Uncertainty and Professional Work: Perceptions of Physicians in Clinical Practice

Martha S. Gerrity, Jo Anne L. Earp, and Robert F. DeVellis
University of North Carolina at Chapel Hill

Donald W. Light
University of Medicine and Dentistry of New Jersey

Despite growing awareness of uncertainty in technical and scientific fields, uncertainty among physicians, except among physicians in training, is not well researched. Existing studies have primarily used small samples and qualitative methods. This article reports the first rigorously developed measures of uncertainty administered to a large sample of practicing physicians. In contrast to denial and the tendency to minimize uncertainty reported in field studies of trainees, physicians in this study readily acknowledged uncertainty in a number of areas.

INTRODUCTION

The rapid growth of technology and scientific knowledge has brought with it, paradoxically, a rapid increase in uncertainty. Uncertainty borders the edges of knowledge, so that the larger the territory known, the more extensive are the settings in which uncertainty is experienced. As science and technology push toward ever more fundamental frontiers in molecular biology and thermonuclear physics, our awareness of uncertainty deepens (Sorensen 1974; Douglas and Wildavsky 1982, pp. 49–66; Wolf, Gruppen, and Billi 1985; Slovic 1986). Rationality, as a cultural icon, accentuates the uncertainties at the edges of our newest, most fun-

---

1 This study was supported in part by the Robert Wood Johnson Foundation during Gerrity's tenure as a Robert Wood Johnson Clinical Scholar. We thank the 428 physicians who took time from their busy practices to complete our extensive questionnaire and Robert H. Fletcher, M.D., for his advice throughout the entire process of this study. Two anonymous reviewers and Victor Lidz helped us add depth to the paper. Correspondence should be addressed to Dr. Martha S. Gerrity, Division of General Medicine and Clinical Epidemiology, CB# 7110, Old Clinic Building, University of North Carolina, Chapel Hill, North Carolina 27599-7110.

© 1992 by The University of Chicago. All rights reserved.
0002-9602/92/9704-0006$01.50

1022 AJS Volume 97 Number 4 (January 1992): 1022–51
damental knowledge (Fox 1989, pp. 183–202). Each of its positive attributes—logic, objectivity, value neutrality, universality, reductionism, and determinism—makes ever more problematic those phenomena characterized by happenstance, bias, complexity, contingency, and intuition. As rising expectations and the dramatic accomplishments of science and technology intensify the quest for certainty, ironically our awareness of risk and uncertainty increases proportionately (Bosk 1986; Peterson and Pitz 1988; Kassirer 1989). In clinical settings, too, expectations have grown as the number of serious diseases cured has increased and knowledge expanded; this results in a more painful uncertainty when medicine's limits and doubts are confronted.

Despite a constant stream of articles in the scientific literature about the statistical, philosophical, and cognitive aspects of uncertainty, sociology has barely explored this shadow world of modern science and professional life. Intrinsic to the technical parameters and cognitive experiences of uncertainty are its sociological and cultural contexts. Yet, recent attempts to understand uncertainty come mainly from disciplines that rely heavily on psychological or cognitive frameworks (e.g., Hershey and Baron 1987; Curley, Young, and Yates 1989) and focus on risk and decision making (Hogarth 1987; Hershey and Baron 1987; Slovic 1986, 1987). These perspectives, with their highly rational models such as expected utility theory and Bayesian probability theory, describe or predict but a portion of actual behavior (Wolf et al. 1985) because they ignore social, cultural, and organizational forces (Douglas and Wildavsky 1982, pp. 79–80). The sociology of uncertainty, with its attention to norms, beliefs, rituals, and institutional responses, has yet to be written.

REVIEW OF THE LITERATURE

Foundation Work

Uncertainty about causes and effects in medicine and life have preoccupied many students of society, but perhaps none has matched E. E. Evans-Pritchard's (1937) study, *Witchcraft, Oracles and Magic among the Azande*. Zande witchcraft provides a precise system for addressing the uncertainties of life. For example, if someone falls ill, the Azande can explain not only *how* but *why* that *particular person* was afflicted at a particular moment: someone bewitched him or her (1937, pp. 507–8). There are practically no illnesses of unknown diagnosis, no deaths from unknown causes.

The dual cause of disease among the Azande calls for two lines of attack, one to counter the disease via medicines and leech-craft and one to counter the witchcraft via witch doctors, oracles, and magic (Evans-
Pritchard 1937, p. 541). Evans-Pritchard identified thousands of medicines of extraordinary range, medicines for causing rain to fall, for ensuring good harvests, for hexing witches, and for assuring success in love affairs. The medicinal powers of this enormous pharmacopoeia are infused through ritual and magic rather than residing in the substance itself. Of course, they did not always work, and Evans-Pritchard identifies 22 classes of explanations for these failures, many of which have to do with timing, the effects of social power, and the countervailing powers of witchcraft.

Evans-Pritchard’s study is an exemplar of mapping the responses to uncertainty in the social structure and group dynamics of the community. All illnesses and deaths emanate from and reflect back on the structural contexts and group dynamics surrounding the victim so that, in the end, a limited but rather precisely defined amount of uncertainty remains.

Malinowski (1948), in an influential work, also addresses uncertainty, although he does so implicitly by explaining how magic, science, and religion differ as ways to know and affect the unknown. Primitive man experiences impasses “where gaps in his knowledge and limitations of his early power of observation and reason betray him at a crucial moment” (p. 70). According to Malinowski’s psychological theory, the natives react to these uncertainties by so intensely obsessing about the desired end through ritual that they imbue themselves with the magical power to achieve it (pp. 60–70). In Malinowski’s view, “from our high places of safety in developed civilization” magic is based on emotional states in man and the belief “that hope cannot fail nor desire deceive,” while science is “founded on observation, fixed by reason” (pp. 60–70). Malinowski’s failure to accept magic systems as complex, integrated constructions of reality on their own terms influenced much subsequent work.

It was Mary Douglas (1966), in a brilliant theoretical essay, who traced to Robertson Smith, and allegedly thence to Durkheim, the origins of these prejudices and separations of magic from religion. Although Douglas wrote specifically about dirt, pollution, and risk, many of her insights apply to uncertainty as well. Uncertainty does not exist in the absolute but only in relation to order. The more differentiated the order, the more uncertainty appears. Conversely, uncertainty defines what is ordered and known. Elaborate rules and rituals are developed to prevent uncertainty, to minimize it, to attribute responsibility for it, and to eliminate it. In particular, we have replaced symbolic spiritualism with scientific materialism and therefore no longer “see” the symbolic role of our ideas about it. We are not even aware of our own rituals, which frame, aid, and ultimately formulate and modify experience.

In sociology, Parsons (1951) seems to have accepted Malinowski’s ob-
servations while avoiding his prejudices; thus he was able to present a broader, more balanced, set of observations. Parsons recognized that magical thinking was by no means restricted to preliterate societies but was found in lay accounts, home remedies, patent medicines, and popular superstitions of modern societies. Applying science to illness is the exception among the world’s cultures, even in countries where Western medicine and science dominate (Payer 1988, pp. 23–34). It was his student, Renée Fox (e.g., 1976b), who made the final inference, that scientific medicine is itself a symbolic system for coping with the fears and uncertainties of medicine.

Parsons (1951) recognized that scientific medicine ups the ante for doctors because it places on them the full burden of diagnosis, effective treatment, and the control of social disruptions caused by illness. He described at length the burdens and stresses of the doctor-patient relationship and “the element of uncertainty which looms so large in medical practice” (p. 566). Yet “the physician’s responsibility is to ‘do everything possible’ to forward the complete, early and painless recovery of his patients” (p. 450). No Zande ever expected so much from even the best witch doctor or curer.

Perhaps the best explication and extension of Parsons’s ideas about uncertainty and trust was made by Bidwell (1976). He systematically delineates classes of uncertainty arising from aspects of professional work: conflicts between the ethos of scientific inquiry and the application of scientific knowledge for practical problems, the indeterminacies of using scientific knowledge for practical purposes, the uncertainty over who controls the application of scientific knowledge arising from communication gaps between laymen and experts, and the tensions between science and other bases of legitimacy. Trust, according to Bidwell (1976), is central to solving these problems and is inherent in specialization itself. Without it, the whole system of complementary roles and tasks that allow professional help collapses.

Studies of Uncertainty in Medicine
Against the rich backdrop of anthropological and sociological thinking, there are few modern empirical studies by sociologists of uncertainty. Most interesting is the work by Renée Fox. Starting with field observations, interviews, and student diaries, Fox (1957) documented the medical school experiences that led students to appreciate three types of uncertainty: that arising from incomplete mastery of the vast and expanding range of medical knowledge and skills, uncertainty due to the limitations and ambiguities of that knowledge and those skills, and the uncertainties of distinguishing between the first two. In addition to describing these
types of uncertainty, Fox noted that stress resulting from a sense of
"personal inadequacy" (pp. 210–11, 231–33) was a prominent character-
istic of medical students' reactions, both adaptive and maladaptive, to
uncertainty.

Fox is the only sociologist to have made uncertainty a central focus of
sustained work, and she did so in the special context of research-clinicians
(Fox 1959, 1980, 1989; Fox and Swazey 1975). Her research did not yield
a systematic analysis of types of uncertainty, but it did produce a full
catalog of ways in which both doctors and patients cope in this special
setting. Most commonly cited are the game of chance, in which physi-
cians pit their professional skills in friendly competition and at the same
time practice magical thinking, and "gallows humor," with its ability
to lighten the burdens of ignorance and powerlessness. In Experiment
Perilous, Fox (1959) identifies a host of other, too-often overlooked, cop-
ing mechanisms. They include group bonds and commitment to each
other; caring, informing, and sharing with patients; honoring patients for
their courage and dedication; telling over and over stories of success as
myths of the enterprise; trying out new procedures, drugs, or combina-
tions on a hunch; keeping meticulous records in hopes of discovering
patterns in the uncertain swirl of events; turning to religion; and ac-
cepting ignorance, uncertainty, and death as part of life.2 Given Mal-
nowski's perspective on magic, it took unusual intellectual integrity for
Fox to see magical thinking at the center of scientific work and to treat
it with respect.

Other forms of what Fox characterizes as "scientific magic" include
exuberantly focusing on the positive features of an experimental therapy;
"the necessity to hope"; and the custom of giving an animal a name a
day or two after an implant as if to confirm that it will live (Fox 1976a,
1984; Fox, Swazey, and Cameron 1984). When magic does not "work"
and things go badly, researchers announce a "clinical moratorium" as a
collective retreat and stocktaking (Swazey and Fox 1970; Fox 1989, pp.
198–202).

Aside from this body of work, most sociological research on uncertainty
in medicine has focused on those in training. As research shifted from
medical school to residency training, new kinds of uncertainty were iden-
tified. Light (1979, pp. 311–12), in consultation with Fox, identified "a
new bundle of uncertainties . . . as the young professional takes on actual
cases." Cross-cutting the three uncertainties of knowledge described in
Fox's studies of medical school are clinical uncertainties surrounding
diagnosis, treatment, client responses and supervisors' reactions. Ac-

2 Detached concern is presented but seems to dissolve before the many forms of at-
tached concern (Fox 1959, pp. 86–104).
According to Light (1979), these exist in specialties as divergent as psychiatry and orthopedic surgery.

Light (1979) emphasized that, while students learn to appreciate the uncertainties of knowledge in what are called the “undergraduate years” of medical school, as residents they must learn how to control the many sources of uncertainty or be paralyzed by it. Hence, residents learn forms of control matched to each kind of uncertainty, and each form of control builds on those before it. To control the uncertainties of subordination, residents “psych out” supervisors and conform to their expectations (also see Bosk 1979, 1980). To control uncertainties of knowledge, residents reduce the problem by specializing and adopting a “school of thought” that resolves uncertainties through conviction; and in so doing, they master a great deal of information. To manage uncertainties of diagnosis residents use the above techniques, plus they invoke the clinical experiences they acquire as a ritual anecdotal resolution. Uncertainties of treatment are controlled by all the preceding strategies but with an emphasis on technique that transposes adverse outcomes into correct procedures or treatments. Finally, the uncertainties of patient response are reduced by the above techniques and by limiting what the patient knows (see also Waitzkin and Waterman 1974). Perpetuating and reshaping patient uncertainty helps protect physicians from being confronted with their own uncertainties, and makes their job easier, as Fred Davis (1960) found among doctors treating victims of polio.

Ironically, withholding information results not infrequently in heightening patients’ uncertainties possibly since most patients want as much information and feedback as they can get (Waitzkin 1983, 1985). Waitzkin, a practicing physician as well as a sociologist, has conducted extensive research on ways in which physicians, managing their own uncertainty, maintain power and control through keeping patients unaware of diagnostic information or therapeutic options. On the other hand, research addressing the effects of physician uncertainty on patient satisfaction (Johnson et al. 1988; Gutheil, Bursztajn, and Brodsky 1984) and treatment decisions (Curley, Eraker, and Yates 1984) suggests that patients may be less satisfied with their care when physicians express their uncertainty, and in some cases patients prefer to defer ambiguous treatment decisions to physicians.

Bosk (1980), in a major study of surgical residency, found that residents used eight rituals to manage the uncertainty of diagnostic and treatment decisions: hedging assertions, probabilistic reasoning, requests for consultations, Socratic teaching, deciding not to decide, gallows humor, hyperrealism, and focusing on uncertainty as a research problem. And Atkinson (1984) argues that physicians learn to manage uncertainty by receiving a “training for certainty.” They learn to view the science
underlying medicine as "established 'facts' and soluble 'puzzles.'" From this perspective, patients' problems always result from identifiable diseases, and, therefore, once the "correct" identification has been made, treatment and related recommendations automatically and predictably follow.

Light (1979) expressed concern that this "training for control" (or Atkinson's "training for certainty"), when successful, leads to premature closure and denial of genuine uncertainties in clinical work. At the center of this training is the top-down tradition of education based on a class hierarchy that judges students and trainees by their ability to "know the answers" and do things "right" (Bowers 1987, pp. 49–72). What may be covered over is the scientific uncertainty that actually exists. As Bosk (1979) discovered, normative errors arising from failure to conform to "the way things are done" by a resident's attending physician are far more serious than technical errors because they indicate professional insubordination and possible irresponsibility. Light (1979) points out that a "school of thought" is an ideological resolution of uncertainty. This is aptly illustrated by a physician who trained under a renowned advocate of radical breast surgery and exclaimed, "Anything but radical mastectomy is criminal conduct!" when, in fact, the evidence is equivocal and complex (Katz 1984, p. 39).

Strong defenses against and denial of uncertainties is one of the most consistent observations made by sociologists studying medical training. Bucher and Stelling (1977), in their comparative study of residents in several specialties, concluded that by the end of the second year residents could no longer "hear" or learn from alleged mistakes. Light (1980, chap. 4, pp. 297–307) came to a similar conclusion in his discussion of the ways in which the structure of residency encourages feelings of omnipotence. More recently, Mizrahi (1984, 1986) has emphasized that residents are given no training in how to cope constructively with uncertainty and, in response, they acquire elaborate rituals for coping with mistakes or defending themselves against uncertainties. She found that medical faculty have become less involved in day-to-day patient care, hence residents who are without role models invoke even stronger defenses when faced with uncertainty.

Katz (1984, p. 37), in his influential writings, emphasizes "how pervasive the disregard of uncertainty becomes whenever uncertainty ceases to be merely theoretical and impinges on . . . actual clinical encounters." In fact, Katz concludes that, once in practice, physicians are reluctant

---

3 For a systematic outline of adaptations to uncertainty, see Vyner (1988), Curley, Young, and Yates (1989), and Curley et al. 1984.
to admit Fox's three kinds of uncertainties of knowledge that they previously recognized and appreciated during their training. Indeed, the denial of uncertainty allows physicians to make potentially threatening situations more understandable and controllable, thus enabling action to take place.

Denial of uncertainty, defenses against criticism, and management of patients to maintain dominance, if they are common products of training, have important consequences for medical practice. They may be predisposing factors behind overtreatment and iatrogenesis, diseases and health problems caused by medical treatment (Applegate 1986). "The high rate of 'unnecessary' surgery, of resort to antibiotics and to tranquilizers, bears testimony to physicians' propensity to resolve uncertainty and ambiguity by action rather than inaction" (Katz 1984, p. 41). This seems equally true of overtesting, which strives for diagnostic certainty rather than pragmatic decisions about treatment (Kassirer 1989; Hardison 1979; Sox 1986). At a time of great concern about containment of health care costs, uncertainty is thought to be an important cause of excessive use of resources (Detsky et al. 1981; Wennberg, Barnes, and Zubkoff 1982) and variations in physicians' practice patterns (Eddy 1984).

It is important to remember that such behavior does not evidence disregard for patients or the acceleration of medical costs but shows instead an intense preoccupation with uncertainty and an insidious aspect of the powerful influence that norms, beliefs, and institutional responses requiring greater certainty hold over physician's behavior. Current efforts to limit the rapid increase in medical expenses only exacerbate the dilemma. The pressure for diagnostic certainty and the push for therapeutic results at any price play themselves out in a world of limited resources but seemingly unlimited technological discoveries (Eddy and Billing 1988).

Although uncertainty is frequently mentioned in the medical literature (Lusted 1984) and past observations and insights have provided an initial framework for approaching an empirical study of uncertainty, the actual patterns of uncertainty among practicing physicians remain unknown (Katz 1984). Previous research focused on physicians in training and used primarily qualitative research methods. This article reports one of the first attempts to move from fieldwork and theory to using quantitative methods to explore, in a large sample of community-based practitioners, physicians' reactions to uncertainty in patient care. The study had three objectives: (1) to begin the process of defining the construct, affective reactions to uncertainty, and developing quantitative measures of the main dimensions of the construct, (2) to develop a conceptual model of factors influencing physicians' reactions to uncertainty as a heuristic device to guide our research in this area, and (3) to map the extent and
variation of physicians' affective reactions to the uncertainty inherent in clinical work.

METHODS
Conceptual Model
Semi-structured interviews with physicians, nurses, and laboratory and insurance personnel and a review of the medical sociology, psychology, and health-services literatures served as a basis for developing a model to identify factors affecting physicians' reactions to uncertainty and how reactions to uncertainty might influence their behavior (fig. 1). The model focuses on five major elements: the patient, the medical problem or illness, the physician, test and treatment characteristics, and the organizational structure. It attempts to integrate internal processes, cognitive and affective, with external influences, sociological and cultural.

In the model, patients present to physicians with medical problems. Besides the medical problem, other characteristics of patients (their age, Figure 1.—Conceptual model of factors influencing physicians' reactions to uncertainty.
gender, socioeconomic status, attitudes toward medical care, need for certainty, social support) may influence physicians' decision making (Eisenberg 1979). The medical problem, together with patients' characteristics, creates the uncertainty inherent in the clinical encounter. Physicians bring to clinical encounters their own reactions to clinical uncertainty, both cognitive and affective. Physicians' reactions may vary depending on their characteristics (age, specialty training, prior patient-care experiences, attitudes and beliefs). Patients and physicians, each with their own set of characteristics, interact to produce a series of medical decisions (test ordering, referral, treatment, follow-up visits, reassurance, hospitalization). The decision outcome, the physician's behavior, may be modified either by system characteristics (practice setting and payment plan), or patient characteristics, or both (patients refuse treatment, insurance companies or prepayment plans deny payment for treatments or hospitalizations, the diagnostic tests are not available).

Definition of the Construct

After developing the conceptual model, we defined the construct "affective reactions to uncertainty in patient care." We discovered from our interviews and literature review that physicians have a variety of reactions to uncertainty, including tolerance of uncertainty. These reactions fell into the following nine categories: patient-physician relationships, physician-colleague relationships, professional norms, self-esteem as a physician, bad outcomes, missed diagnoses, malpractice worries, patient referrals, and test ordering. Of note is the fact that many of the categories involve perceived consequences of uncertainty and possible coping behaviors. We then broadly defined affective reactions to uncertainty in patient care as (a) the emotional reactions and concerns engendered in physicians who face clinical situations that are unfamiliar or not easily resolved and (b) the behaviors used by physicians to cope with those emotions and concerns.

Development of the Instrument

The development of the original pool of 61 items and the final scale has been described in detail previously (Gerrity, DeVellis, and Earp 1990). The methods described here include the physician sample, a summary of the scale development, and analyses pertinent to the data presented in this article.

The physician sample.—We administered a 61-item scale to a sample of physicians similar to those who, in the future, might be studied using this scale. For this initial sample, we wanted community physicians who
did primary and consultative patient care, had exposure to a wide variety of patient problems, and represented several different specialties and subspecialties. We selected a random sample of 700 physicians, stratified by specialty, from two sampling frames; half were licensed in North Carolina and half in Oregon. Four hundred were generalists in family medicine, general practice, or general internal medicine, 200 were internal medicine subspecialists, and 100 were surgeons.

Of the 700 physicians contacted, 428 returned completed questionnaires, a response rate of 61%. Eleven percent of the nonresponses were due to (1) the physician's being retired for over two years (4%) or out of the country (1%) and (2) no forwarding address (6%). Further attempts to obtain responses from the remaining 241 nonrespondents were not made owing to the length of the questionnaire and the expense and time required by such an extensive follow-up.

The stratified selection of physicians produced a sample whose mean age was 46 years (SD 13 years), 374 (88%) of whom were male, and for whom a mean of 20 years (SD 14 years) had passed since medical school graduation. By design, the majority of the physicians were generalists: 110 (26%) family physicians, 30 (7%) general practitioners, and 66 (15%) general internists. One hundred twenty-three (29%) were internal medicine subspecialists and 43 (10%) were surgeons. The 53 remaining physicians included 3 in residency training, 26 no longer in practice, and 22 who retrained in another specialty such as rehabilitation medicine, radiation oncology, or occupational medicine.

Physicians in our sample considered themselves primary care providers. Three hundred thirty-five (78%) were in full-time practice and 205 (54%) spent 75%–100% of their time in primary patient care. Two hundred seventy-three (73%) of the physicians were in private-group or solo practices and 220 (61%) had 2–15 physicians in their group.

*Exploratory factor analysis and selection of items for the final scale.*—We asked these physicians to respond to the 61 items using a six-point Likert scale ranging from strongly agreeing ("1") to strongly disagreeing ("6"). The sample also rated their perception of the amount of uncertainty encountered by physicians in 14 specialties and subspecialties using a 10-point Likert scale ranging from the least amount of uncertainty ("1") to the greatest amount of uncertainty ("10").

We then factor-analyzed the physicians' responses to the 61 items. Exploratory factor analysis allowed us to determine how many dimensions (factors) underlay the entire set of uncertainty items and to identify which items were strongly and unambiguously associated with these factors. (Nunnally 1978, pp. 327–436) A scree test (Cattell 1966) applied to
the factor-analytic results indicated that two factors were adequate to account for the observed findings.

The two-factor solution in our study explained 58% of the common variance in the physicians' responses to the 61 items. Items were evaluated as having a strong and unambiguous relationship with only one factor if their loading on that factor was greater than .40 while their loading on the other was under .20. Items meeting these criteria defined two reliable and readily interpretable scales, which we call the Physicians' Reactions to Uncertainty (PRU) scales. One of these, the final Stress from Uncertainty scale, contains 13 of the original 61 items (mean score = 44, SD 11, \( \alpha = .90 \)). The other, the Reluctance to Disclose Uncertainty to Others scale, contains nine of the original 61 items (mean score = 23, SD 6, \( \alpha = .75 \)).

Analysis of the 61 Items and Scale Scores

To assess the extent that physicians in the sample varied in their responses to the original 61 items or held uniform views, we dichotomized their responses into agreeing or disagreeing with each item.\(^5\) We then defined a "consistent response" among physicians as items where 75%-100% of the physicians had the same response (either agreeing or disagreeing with the item). Items that had a consistent response from the study physicians were examined for patterns in their content (patient-physician relationship, malpractice worries, test ordering).

Next, we used the two Physicians' Reactions to Uncertainty (PRU) scales, developed from the 61 items, to explore past assumptions about physicians' reactions to uncertainty and to identify differences among subgroups of physicians along the dimensions Stress from Uncertainty and Reluctance to Disclose Uncertainty to Others. These scales provided us with measures that were more reliable than any single item would be. Because of past observations by Fox (1957) and Budner (1962) and research on gender differences described by others (Bickel 1988; Spiegel, Smolen, and Jonas 1986; Woodward and Adams 1985; Young 1987; Bowman and Allen 1990), we focused primarily on the relationship between physicians' gender, years in practice, specialty group, and their scores on the two PRU scales. Specifically, we examined the hypotheses that:

---

\(^4\) For the Stress from Uncertainty scale, the higher the score the greater the stress. For the Reluctance to Disclose Uncertainty to Others scale, the higher the score the greater the reluctance to disclose uncertainty.

\(^5\) Agreement = strongly, moderately, and slightly agreeing. Disagreement = strongly, moderately, slightly disagreeing with an item based on a six-point Likert scale.
(1) physicians' reactions to uncertainty differ as a result of their gender and specialty group and (2) the longer physicians are in practice the less they will react to uncertainty. The t-test and analysis of variance (ANOVA) were used to compare mean scale scores (SAS Institute 1985). When ANOVA results indicated a significant difference among the mean scores, individual pairs were compared using Tukey's test (Keppel 1982; SAS Institute 1985). Multiple linear regression, with dummy coding for categorical variables, was used to control for potential confounding among gender, years in practice, and specialty while assessing each variable's relationship to the PRU scale scores (Kleinbaum, Kupper, and Muller 1988, pp. 102–43, 260–96).

Last, physicians' ratings of the amount of uncertainty encountered in the "day-to-day work" of 14 different specialists and subspecialists were examined by first using descriptive statistics. Then, we dichotomized physicians' responses to the 10-point Likert scale (1 = least amount of uncertainty; 10 = greatest amount of uncertainty) into "less uncertainty" or "greater uncertainty" encountered based on the median rating for that specialty. We divided physicians who rated the level of uncertainty encountered in their own specialty (seven of the 14 specialties listed) into two groups based on the median rating of the amount of uncertainty for their specialty. We then compared the mean Stress from Uncertainty scale scores and Reluctance to Disclose Uncertainty scale scores for the "less uncertainty" and the "greater uncertainty" groups using the t-test.

FINDINGS
Affective Reactions to Uncertainty

The two dimensions that emerged from the exploratory factor analysis are consistent with our prediction that the construct "affective reactions to uncertainty" would have both an emotional and behavioral dimension. Other components, aside from Stress from Uncertainty (an emotional reaction) and the Reluctance to Disclose Uncertainty to Others (a coping behavior), may exist; indeed "test ordering" was suggested by the three-factor solution in the exploratory factor analysis. However, the breadth of the domain we defined and the number of items we used in our original item pool make it unlikely that our analysis missed major dimensions of the construct. Moreover, other concepts or components, such as malpractice worries and test-ordering, fit within the construct we label "affective reaction to uncertainty," since these also embrace emotional reactions or coping behaviors, the main dimensions of affective reactions to uncertainty. By giving form to this highly abstract construct, this conceptualization should prove useful in guiding future research.
Consistency Among Physicians' Responses

Although the quantitative technique, exploratory factor analysis, defined main dimensions, examining physicians' responses to the 61 items in the original item pool and the extent that physicians had consistent responses to single items gives insight into the variability of physicians' responses to uncertainty and the factors that may modulate these responses. However, caution must be used when examining single items since subtle changes in wording can evoke different patterns of responses (Tversky and Kahneman 1981; McNeil et al. 1982). As one physician in the study noted, "Very interesting. Placing the same question in [a] different format draws a different answer."

The most striking feature of these data is the extensive variability in physicians' reactions to uncertainty. This is evident in both the scale scores, with rather large standard deviations around the mean scores (Stress from Uncertainty scale, 44, SD 11; Reluctance to Disclose Uncertainty to Others scale, 23, SD 6), and the responses to individual items. When physicians' responses to the 61 items were dichotomized into "agree" and "disagree," 75%–100% of the physicians agreed with only 12 items and disagreed with only 11 items (we call these "consistent responses" and list them in App. A, pt. 1 below). For the majority of items (38 of the 61), there was variability in physicians' responses with some agreeing and some disagreeing (these "inconsistent responses" are given in App. A, pt. 2 below).

An example of this variability, an area for research, are the items involving malpractice. With growing concern over malpractice, many physicians feel honesty is the best policy. More than 75% of physicians disagreed with statements such as "I am afraid other physicians would doubt my ability if they knew about my patient care mistakes" and "If I share my uncertainties with patients, I will increase the likelihood that I will be sued." On the other hand, there was greater variability in physicians' responses (25%–74% who agreed) to statements such as "I worry about malpractice when I do not know a patient's diagnosis" and "I frequently think about the legal implications of missing a diagnosis" and "I fear being held accountable for the limits of my knowledge." In addition, more than 75% of the study physicians agreed that, "When physicians are uncertain of a diagnosis, they should share this information with their patients."

Yet, fewer physicians (25%–74%) agreed about what they actually do: "I always share my uncertainty with patients." One physician specifically noted that doctors cope with uncertainty individually and in their own way. "Certainly this is a very important subject. Physicians, particularly those out of training, don't share very much with each other the
stress and uncertainty they feel. We don’t discuss it and we deal with it each in our own way.”

The gap between believing in the honest sharing of uncertainty and actually doing it needs to be measured by more field research. In addition, further research is needed to better define our social concepts of normality since “blameworthiness takes over at the point where the line of normality is drawn” (Douglas and Wildavsky 1982, p. 35).

Explaining Variable Reactions to Uncertainty

To understand the reasons why physicians vary in their affective reactions to uncertainty, we used the two PRU scales, Stress from Uncertainty and Reluctance to Disclose Uncertainty to Others, to compare subgroups of physicians based on certain demographic, professional, and practice characteristics.

Physicians’ scores on the Stress from Uncertainty scale distinguished physicians based on their gender, years of experience, and specialty group (table 1). Practicing male physicians reported significantly less stress from uncertainty than did female physicians as evidenced by their lower mean score, 43 (SD 11) versus 50 (SD 10). Additionally, physicians who had been in practice longer felt less stress from uncertainty than their colleagues who had practiced for a shorter time. Specifically, physicians in practice for 17–31 years, as well as those in practice over 31 years, both had significantly less stress produced by uncertainty than physicians in practice less than nine years, based on Tukey’s test of mean scale scores. Although Stress from Uncertainty did not differ between internal medicine subspecialists and surgeons, both groups reported significantly less stress from this source than did generalists. Of note is the variability in the scale scores even within subgroups of physicians, as evidenced by the relatively large standard deviations.

We made the same comparisons for the Reluctance to Disclose Uncertainty to Others scale. On none of the comparisons did the physicians’ mean scores differ significantly. The variation in physicians’ scores may be based on other characteristics, such as experience with malpractice and bad outcomes that resulted from uncertainty. These were not examined in our study.

Since female physicians in this study tended to be generalists and have fewer years in practice compared with male physicians, we examined the possibility that gender, years in practice, and specialty were not independently associated with the scale scores but were confounded with each other. Gender, specialty, and region of the country were entered into a linear regression model using dummy coding and years in practice was entered as a continuous variable. Gender ($F = 5.69, P < .02$), years in
TABLE 1

COMPARISON OF THE STRESS FROM UNCERTAINTY SCALE SCORES ACROSS GENDER, SPECIALTY GROUP, AND YEARS IN PRACTICE

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Meana</th>
<th>SD</th>
<th>Test Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td>t = 4.05**</td>
</tr>
<tr>
<td>Male</td>
<td>373</td>
<td>43</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>50</td>
<td>50</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Years in practice:</td>
<td></td>
<td></td>
<td></td>
<td>F = 4.37*</td>
</tr>
<tr>
<td>2–9</td>
<td>109</td>
<td>47</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>10–16</td>
<td>117</td>
<td>44</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>17–31</td>
<td>97</td>
<td>43</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>&gt;31</td>
<td>97</td>
<td>42</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Specialty groups</td>
<td></td>
<td></td>
<td></td>
<td>F = 6.21*</td>
</tr>
<tr>
<td>Generalistsb</td>
<td>213</td>
<td>45</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Internal medicine subspecialists</td>
<td>126</td>
<td>42</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Surgeons</td>
<td>43</td>
<td>41</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

*a The greater the score the greater the stress from uncertainty.
*b Includes general practitioners, family practitioners and general internists.
* P < .005.
** P < .0001.

practice (F = 5.12, P < .03), and specialty (subspecialists vs. generalists and surgeons, F = 9.07, P < .003; surgeons vs. generalists and subspecialists, F = 3.76, P ≤ .06) each predicted physicians’ scores on the Stress from Uncertainty scale after controlling for the other variables in the model. For the Reluctance to Disclose Uncertainty to Others scale, specialty (subspecialists vs. generalists and surgeons; F = 4.76, P < .03) predicted physicians’ scores after controlling for the other variables.

Detailed analyses of the scale scores for other groups of physicians based on characteristics such as practice organization (fee-for-service vs. salary), number of physicians in the practice, or population of the town or city where the practice was located could not be done due to confounding plus small numbers of physicians in each subgroup. For example, men were more likely than women to be in fee-for-service practices (76% vs. 48%); have solo practices (29% vs. 16%); and reside in towns of less than 100,000 people (59% vs. 40%). Physicians in small towns (less than 100,000) were more likely to be generalists or surgeons (78% vs. 52% in larger towns); solo practitioners (37% vs. 14% in larger towns); and in fee-for-service practices (80% vs. 64% in larger towns).

Perceptions of Uncertainty Among Various Specialists

Table 2 describes physicians’ responses when asked to rate how much uncertainty they thought physicians in 14 different specialties or subspe-
TABLE 2

PHYSICIANS’ PERCEPTION OF THE AMOUNT OF UNCERTAINTY ENCOUNTERED IN
DAY-TO-DAY WORK IN 14 SPECIALTIES

<table>
<thead>
<tr>
<th>Specialty or Subspecialty</th>
<th>All Physicians ( (N = 410) )</th>
<th>Generalists ( (N = 205) )</th>
<th>Subspecialists ( (N = 123) )</th>
<th>Surgeons ( (N = 42) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychiatry</td>
<td>7.4 (2.2)</td>
<td>7.3 (2.1)</td>
<td>7.6 (2.1)</td>
<td>7.2 (2.5)</td>
</tr>
<tr>
<td>Family medicine</td>
<td>6.8 (2.0)</td>
<td>7.0 (2.1)</td>
<td>6.9 (1.9)</td>
<td>6.3 (1.6)</td>
</tr>
<tr>
<td>General internal medicine</td>
<td>6.7 (1.9)</td>
<td>6.7 (1.9)</td>
<td>6.8 (1.8)</td>
<td>5.9 (1.8)</td>
</tr>
<tr>
<td>Pediatrics</td>
<td>6.0 (2.1)</td>
<td>6.0 (2.0)</td>
<td>6.1 (2.0)</td>
<td>5.4 (2.0)</td>
</tr>
<tr>
<td>Obstetrics-gynecology</td>
<td>5.7 (2.2)</td>
<td>6.1 (2.2)</td>
<td>5.2 (2.1)</td>
<td>5.5 (2.4)</td>
</tr>
<tr>
<td>Hematology- oncology</td>
<td>5.5 (2.2)</td>
<td>5.5 (2.2)</td>
<td>5.6 (2.2)</td>
<td>4.9 (2.3)</td>
</tr>
<tr>
<td>Rheumatology</td>
<td>5.5 (2.2)</td>
<td>5.4 (2.2)</td>
<td>6.0 (2.1)</td>
<td>4.4 (2.1)</td>
</tr>
<tr>
<td>Gastroenterology</td>
<td>5.2 (1.8)</td>
<td>5.0 (1.8)</td>
<td>5.5 (1.9)</td>
<td>5.0 (1.9)</td>
</tr>
<tr>
<td>Cardiology</td>
<td>5.1 (2.0)</td>
<td>5.0 (2.1)</td>
<td>5.2 (2.0)</td>
<td>5.0 (2.0)</td>
</tr>
<tr>
<td>General Surgery</td>
<td>4.9 (1.8)</td>
<td>5.0 (1.8)</td>
<td>4.9 (1.8)</td>
<td>5.0 (2.1)</td>
</tr>
<tr>
<td>Dermatology</td>
<td>3.8 (2.2)</td>
<td>3.8 (2.1)</td>
<td>4.1 (2.4)</td>
<td>3.3 (2.0)</td>
</tr>
<tr>
<td>Anesthesiology</td>
<td>3.4 (2.1)</td>
<td>3.4 (2.0)</td>
<td>3.4 (2.2)</td>
<td>3.7 (2.2)</td>
</tr>
<tr>
<td>Orthopedic Surgery</td>
<td>3.3 (1.8)</td>
<td>3.4 (1.8)</td>
<td>3.2 (1.8)</td>
<td>3.4 (2.0)</td>
</tr>
<tr>
<td>Urology</td>
<td>3.2 (1.4)</td>
<td>3.2 (1.4)</td>
<td>3.2 (1.5)</td>
<td>3.2 (1.7)</td>
</tr>
</tbody>
</table>

Note.—Numbers in parentheses are SDs.

* Ratings were based on a 10-point Likert scale ranging from least amount of uncertainty (“1”) to greatest amount of uncertainty (“10”).

Specialties encountered in their day-to-day work. Overall, physicians felt that psychiatrists encountered the greatest uncertainty followed by physicians in primary care or “generalist” specialties. The surgical subspecialists (urologists and orthopedic surgeons), anesthesiologists, and dermatologists were thought to encounter the least amount of uncertainty in their work. These beliefs persisted even when subgroups of physicians were examined. For example, surgeons felt, as did other physicians, that psychiatrists and generalists encountered greater uncertainty in their work than did surgeons. Surgeons also felt that general surgeons encountered at least as much uncertainty as did internal medicine subspecialists and more uncertainty than surgical subspecialists, anesthesiologists, and dermatologists.

These relative values are not meant to imply that any of the groups of physicians encounter little or no uncertainty in their work or that their impressions of the amount of uncertainty are necessarily correct. As one physician in the study commented, “Before I went into radiation oncology, I thought that it was a field with very little uncertainty—‘pretty naive.’ I learned that it is filled with uncertainty, as are all medical specialties, ‘in my opinion.’”
In fact, physicians in one specialty may have little insight into what physicians in other specialties face in their work. This is expressed by another physician in the study. "Basically, I don't feel that physicians in different specialties understand what someone in another specialty really does and the kind of stresses [she or he] deals with."

Indeed, Light's (1979) comparative study of the uncertainty experienced in two widely different specialties (psychiatry vs. orthopedic surgery) found evidence that, from the practitioner's viewpoint, a similar amount of uncertainty was experienced by specialists in both fields.

The perceptions represented by the ratings in table 2 may not be accurate assessments of how much uncertainty physicians in different specialties encounter; however, they do corroborate Fox's (1957) observations of the perceptions that medical students have of the amount of uncertainty and structure in different specialties (Budner 1962). These perceptions of relative uncertainty may be more consequential than the reality; those who perceive more uncertainty in their specialty than in others may report more stress from uncertainty.

To determine how physicians' perceptions of great or little uncertainty in their own specialty related to their reports of perceived stress from uncertainty and their reluctance to disclose uncertainty to others, we divided physicians into two groups based on the median rating of how much uncertainty they felt their specialty encountered in clinical work. Next, we examined the mean Stress from Uncertainty and Reluctance to Disclose Uncertainty to Others scale scores for these two groups. Results for the Stress from Uncertainty scale are shown in table 3. Overall, physicians who perceived that their specialty encountered greater uncertainty reported significantly greater stress from uncertainty than physicians who perceived that their specialty encountered less uncertainty. This trend is present for three specialties, but not present for internal medicine subspecialists, and only the difference in scores for general interns reach statistical significance. These same comparisons were made for the Reluctance to Disclose Uncertainty scale. No significant differences were found among physicians who perceived greater or lesser uncertainty in the practice of their own specialties. The findings on relative perceived uncertainty and stress suggest differences in how uncertainty is handled and experienced within different specialties.

Potential Influences on Reactions to Uncertainty

Physicians appear to have a complex and wide range of reactions to uncertainty. A number of variables, some measured in this study (years of experience, specialty, and gender) and many not measured (severity of an illness, patient's desire for certainty) may shape or influence physi-
American Journal of Sociology

TABLE 3

COMPARISON OF MEAN OF STRESS FROM UNCERTAINTY SCALE SCORES FOR PHYSICIANS

<table>
<thead>
<tr>
<th>Specialty</th>
<th>Less Uncertainty</th>
<th>Greater Uncertainty</th>
<th>Test Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family physicians</td>
<td>43.5</td>
<td>46.1</td>
<td>( t = 1.33^a )</td>
</tr>
<tr>
<td>((n = 32))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General internists</td>
<td>41.3</td>
<td>48.6</td>
<td>( t = 2.83^* )</td>
</tr>
<tr>
<td>((n = 26))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal medicine subspecialists(^b)</td>
<td>42.4</td>
<td>41.6</td>
<td>( t = -.30^a )</td>
</tr>
<tr>
<td>((n = 35))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgeons</td>
<td>39.3</td>
<td>42.2</td>
<td>( t = .82^a )</td>
</tr>
<tr>
<td>((n = 24))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall group mean</td>
<td>42.2</td>
<td>45.1</td>
<td>( t = 2.21^{**} )</td>
</tr>
<tr>
<td>((n = 117))</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note.—The "less uncertainty" and "greater uncertainty" groups were formed based on the median rating physicians gave for the amount of uncertainty encountered in that specialty.

\(^a\) N.S.
\(^b\) Includes rheumatology, cardiology, gastroenterology, and hematology-oncology.
\(* p < .01.\)
\(^{**} p < .05.\)

cicians' reactions to uncertainty as described by our conceptual model (fig. 1). Comments made at the end of the questionnaire highlight the complexity of physicians' responses to uncertainty and suggest reasons for the variability between physicians in different specialties, between physicians within the same specialty, and even within individual physicians as they move from one patient encounter to the next.

The medical problem, identified in the conceptual model is one factor that may affect physicians' reactions to uncertainty from one patient encounter to the next. One physician comments on the effect of a dangerous or "high-risk" disease when it is considered in the differential diagnosis (e.g., appendicitis, viral gastroenteritis, etc.) for a medical problem (e.g., abdominal pain): "Many of the questions are highly dependent on [the] situation. For instance, generally [the] diagnosis of appendicitis is not highly stressful because uncertainty is predictable and low risk, especially if [an] operation is undertaken. Other situations are more stressful because the uncertainty leads to much higher risk."

Another example of how the type of medical problem may influence physicians' reactions to uncertainty is seen in the evaluation of patients with sore throats compared to those with chest pain. Missing a diagnosis of a strep throat or treating a patient inappropriately with penicillin will probably not result in a life-threatening situation whereas, with chest pain, there is a risk of missing a heart attack that, if treated inappropriately, could result in death. Uncertainty in the latter situation produces
far greater stress for the physician. Stated another way, by a respondent to our survey: "The emotional response to uncertainty is a function of the consequence of being wrong. I may feel uncertain about the cause of chest pain but comfortable in my uncertainty if important [life-threatening] causes are excluded. There may be many uncertainties in family medicine but my perception is that most of them are not about life-threatening situations."

Consideration of a high-risk disease in the differential diagnosis of a medical problem heightens the stakes and the stress from the diagnostic uncertainty Light (1979) described. The fear or anxiety over bad outcomes resulting from being wrong or uncertain has been described in various ways by Feinstein (1985) and others (Nightingale 1987, 1988; Bell 1982; Hershey and Baron 1987; Williams, Suchman, and Herrera 1988). They have termed these influences the "chagrin factor," "risk aversion," and "regret." In fact, the stress from uncertainty in relation to a medical problem, and its differential diagnosis, may be due to the feelings of personal inadequacy that Fox (1957, pp. 240–41) noted among medical students and to the cultural and institutional frameworks that define "high risk" (Douglas and Wildavsky 1982, pp. 79–82).

Patient characteristics, another major component in the conceptual model, may also influence physicians' reactions to uncertainty and how they convey uncertainty to patients. This influence is described by one respondent. "Some physicians . . . are perturbed by uncertainty. Most patients as well eschew uncertainty. They prefer to polarize, to see the world as black and white without shades of grey. I try to use a minimum of uncertainty in my talks with patients. Most patients prefer that. But I also indicate that uncertainty exists."

Physicians' perception of patients' desires for certainty may affect how uncertainty is handled by physicians and conveyed to patients. Additionally, other patient characteristics may affect physicians. "Other appropriate questions might be: Do you worry about confusing the patient when you decide to discuss uncertainties of his/her diagnosis? Does your patient's education level or levels of understanding affect your decision to discuss uncertainties of his/her illness? . . . Do patients want to know your uncertainty?"

These verbatim comments illustrate practicing physicians' reactions to uncertainty, point to a number of factors influencing physicians, and highlight the complexity of their reactions to uncertainty. Overall, these spontaneous comments focus on two factors in the model, the type of medical problem and patient characteristics, that may influence physicians' reactions to uncertainty. The other factors noted in the model—test and treatment characteristics, physicians' characteristics, and organizational characteristics—were not mentioned spontaneously by
physicians in this study. Although the influences of medical education have been described by Fox and others, the effect of other institutional forces on physicians and physician-patient relations awaits further research.

DISCUSSION

Our study is one of the first systematic quantitative evaluations of practicing physicians' reactions to uncertainty based on a large sample. From it arises a revised, more complex perspective than was held previously about physicians' responses to uncertainty. Physicians, using a self-report format, acknowledge uncertainty and the implications of uncertainty to a greater degree than described by previous qualitative research, which focused on denial of uncertainty and techniques for controlling or minimizing uncertainty (Light 1979; Bosk 1980; Mizrahi 1984) used by trainees. These differences may be due to differences (1) between trainees and practicing physicians, (2) in the predominant sociological forces in training and clinical practice settings, and/or (3) in the research methodologies used in these studies. Research including both trainees and practicing physicians and using qualitative and quantitative research methods is necessary for a better understanding of the relationship between our findings using a quantitative method and those of previous studies using qualitative methods.

Physicians' reactions to uncertainty vary by certain demographic and professional characteristics. This study begins to map the patterns of uncertainty and the variations in them that actually exist. Although Fox (1957, pp. 239–41), in her seminal work on physicians and uncertainty, chose to focus on the "average" student, she indicated that significant variability exists among medical students in their responses to uncertainty, particularly those resulting from "imperfect mastery of what is currently known." The research done since (primarily with physicians in residency training) yielded a narrower view of these responses (Light 1979; Bosk 1980; Mizrahi 1984). By not studying physicians in practice, this earlier work might have missed some of the complexity and variability of physicians' responses to uncertainty that are evident in practitioners past the training stage of their career; after all, physicians meet a variety of factors that may counter or reinforce the influences of their residency training (Mizrahi 1986, pp. 136–63). Indeed, residency training and academic medical centers may create organizational forces that override other factors during the training period. To what extent these forces create a lasting effect on physicians' reactions to uncertainty is an important question to be answered by longitudinal studies that follow physicians from training into practice.
Fox (1957, pp. 239–41) suggested that variations in medical students' aptitudes, skills, knowledge, and awareness of their own limitations along with variations in the "experiences through which the student becomes acquainted with the uncertainties of medicine" all contribute to the variability in their responses to uncertainty. Wide variations in the levels of agreement with the majority of scale items by physicians in this study also suggest a far more complicated picture than heretofore described. The physician characteristics described by Fox were combined with four other factors to form the conceptual model for this study (fig. 1). The five groups of factors, and their grounding in a sociocultural context, may account for the complexity and variability in physicians' responses to uncertainty. Multidisciplinary research is needed to understand the effects of these factors, internal and external, on physicians' reactions to uncertainty.

However, one consistent theme seems to emerge from all of these studies of medical students, physicians in residency training, and physicians in practice: the fear of personal inadequacy and failure. This theme was first identified by Fox (1957) and further developed by Mizrahi (1984) in her study of residents in internal medicine training. In addition, fear of personal inadequacy and failure was evident among a portion of the physicians in this study. Others have noted this theme among practicing physicians as well (Feinstein 1985; Nightingale 1987, 1988; Williams et al. 1988). In a follow-up of a sample of residents from her original study, Mizrahi (1986, p. 158) found that those in community practice feared failure, and this was "almost always linked to the clinical diagnosis and treatment" of patients. Although this was not a major dimension of physicians' affective reaction to uncertainty, it may indeed be related to the stress from uncertainty that was identified as a major dimension, and it merits further exploration. This indeed may be the burden professionals and experts take on as our society becomes increasingly specialized and technological, relying on science versus religion or magic to explain uncertainties.

Second, our study exemplifies (1) a methodological approach not previously used to study physicians' reactions to uncertainty and (2) a conceptual approach that attempts to integrate internal processes, findings from psychological work, with external influences and findings from sociological and anthropological work. We have demonstrated how, by building upon a body of qualitative work, an elusive yet important social phenomenon can be analyzed quantitatively. In addition, we have shown, in the process of integrating quantitative and qualitative findings, how new areas for research can be identified. In particular, stress from uncertainty and reluctance to disclose uncertainty are important dimensions for future research as institutional pressures to contain costs force
doctors surrounded by close monitoring to live without exhaustive testing.

Other examples of research areas suggested by our findings and conceptual framework include: comparative studies done on attitudes, intentions, and actual behaviors of physicians in different settings operating under different organizational and financial constraints and incentives; the impact of being sued on medical decision making and physicians' stress from uncertainty; and the identification of structural or cultural barriers, including the educational process, that may prevent constructive disclosure of uncertainties to colleagues or patients. These studies cannot fail to help medical curriculum specialists reorganize protocols for communicating more effectively with patients (Lipkin et al. 1984) and develop new programs for teaching problem solving and decision making (Bursztajn, et al. 1981; Light 1988) under conditions of uncertainty.

Beyond medicine, research has not even begun to uncover the predictors and effects of uncertainty on scientists, commercial airline pilots, business managers and executives, corporate lawyers, junior faculty and other professionals. Do perceptions of uncertainty among members of these occupations highlight dimensions other than stress and disclosure? What structural and demographic variables affect these professionals' reactions to uncertainty? From what we have learned in this study of one profession, the nature of uncertainty almost undoubtedly will vary widely for each of these other occupations according to technological characteristics, social customs, organizational factors, and financial constraints. It is time to move beyond medicine to develop a comparative sociology of uncertainty. This article might be seen as an early contribution to that effort.

Looking at physicians’ experience of uncertainty and their fear of failure in the larger context of anthropological and sociological observations suggests a deeper implication for the nature of the patient’s role and the doctor-patient relationship. Scientific medicine seems to have assumed an impossible burden. As Parsons (1951, 1970), Douglas (1966), and Fox (1979) imply, the effort of science and rationality to erase ignorance, eliminate uncertainty, and conquer nature is bound to disappoint, anger, and fail. “By disclaiming that the cause and meaning of illness have anything to do with the supernatural or the inherently mysterious,” Fox (1979, p. 510) observes, “modern medicine provides no legitimation for the occurrence of such problems of meaning and no institutionalized way of dealing with them.” The emphasis on vigorous treatment and a “can-do” attitude makes it all the worse (Payer 1988). Were doctors

---

6 It can also identify the latent functions of sustaining client uncertainty (Davis 1960; Waitzkin and Waterman 1974; Light 1979).
and patients to reframe their relationship as an attempt to discover a modicum of pattern and effect what improvements they could in a sea of complex biopsychosocial interactions and uncertainty, expectations would be more realistic and role relations more constructive. Were they, like Douglas and Fox, to regard diagnostic systems as attempts to bring order to a large complex of phenomena and scientific medicine as a symbolic and empirical system for identifying some causal relations between pathogens, symptoms, and interventions, modern medicine would come closer to the sensible balance of the Azande between systems for coping with the problems and uncertainties of life and a score of reasons why witch doctors are sometimes wrong and magic does not always work.

APPENDIX

The Appendix contains the original pool of 61 items used to develop the Physicians' Reactions to Uncertainty (PRU) scales. As a group, the study physicians had consistent responses to the 23 items in part 1 and inconsistent responses to the 38 items in part 2. To assess consistency, item responses were collapsed into dichotomous variables: strongly, moderately, slightly agreeing = agreement; strongly, moderately, slightly disagreeing = disagreement. We then defined a "consistent response" among physicians as items where 75%-100% of the physicians had the same response (either agreement or disagreement with the item). The items labeled stress scale (13 items) and disclosure scale (9 items) were retained in the final Stress from Uncertainty and Reluctance to Disclose Uncertainty to Others scales, respectively.

Part 1: Items Where Study Physicians Had Consistent Responses

75%-100% of Physicians Agree

I am frustrated when I do not know a patient’s diagnosis (stress scale).

When physicians are uncertain of a diagnosis, they should share this information with their patients (disclosure scale).

I frequently refer patients to other physicians when I am uncertain of a diagnosis.

I worry that I cannot keep up with the medical literature.

Patients who cannot give a clear description of their problem frustrate me.

When I chose medicine as a career, I was not fully aware of the degree of uncertainty it entailed.

If patients accepted the limitations of biomedical science, a physician’s job would be much easier.
I often discuss my uncertainty with patients when I am not sure what is causing their problem.

Even when I make patient-care mistakes, I feel confident of my abilities as a physician.

If a patient requests that a test be done, I will usually do the test.

I often feel guilty when I miss a diagnosis.

I am extremely troubled when I think patients of mine may have a bad outcome because of my care.

75%—100% of Physicians Disagree

I am tolerant of the uncertainties present in patient care (stress scale).

Not being sure of what is best for a patient is one of the most stressful parts of being a physician (stress scale).

The hardest thing to say to patients or their families is, “I don’t know” (disclosure scale).

I almost never tell other physicians about diagnoses I have missed (disclosure scale).

I never tell other physicians about patient-care mistakes I have made (disclosure scale).

I am afraid other physicians would doubt my ability if they knew about my patient care mistakes (disclosure scale).

If I share my uncertainties with patients, I will increase the likelihood that I will be sued (disclosure scale).

Missing a diagnosis does not bother me.

I find the uncertainty in medicine challenging.

When I am uncertain of a diagnosis, ordering more tests always relieves my anxiety.

I never think about the consequences of my uncertainty in patient care.

Part 2: Items Where Study Physicians Had Inconsistent Responses

Less than 75% of Physicians Agree

I worry about malpractice when I do not know a patient’s diagnosis (stress scale).

I frequently wish I had gone into a specialty or subspecialty that would minimize the uncertainties of patient care (stress scale).

I usually feel anxious when I am not sure of a diagnosis (stress scale).
Uncertainty in patient care makes me uneasy (stress scale).
The uncertainty of patient care often troubles me (stress scale).
I find the uncertainty involved in patient care disconcerting (stress scale).
I am quite comfortable with the uncertainty in patient care (stress scale).
The vastness of the information physicians are expected to know overwhelms me (stress scale).
I fear being held accountable for the limits of my knowledge (stress scale).
I always share my uncertainty with my patients (disclosure scale).
I always feel anxious when I consider a potentially fatal disease in a patient’s differential diagnosis.
I would be a much better physician if I read more of the medical literature.
I always feel relieved when a consultant finds something I missed.
I frequently think about the legal implications of missing a diagnosis.
I virtually always feel my clinical ability is adequate.
I have confidence in my knowledge of the current medical literature.
In some ways being unsure of how a patient's condition will turn out is more stressful than knowing for sure that it will turn out badly.
I owe it to my patients to appear confident and knowledgeable, even if I am unsure of what they have or how to treat them.
I frequently order tests to cover all the bases if I am uncertain of a diagnosis.
I always feel frustrated when I do not know a patient’s diagnosis.
Confronting one's own limitations in medical practice is a very stressful experience.

Less than 75% of Physicians Disagree
When I am uncertain of a diagnosis, I imagine all sorts of bad scenarios—patient dies, patient sues, etc. (stress scale).
If I do not make a diagnosis, I worry that the referring physician will stop sending patients to me (disclosure scale).
If I shared all of my uncertainties with my patients, they would lose confidence in me (disclosure scale).
American Journal of Sociology

If I do not know a patient's diagnosis, I always order more tests. To maintain my practice, I must have answers for nearly all of the patient-care problems referred to me. Uncertainty doesn't bother me. Patients will seek care elsewhere if I do not have answers for them. When I do not know the answer to a patient's question, I attribute it to the uncertainty inherent in medicine. I feel anxious when my patients want a second opinion. I feel threatened by patients who demand answers. I feel helpless when a patient demands an answer that I do not have. Patients often want me to share my uncertainty with them. To reassure patients, I order more tests when I am uncertain of their diagnoses. I feel inadequate as a physician when I do not know a diagnosis. Patients demand too many answers from physicians. I always feel inadequate when one of my patients has a bad outcome. Rarely am I bothered by the uncertainty of patient care.

REFERENCES


American Journal of Sociology


Uncertainty


1051