Check here to receive a summary of the study's findings.**

Return to Jane Karwoski, 2329 Nesbitt Drive NE, Atlanta, GA 30319-3933 or fax to (404) 728-4374

APPENDIX IV

RESULTS TABLES

Responses to open-ended question, "When you have changed some aspect of your own clinical behavior, what prompted you to do so?"

C, colleagues
CME, meetings, lectures, conferences
CPG, clinical practice guidelines, practice parameters
E, experience
EC, experience of colleagues
L, literature
Lg, legal or professional considerations
Lr, life-long learning
NC, no change
NI, new information
P, patient input
R, research

Participant #/classification code/comment

1	E	many patients responding to a treatment
2	CME	continuing education
3	--	
4	R	new research
5	L	literature
7	L	literature
8	--	
9	--	
10	L, CME	new information from articles, other CME
11	L	peer-reviewed literature
12	--	
13	NC	N/A
14	L, CME	meetings, literature
15	E	experience
16	E, R	clinical experience, research data
17	R, C	new research, discussion with colleagues
18	--	
19	E	life, to learn more from people
20	E	critical observation, experience
21	--	
22	--	
23	EC, R	experience of others, research papers
24	--	
25	R	reading very well done clinical studies (only prospective randomized treatment studies affect my practice)
26	--	
27	E	personal observation
28	NI	increasing use of genetic information
29	L, C	awareness of new literature, informal advice from colleagues
30	L	reading the literature
31	EC, R	multiple expert clinician experiences, well done research
32	L	literature, journals, reading
33	C, CPG	advice from national position papers or experts
34	E, EC, L, C	experience, literature, observing and consulting mentors
35	R	best medical evidence
36	NI	new information
37	--	
38	P	changes in behavior likely to be patient driven
39	E	clinical responses
40	L, C	either journal information or by talking to others involved in MDA clinics
41	--	
42	R	convincing new data

43	E, C	prior experience, advice from colleagues
44	R, NI	logical, well-reasoned new info or new info from well-designed studies
45	Lr	I think, or hope, I continuously evolve
46	NI, C	new information or advice
47	E, L, C	patient response, the literature, colleagues' recommendations
48	E, NI	experience, new information
49	E, CME, L, C	clinical experience, CME courses, reading literature, advice from colleagues
50	E	many changes prompted by many experiences
51	NI	new information
52	E, NI	patients' needs, new information
53	E	maturity
54	CME, C	information learned from colleagues either at work or from national academy meetings
55	--	
56	NI	new information, techniques, or medications
57	E, R	experience, data
58	--	
59	NI	better understanding of issues
60	--	
61	E	to provide better patient care
62	EC, CME, R, L, C	discussions with other practitioners of their approach to a difficult problem, lectures defining new approaches, research papers
63	R, L, C	the individuals who have completed the research, reading the literature, discussing the issues
64	E, L	assessment of my own clinical outcomes, literature
65	NI, Lg	new diagnostic and treatment modalities, fear of litigation
66	--	
67	L, C	peer-reviewed articles, discussion with other specialists
68	--	
69	P, L, C	patient input (regarding how they understand their disease, communication, etc.), medical literature, discussions with colleagues
70	R	published clinical research developments
71	R, NI	research, new information
72	--	
73	E, R	patient needs, studies in the literature
74	E	considering it could benefit patient care
75	E, NI	patient experience, new information
76	E, CME, R, L	1) literature (including research updates in MDA publications), 2) what I've learned at neuromuscular conferences/CMEs (especially MDA meeting in Tucson), and 3) what I've learned from my patients (what works vs. doesn't work)
77	R	new research studies
78	E	necessity in order to improve patient care
79	NI	improvement in diagnostics and/or treatment
80	E, R, C	good or bad clinical results, recent research, informal consultation
81	R	evidence from a reliable source
82	EC	sharing patients with colleagues and seeing benefits
83	R	new research
84	CME, L	conferences, Medline
85	E, L, C	personal observation, journal article, colleague
86	CME, L, C	conferences, meetings, journal articles, discussion with colleagues
87	--	
88	E, NI	mistakes, ignorance, new knowledge
89	R	clinical research studies
90	P, E	learning from my patients
91	E	learning from my mistakes, learning new information
92	E	experience

93	R	evidence-based medicine
94	P	feedback
95	R	research data
96	NC	N/A
97	P, E	with increasing age I've become more comfortable with patients and families
98	R	data
99	L, C	literature or consultant advice
100	R	important well-documented scientific fact
101	C, NI	new ideas from recent trainees, improved treatments, new ideas from tertiary centers
102	R, C	new research to support change, advice of experts in the field
103	E, NI	necessity, new knowledge
104	EC, CME, R, L, NI	peer experiences, speakers, new research-based medical info, journals mainstream news alerts occ[asionally]
105	--	
106	L	recent literature
107	P	what patients tell me
108	CME, L	learning from literature, lectures
109	R, NI	new research, new medications
110	--	
111	R, C	research findings, best available evidence via colleagues
112	L	literature
113	--	
114	L	new literature
115	EC, CME, L	clinical colleagues' observations, conferences, literature
116	--	
117	NI	new information
118	NI	everything
119	--	
120	R	updating myself on advances in knowledge of neuromuscular diseases
121	E	patient's responses
122	E, NI	improved results with new approach, new information
123	L, NI	literature, better insight
124	E, NI	unsuccessful old way, new information
125	R, C	new research information, guidance from colleagues
126	E, L, C	experience and reason, literature, my colleagues
127	E	experience
128	L, C	publications, direct communication with colleagues
129	R, C	research findings, suggestions from colleagues
130	--	
131	CME, L	review lectures, scientific presentations, literature (published papers)
132	NI	when new information is available and pertinent
133	NC	I have not changed a lot
134	R	evidence in the literature
135	R, C	published data, colleagues I respect
136	NI	new information
137	E, EC	seeing others [practice] and finding that it was good or better than what I was doing
138	Lg	pressure to produce
139	E, L	experience with prior patient, new information from literature
140	E	outcomes driven
141	--	
142	C	guided by people I respect
143	E, R	clinical experience, evidence-based research
144	E, R	response to treatment from patients, new findings in medical literature
145	--	

146	R	new information established by appropriate research in peer-reviewed journals or advocated by reliable researcher
148	CME, R, C	CME conferences, evidence-based medical literature, interprofessional interactions
149	E, Lg	perception that the change would improve patient outcomes and also improve my efficiency at the same time
150	E, L	experience, literature
151	E	personal experience
152	R	research updates
153	E, R	experience, research findings
154	--	
155	E, NI	experience, new information
156	E	patients with disorders new to me
157	L, C	literature, other clinicians
158	E	the need
159	R, NI	new research, new information, techniques
160	E	experience with patients
161	--	
162	L	reliable medical literature
163	E	need for improvement in diagnosis or treatment
164	NI	new knowledge
165	R	medical advances supported by a body of literature
166	--	
167	--	
168	E, CME, Lr	patient need, personal professional interest or requirement
169	NI	multiple sources
170	E, R	experience based on patient presentation and outcomes, new knowledge or research
171	E, L, C	clinical observation and experience, new information from literature and colleagues
172	L	medical literature
173	E	recognition of a better approach
174	--	
175	R, L, CPG	research, literature, practice parameters
176	E, EC, C, NI	learning from previous mistakes, mentor examples, mentor suggestions, new information
177	E, L	mixture of patient care experience and the literature
178	R	molecular basis of disease discoveries
179	E, CME, C	practice, courses, discussion with MDs
180	L, C	medical literature, advice from medical colleagues (supported by literature)
181	P, Lg	angry letter, complaining letter
182	--	
183	R, C	new research data, personal communication with other neuromuscular specialists
184	E, L	clinical experience, literature
185	--	
186	L, C	published work or advice from respected colleague
187	--	
188	P, CME, L	patient interaction, meetings, journals
189	--	
190	E, NI	recognition that I could improve my delivery of patient care by doing so, a better way to accomplish a goal existed and was implemented, i.e., new treatment, new diagnosis recognized, etc.)
191	CME, C	lecture from more experience colleague
192	NI	new information comes to light, causing a change in treatment paradigm
193	R	good scientific research
194	E, R	experience, patient response to therapy, published data
195	--	
196	E, CME, L	experience, lectures, reading

197	P, C	feedback from others, including colleagues and patients
198	R	scientific advances
199	EC	reports of success on different methods from trusted colleagues
200	L, C	recent literature, others' professional opinions
201	CME, L, C	info obtained at meetings, reading, discussion with peers
202	E, L	new information discovered by personal experience or read in journals
203	C	peers
204	CME, L, CPG	information from specialty-focused meetings, reputable journal articles, practice parameters
205	R	evidence in the literature mainly
206	CME, R, C	info from meetings, research, from peers/advisors
207	--	
208	NI	new knowledge
209	R	new research
210	E, NI	experience, new information

Items and Ratings by Item Number

Item	Freq	Times Rated						Rating Statistics			C.I.
		0	1	2	3	4	5	Med	Mean	Top5	
1. They demonstrate admirable medical judgment.	210	1	0	1	3	35	170	5	4.77	96	±.08 4.69-4.85
2. They publish in peer-reviewed journals.	209	19	18	41	79	42	10	3	2.66	3	±.17 2.49-2.83
3. Their explanations are logical and well-reasoned.	210	0	0	0	11	87	112	5	4.48	47	±.08 4.40-4.56
4. They apply information gained from many sources to their practice.	209	0	0	3	36	94	76	4	4.16	21	±.1 4.06-4.26
5. Their attitude makes me glad I asked for their opinion.	209	1	2	6	35	100	65	4	4.04	16	±.12 3.92-4.16
6. They have a low complication rate among patients they treat.	207	4	5	23	63	81	31	4	3.47	5	±.15 3.32-3.62
7. They put quality research findings into practice promptly.	210	1	0	17	63	91	38	4	3.70	6	±.12 3.58-3.82
8. They welcome the opportunity to help.	209	1	0	6	42	88	72	4	4.07	17	±.12 3.95-4.19
9. They explain clearly how they apply information to pt care.	208	0	0	10	33	99	66	4	4.06	13	±.11 3.95-4.17
10. They excel at the art of medicine, not just the science.	209	0	1	7	29	83	89	4	4.21	43	±.11 4.1-4.32
11. They can put into words what they do intuitively.	210	0	4	10	43	113	40	4	3.83	6	±.12 3.71-3.95
12. They are patient.	210	0	8	27	48	93	34	4	3.56	9	±.14 3.42-3.7
13. They are avid readers of important journals.	209	2	7	25	71	82	22	3	3.39	3	±.14 3.25-3.53

14. They understand the perspective of someone with less expertise in the area.	209	3	2	22	50	96	36	4	3.64	4	±.14 3.5-3.78
15. They recognize the limitations of their expertise.	209	0	0	4	27	90	88	4	4.25	45	±.1 4.15-4.35
16. What they write or say helps me see how to put information to practical use.	209	0	1	3	45	114	46	4	3.96	6	±.1 3.86-4.06
17. They know the facts.	210	0	0	1	11	86	112	5	4.47	31	±.08 4.39-4.55
18. They have a reputation for excellent patient care.	210	0	3	5	25	93	84	4	4.19	44	±.11 4.08-4.3
19. They can often cite or reference the source of their information.	209	0	8	24	87	73	17	3	3.32	8	±.12 3.2-3.44
20. They are kind.	210	3	7	17	43	91	49	4	3.71	12	±.15 3.56-3.86
21. They can explain why they do something a certain way.	210	0	0	4	28	113	65	4	4.14	23	±.1 4.04-4.24
22. They have a wealth of knowledge on the specific issue I'm apt to ask about.	210	0	0	1	25	96	88	4	4.29	49	±.09 4.2-4.38
23. They make time to teach others when in a clinical setting.	210	0	3	16	59	99	33	4	3.68	6	±.12 3.56-3.8
24. They have a personality I enjoy working with.	210	3	5	25	53	87	37	4	3.56	12	±.15 3.41-3.71
25, Their judgment is such that once they adopt a new approach, my respect for it increases.	210	2	3	20	67	100	18	4	3.50	4	±.12 3.38-3.62
26. They are skilled in the clinical management of disorders I ask about.	209	0	0	2	12	83	112	5	4.46	68	±.09 4.37-4.55
27. They are familiar with a different literature than I am.	209	3	5	25	83	79	14	3	3.30	1	±.13 3.17-3.43
28. They are happy to answer my questions.	210	0	2	12	43	107	46	4	3.87	12	±.12 3.75-3.99

29. They understand the theory and concepts involved in the topic of my questions.	208	0	0	2	30	119	57	4	4.11	15	±.09 4.02-4.2
30. They always get back to me as promptly as possible when I ask for input.	210	0	3	21	57	97	32	4	3.64	7	±.12 3.52-3.76
31. They show how to adapt knowledge to local settings.	207	1	2	22	69	90	23	4	3.52	1	±.12 3.4-3.64
32. They have a reliable fund of knowledge.	210	0	0	1	16	113	80	4	4.30	21	±.08 4.22-4.38
33. They see many pts with the problem that concerns me.	208	0	0	8	36	101	63	4	4.05	26	±.11 3.94-4.16
34. They are friendly.	209	2	7	26	61	70	43	4	3.53	8	±.15 3.38-3.68
35. They know the literature pertaining to my patient care question.	210	0	0	8	41	108	53	4	3.98	20	±.1 3.88-4.08
36. They give good verbal descriptions when I am not present to observe them.	208	7	7	18	66	92	18	4	3.36	2	±.15 3.21-3.51
37. Their own practice evolves in response to new information from research.	210	2	0	9	38	114	47	4	3.92	18	±.12 3.8-4.04
38. They treat me as an equal even though it is clear they are helping me.	210	4	7	17	55	97	30	4	3.54	5	±.14 3.4-3.68
39. They recall pertinent information quickly.	210	1	1	19	71	103	15	4	3.52	0	±.11 3.41-3.63
40. They take my asking for advice as a positive sign of my interest in quality practice.	210	5	8	16	52	106	23	4	3.50	3	±.14 3.36-3.64

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