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**THE PSYCHOLOGY
OF PRACTICAL THINKING
AMONG PHYSICIANS
AND NURSES**

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THE PSYCHOLOGY OF PRACTICAL THINKING AMONG PHYSICIANS AND NURSES

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Abstract:

Medicine as a practice; medicine: science or art, or, art and science? medicine and artificial intelligence systems; the complexity of clinical rationality; the radical uncertainty of clinical practice; a science of individuals?; why does medicine collude in the misrepresentation of its rationality? medical educators and the misrepresentation of medicine, medicine's irreducible uncertainty and the over-reliance on science; clinical judgment and the interpretation of the individual case; doctors do not reason as scientists do, generalization and particularization; every lion is different; EBM, the individual and the exercise of clinical judgment; EBM, clinical judgment and 'Feinsteinian' thinking; clinical reasoning: far more situated and flexible than even the most complex clinical algorithm; clinical knowing – 'Don't think zebras', 'The research shows ... and in my experience ...', habits of practice; the overarching paradox of medicine's theory of knowledge; counterbalancing as a practical theory of clinical rationality.

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Introduction

This book is about what goes on in a doctor's mind as he or she treats a patient. The idea for it came to me unexpectedly, on a September morning three years ago while I was on rounds with a group of interns, residents, and medical students. I was the attending physician for "general medicine," meaning that it was my responsibility to guide this team of trainees in its care of patients with a wide range of clinical problems, not just those in my own specialties which are blood diseases, cancer, and AIDS. There were patients on our ward with pneumonia, diabetes, and other common ailments, but there were also some with symptoms that did not readily suggest a diagnosis, or with maladies for which there was a range of possible treatments, where no one therapy was clearly superior to the others.

I like to conduct rounds in a traditional way. One member of the team first presents the salient aspects of the case and then we move as a group to the bedside, where we talk to the patient and examine him. The team then returns to the conference room to discuss the problem. I follow a Socratic method in the discussion, encouraging the students and residents to challenge each other, including me, with their ideas. But at the end of rounds on that September morning I found myself feeling disturbed. I was concerned about the lack of give-and-take among the trainees, but even more I was disappointed with myself as their teacher. I concluded that these very bright and very affable medical students, interns, and residents all too often failed to question cogently, listen carefully or observe keenly. They were not thinking deeply about their patients' problems. Something was profoundly wrong with the way they were learning to solve clinical puzzles and care for people.

You hear this kind of criticism — that each new generation of young doctors is not as insightful or competent as its predecessors — regularly among older physicians, often couched like this: "When I was in training thirty years ago, there was real rigor and we had to know our stuff.

Nowadays, well ...» These wistful, aging doctors speak as if some magic that had transformed them into consummate clinicians has disappeared. I suspect each older generation carries with it the notion that its time and place, seen through the distorting lens of nostalgia, were superior to those of today. Until recently, I confess, I shared that nostalgic sensibility. But on reflection I saw that there also were major flaws in my own medical training. What distinguished my learning from the learning of my young trainees was the nature of the deficiency, the type of flaw.

My generation was never explicitly taught how to think as clinicians. We learned medicine catch-as-catch-can. Trainees observed senior physicians the way apprentices observed master craftsmen in a medieval guild, and somehow the novices were supposed to assimilate their elders' approach to diagnosis and treatment. Rarely did an attending physician actually explain the mental steps that led him to his decisions. Over the past few years, there has been a sharp reaction against this catch-as-catch-can approach. To establish a more organized structure, medical students and residents are being taught to follow preset algorithms and practice guidelines in the form of decision trees. This method is also being touted by certain administrators to senior staff in many hospitals in the United States and Europe. Insurance companies have found it particularly attractive in deciding whether to approve the use of certain diagnostic tests or treatments.

The trunk of the clinical decision tree is a patient's major symptom or laboratory result, contained within a box. Arrows branch from the first box to other boxes. For example, a common symptom like "sore throat" would begin the algorithm, followed by a series of branches with "yes" or "no" questions about associated symptoms. Is there a fever or not? Are swollen lymph nodes associated with the sore throat? Have other family members suffered from this symptom? Similarly, a laboratory test like a throat culture for bacteria would appear farther down the trunk of the tree, with branches based on "yes" or "no" answers to the results of the culture.

Ultimately, following the branches to the end should lead to the correct diagnosis and therapy.

Clinical algorithms can be useful for run-of-the-mill diagnosis and treatment — distinguishing strep throat from viral pharyngitis, for example. But they quickly fall apart when a doctor needs to think outside their boxes, when symptoms are vague, or multiple and confusing, or when test results are inexact. In such cases — the kinds of cases where we most need a discerning doctor — algorithms discourage physicians from thinking independently and creatively. Instead of expanding a 'doctor's thinking, they can constrain it.

Similarly, a movement is afoot to base all treatment decisions strictly on statistically proven data. This so-called evidence-based medicine is rapidly becoming the canon in many hospitals. Treatments outside the statistically proven are considered taboo until a sufficient body of data can be generated from clinical trials. Of course, every doctor should consider research studies in choosing a therapy. But today's rigid reliance on evidence-based medicine risks having the doctor choose care passively, solely by the numbers.

Statistics cannot substitute for the human being before you; statistics embody averages, not individuals. Numbers can only complement a physician's personal experience with a drug or a procedure, as well as his knowledge of whether a "best" therapy from a clinical trial fits a patient's particular needs and values.

Each morning as rounds began, I watched the students and residents eye their algorithms and then invoke statistics from recent studies. I concluded that the next generation of doctors was being conditioned to function like a well-programmed computer that operates within a strict binary framework. After several weeks of unease about the students' and residents' reliance on algorithms and evidence-based therapies alone, and my equally unsettling sense that I did not know how to broaden their perspective and show them otherwise, I asked myself a simple question: How should a doctor think?

This question, not surprisingly, spawned others: Do different doctors think differently? Are different forms of thinking more or less prevalent among the different specialties? In other words, do surgeons think differently from internists, who think differently from pediatricians? Is there one "best" way to think, or are there multiple, alternative styles that can reach a correct diagnosis and choose the most effective treatment? How does a doctor think when he is forced to improvise, when confronted with a problem for which there is little or no precedent? (Here algorithms are essentially irrelevant and statistical evidence is absent.) How does a doctor's thinking differ during routine visits versus times of clinical crisis? Do a doctor's emotions — his like or dislike of a particular patient, his attitudes about the social and psychological makeup of his patient's life — color his thinking? Why do even the most accomplished physicians miss a key clue about a person's true diagnosis, or detour far afield from the right remedy? In sum, when and why does thinking go right or go wrong in medicine?

I had no ready answers to these questions, despite being trained in a respected medical school and residency program, and having practiced clinical medicine for some thirty years. So I began to ask my colleagues for answers. Nearly all of the practicing physicians I queried were intrigued by the questions but confessed that they had never really thought about how they think. Then I searched the medical literature for studies of clinical thinking. I found a wealth of research that modeled "optimal" medical decision-making with complex mathematical formulas, but even the advocates of such formulas conceded that the latter rarely mirrored reality at the bedside or could be followed practically. I saw why I found it difficult to teach the trainees on rounds how to think. I also saw that I was not serving my own patients as well as I might. I felt that if I became more aware of my own way of thinking, particularly its pitfalls, I would be a better caregiver.

Of course, no one can expect a physician to be infallible. Medicine is, at its core, an uncertain science. Every doctor makes mistakes in

diagnosis and treatment. But the frequency of those mistakes, and their severity, can be reduced by understanding how a doctor thinks and how he or she can think well. This book was written with that goal in mind. It is primarily intended for laymen, though I believe physicians and other medical professionals will find it useful. Why for laymen? Because doctors desperately need patients and their families and friends to help them think. Without their help, physicians are denied key clues to what is really wrong. I learned this not as a doctor but when I was sick, when I was the patient.

We've all wondered why a doctor asked certain questions, or detoured into unexpected areas when gathering information about us. We have all asked ourselves exactly what brought him to propose a certain diagnosis and a particular treatment and to reject the alternatives. Although we may listen intently to what a doctor says and try to read his facial expressions, often we are left perplexed about what is really going on in his head. That ignorance inhibits us from successfully communicating with the doctor, from telling him all that he needs to hear to come to the correct diagnosis and advice on the best therapy.

While modern medicine is aided by a dazzling array of technologies, like high-resolution MRI scans and pinpoint DNA analysis, language is still the bedrock of clinical practice. We tell the doctor what is bothering us, what we feel is different, and then respond to his questions. This dialogue is our first clue to how our doctor thinks, so the book begins there, exploring what we learn about a physician's mind from what he says and how he says it. But it is not only clinical logic that patients can extract from their dialogue with a doctor. They can also gauge his emotional temperature. Typically, it is the doctor who assesses our emotional state. But few of us realize how strongly a physician's mood and temperament influence his medical judgment. We, of course, may get only glimpses of our doctor's feelings, but even those brief moments can reveal a great deal about why he chose to pursue a possible diagnosis or offered a particular treatment.

After surveying the significance of a doctor's words and feelings, the book follows the path that we take when we move through today's medical system. If we have an urgent problem, we rush to the emergency room. There, doctors often do not have the benefit of knowing us, and must work with limited information about our medical history. I examine how doctors think under these conditions, how keen judgments and serious cognitive errors are made under the time pressures of the ER. If our clinical problem is not an emergency, then our path begins with our primary care physician — if a child, a pediatrician; if an adult, an internist. In today's parlance, these primary care physicians are termed "gatekeepers," because they open the portals to specialists. The narrative continues through these portals; at each step along the way, we see how essential it is for even the most astute doctor to doubt his thinking, to repeatedly factor into his analysis the possibility that he is wrong. We also encounter the tension between his acknowledging uncertainty and the need to take a clinical leap and act. One chapter reports on this in my own case; I sought help from six renowned hand surgeons for an incapacitating problem and got four different opinions.

Much has been made of the power of intuition, and certainly initial impressions formed in a flash can be correct. But as we hear from a range of physicians, relying too heavily on intuition has its perils. Cogent medical judgments meld first impressions — gestalt — with deliberate analysis. This requires time, perhaps the rarest commodity in a healthcare system that clocks appointments in minutes. What can doctors and patients do to find time to think? I explore this in the pages that follow.

Today, medicine is not separate from money. How much does intense marketing by pharmaceutical companies actually influence either conscious or subliminal decision-making? Very few doctors, I believe, prostitute themselves for profit, but all of us are susceptible to the subtle and not so subtle efforts of the pharmaceutical industry to sculpt our thinking. That industry is a vital one; without it, there would be a paucity of new therapies, a slowing of progress. Several doctors and a pharmaceutical

executive speak with great candor about the reach of drug marketing, about how natural aspects of aging are falsely made into diseases, and how patients can be alert to this.

Cancer, of course, is a feared disease that becomes more likely as we grow older. It will strike roughly one in two men and one in three women over the course of their lifetime. Recently there have been great clinical successes against types of cancers that were previously intractable, but many malignancies remain that can be, at best, only temporarily controlled. How an oncologist thinks through the value of complex and harsh treatments demands not only an understanding of science but also a sensibility about the soul — how much risk we are willing to take and how we want to live our lives. Two cancer specialists reveal how they guide their patients' choices and how their patients guide them toward the treatment that best suits each patient's temperament and lifestyle.

At the end of this journey through the minds of doctors, we return to language. The epilogue offers words that patients, their families, and their friends can use to help a physician or surgeon think, and thereby better help themselves. Patients and their loved ones can be true partners for physicians when they know how doctors think, and why doctors sometimes fail to think. Using this knowledge, patients can offer a doctor the most vital information about themselves, to help steer him toward the correct diagnosis and offer the therapy they need. Patients and their loved ones can aid even the most seasoned physician to avoid errors in thinking. To do so, they need answers to the questions that I asked myself, and for which I had no ready answers.

Medical students are taught that the evaluation of a patient should proceed in a discrete, linear way: you first take the patient's history, then perform a physical examination, order tests, and analyze the results. Only after all the data are compiled should you formulate hypotheses about what might be wrong. These hypotheses should be winnowed by assigning statistical probabilities, based on existing databases, to each symptom, physical abnormality, and laboratory test. Then you calculate the likely

diagnosis. This is Bayesian analysis, a method of decision-making favored by those who construct algorithms and strictly adhere to evidence-based practice. But, in fact, few if any physicians work with this mathematical paradigm. The physical examination begins with the first visual impression in the waiting room, and with the tactile feedback gained by shaking a person's hand. Hypotheses about the diagnosis come to a doctor's mind even before a word of the medical history is spoken. And in cases like Anne's, of course, the specialist had a diagnosis on the referral form from the internist, confirmed by the multitude of doctors' notes in her records.

For a moment, she was confused. Hadn't the doctor spoken with her internist and looked at her records? "I have bulimia and anorexia nervosa," she said softly. Her clasped hands tightened. "And now I have irritable bowel syndrome."

How do doctors think? Is medicine a science or an art, or an uneasy interrelationship between the two? What is this process we call 'clinical judgment' and exactly how reliant upon it are we in making decisions in the context of the individual case? It is with fundamental questions such as these – posed by many authors, many times elsewhere – that Kathryn Montgomery, Professor of Medical Humanities at North Western University USA, opens her important monograph *How Doctors Think: Clinical Judgment and the Practice of Medicine* [Montgomery, 2006].

Structurally, Montgomery's volume is constituted by 12 chapters and divided into four parts. She qualifies her endeavor by describing herself at the outset as 'an outsider, a sort of licensed trespasser in clinical territory' (p. 6), although there is scarcely need for such an early *apologia* given the fundamental importance of the questions she raises and the observations that she will go on to make. Neither is it entirely necessary for her to divulge to the reader the very personal background against which the largest part of her book has been written – her 28-year-old daughter's diagnosis of, and treatment for, breast cancer (p. 13), although from this revelation we are able to gain no small insight into the penetrating nature, indeed urgency, of the greatest number of her observations and questions.

While these observations and questions will be seen to be in many ways particular, Medicine is, after all, at its best and most authentic, when it talks of individuals and not populations, for the reasons that Montgomery reminds us of time and time again, in varying ways, throughout her text. Hers is a necessary philosophy which re-states what remains, and what must remain, the heart and soul of good clinical medicine.

* I quickly realized that trying to assess how psychiatrists think was beyond my abilities. Therapy of mental illness is a huge field unto itself that encompasses various schools of thought and theories of mind. For that reason, I do not delve into psychiatry in this book.

Medicine: science or art, or, art and science?

Much nonsense has been written about the “art” of medicine. All too often, it amounts to a rationalization for doctors doing what they want to do instead of following the evidence. Medicine is not an art like painting. Neither is it a science like physics. It is an applied science. Since patients are not all identical, it can be very tricky to decide how to apply the science to the individual.

‘We make a great, even dangerous mistake about medicine,’ Montgomery asserts, ‘when we assume it is a science in the realist Newtonian sense ... even ... as Lewis Thomas described it (as) the youngest science.’ Indeed. Such words are ‘noble and the aspirations praiseworthy, but assuming that medicine is a science leads to the expectation that physicians’ knowledge is invariant, objective, and always replicable’ (p. 16), which, of course, it clearly is not. So, if medicine is not a science, then what is it? Is it perhaps, what the eminent medical historian and doctor Henry Sigerest suggested: ‘not so much a natural as a social science?’ (p. 29). Montgomery thinks not, especially since in doctors’ minds in particular, the thinking of the 1940s and 1950s has given way to the thinking of the last 60 or so years, during which we have seen, to be sure, huge developments in the biological basis of medicine and in the

strategies designed to find application for this new knowledge. So, medicine as a social science? Perhaps not. Montgomery is surely correct in pointing out that within the profession and in society at large, the everyday understanding of medical practice remains lodged in descriptions that are crude, incomplete and unreflective, such that when it is asserted that medicine is a science, it is also asserted that medicine is an art. The affirmation of this duality is, for her, a reminder that medicine remains ‘poorly defined and poorly described by those who nevertheless practice it quite well’ (p. 30). So what, for Montgomery, is the ‘art’ and ‘science’ of medicine? For her, both terms are ‘slippery’, if not ill-defined and shallow, remaining largely unexamined and which detract from the appreciation that good medicine is neither an art nor a science, but rather ‘a rational practice based on a scientific education and sound clinical experience’ (p. 30). Perhaps one might consider this question in terms of a ‘binary economy’, where ‘art and science [need] to be yoked together (yet held apart) in order to accrue the strengths of their polar positions: soft versus hard, intuitive versus analytical, inductive versus deductive, visual versus logical’ [**Jones, 1998**] (p. 32). Montgomery certainly agrees that some of the most interesting questions relating to clinical judgment are generated from the intersection of the two, but she insists that an inadequate examination of this interrelationship has the potential to render Medicine ‘facilely described and ... poorly understood’ (p. 33). Montgomery is surely correct when, in raising questions as to the effect of this misrepresentation of Medicine on medical practice, she worries that the so-called science–art paradox has the potential to create two very different understandings of Medicine, suggesting that they function as alternatives. She is clear, as is this essayist, that the creation and maintenance of such a false dichotomy is damaging to a proper understanding of the true nature of medical practice and therefore what it is to be a good doctor [**Benner, 1984**].

Medicine as a practice

In clinical practice doctors personally assess patients in order to diagnose, treat, and prevent disease using clinical judgment. The doctor-patient relationship typically begins an interaction with an examination of the patient's medical history and medical record, followed by a medical interview¹ Coulehan,2005¹ and a physical examination. Basic diagnostic medical devices (e.g. stethoscope, tongue depressor) are typically used. After examination for signs and interviewing for symptoms, the doctor may order medical tests (e.g. blood tests), take a biopsy, or prescribe pharmaceutical drugs or other therapies. Differential diagnosis methods help to rule out conditions based on the information provided. During the encounter, properly informing the patient about all relevant facts is an important part of the relationship and the development of trust. The medical **encounter** is then documented in the medical record, which is a legal document in many jurisdictions.¹ Addison,2005¹ Followups may be shorter but follow the same general procedure.

The components of the medical interview [Coulehan,2005]¹ and encounter are:

- Chief complaint (cc): the reason for the current medical visit. These are the symptoms. They are in the patient's own words and are recorded along with the duration of each one. Also called 'presenting complaint.'
- History of present illness / complaint (HPI): the chronological order of events of symptoms and further clarification of each symptom.
- Current activity: occupation, hobbies, what the patient actually does.
- Medications (Rx): what drugs the patient takes including prescribed, over-the-counter, and home remedies, as well as alternative and herbal medicines/herbal remedies. Allergies are also recorded.

- Past medical history (PMH/PMHx): concurrent medical problems, past hospitalizations and operations, injuries, past infectious diseases and/or vaccinations, history of known allergies.
- Social history (SH): birthplace, residences, marital history, social and economic status, habits (including diet, medications, tobacco, alcohol).
- Family history (FH): listing of diseases in the family that may impact the patient. A family tree is sometimes used.
- Review of systems (ROS) or *systems inquiry*: a set of additional questions to ask which may be missed on HPI: a general enquiry (have you noticed any weight loss, change in sleep quality, fevers, lumps and bumps? etc), followed by questions on the body's main organ systems (heart, lungs, digestive tract, urinary tract, etc).

The physical examination is the examination of the patient while looking for signs of disease ('symptoms' are what the patient volunteers; 'signs' are what the healthcare provider detects by examination). The healthcare provider uses the senses of sight, hearing, touch, and sometimes smell (taste has been made redundant by the availability of modern lab tests). Four chief methods are used: inspection, palpation (feel), percussion (tap to determine resonance characteristics), and auscultation (listen); smelling may be useful (e.g. infection, uremia, diabetic ketoacidosis). The clinical examination involves study of:

- Vital signs including height, weight, body temperature, blood pressure, pulse, respiration rate, hemoglobin oxygen saturation
- General appearance of the patient and specific indicators of disease (nutritional status, presence of jaundice, pallor or clubbing)
- Skin
- Head, eye, ear, nose, and throat (HEENT)
- Cardiovascular (heart and blood vessels)
- Respiratory (large airways and lungs)
- Abdomen and rectum
- Genitalia (and pregnancy if the patient is or could be pregnant)

- Musculoskeletal (including spine and extremities)
- Neurological (consciousness, awareness, brain, vision, cranial nerves,
- Psychiatric (orientation, mental state, evidence of abnormal perception or thought)

Laboratory and imaging studies results may be obtained, if necessary.

The medical decision-making (MDM) process involves analysis and synthesis of all the above data to come up with a list of possible diagnoses (the differential diagnoses), along with an idea of what needs to be done to obtain a definitive diagnosis that would explain the patient's problem.

The treatment plan may include ordering additional laboratory tests and studies, starting therapy, referral to a specialist, or watchful observation. Follow-up may be advised.

This process is used by primary care providers as well as specialists. It may take only a few minutes if the problem is simple and straightforward. On the other hand, it may take weeks in a patient who has been hospitalized with bizarre symptoms or multi-system problems, with involvement of several specialists.

On subsequent visits, the process may be repeated in an abbreviated manner to obtain any new history, symptoms, physical findings, and lab or imaging results or specialist consultations.

From this largely introductory discussion, Montgomery proceeds to consider medicine's character as a practice, which she sees as neglected by the preferential and disproportionate study of the science–art duality. For her, medical practice is ‘far more than a body of scientific knowledge and a collection of good-practice skills ... it is the conjunction of the two: the rational, clinically experienced and scientifically informed care of sick people’ (p. 33). The core component, indeed description, of this activity is, as she points out, *clinical judgment*, a process of coming to a conclusion about the optimal management of an individual patient that has been much

studied, both from within and outside medicine. She goes on to discuss the practical reasoning inherent in the exercise of clinical judgment in terms of *phronesis*, particularly the Aristotelian description of *phronesis* the philosopher expounds in his *Nicomachean Ethics*[Lrwin,1985] and when he talks in terms of the intellectual capacity or ‘virtue’ that characterizes practical activities rather than science *per se*. This is a useful discussion, because it brings to the fore the reality that there is more than one kind of rationality of relevance to the formation of judgment than that typically employed as part of the scientific process. Indeed, as Montgomery points out, *phronesis* (while being an ‘interpretive making-sense-of-things way of knowing’ and thus having the capacity to take account, for example, of context and unexpected variability), is typically rejected in favor of the ‘binary split between knowledge of the hard reliable stuff and the mushy but unavoidable ineffabilities’ (p. 34). She asks: ‘Why is clinical judgment not celebrated?’ Why indeed? Probably, as she remarks, because it would be seen as a tacit rejection of ‘science’ or a disregard for ‘evidence’. But she is equally clear that the idea that everything about disease and injury in individual patients can be, or will eventually be known, measured and predicted, is an unwarranted leap and it is in these *typical* circumstances that the need for clinical judgment as an integral and necessary part of good clinical care becomes appreciated [**Feigenbaum**,1983].

Montgomery is clear that if medicine were a science in the conventional sense, then its established laws could be programmed into a computer, with diagnosis and treatment selection being determined following data input. But such is not the case, for a multiplicity of reasons that the *Journal of Evaluation in Clinical Practice* (JECP), as one organ of scholarly communication in the field, has documented and discussed over long years. Taking one such reason, and perhaps the least considered dating, Montgomery highlights *the need for human contact* in the diagnosis and treatment of disease, a requirement, as it were, of the doctor and the patient, and which transaction is well described as the *clinical encounter*. It is the nature of this, as she rightly notes, that goes well beyond the patient's

need for reassurance and support. Indeed, even in our increasingly technologically advanced society, the clinician invariably feels the need to examine the patient for himself as part of medicine's ancient traditions and as part of this activity inevitably uses 'an immense and well-sorted catalogue of clinical cases and the clinical judgment to know how to use it, and that store of knowledge is activated by seeing, touching and questioning the patient' (p. 34) [**Benner, 1984**], .

Medicine and artificial intelligence systems

Man strives to augment his abilities by building tools. From the invention of the club to lengthen his reach and strengthen his blow to the refinement of the electron microscope to sharpen his vision, tools have extended his ability to sense and to manipulate the world about him. Today we stand on the threshold of new technical developments which will augment man's reasoning, the computer and the programming methods being devised for it are the new tools to effect this change.

Medicine is a field in which such help is critically needed. Our increasing expectations of the highest quality health care, and the rapid growth of ever more detailed medical knowledge, leave the physician without adequate time to devote to each case and struggling to keep up with the newest developments in his field. For lack of time, most medical decisions must be based on rapid judgments of the case relying on the physician's unaided memory. Only in rare situations can a literature search or other extended investigation be undertaken to assure the doctor (and the patient) that the latest knowledge is brought to bear on any particular case. Continued training and recertification procedures encourage the physician to keep more of the relevant information constantly in mind, but fundamental limitations of human memory and recall coupled with the growth of knowledge assure that most of what is known cannot be known by most individuals. ~~is is the opportunity for new computer tools: to help organize, store, and retrieve appropriate medical knowledge needed by the

practitioner in dealing with each difficult case, and to suggest appropriate diagnostic, prognostic and therapeutic decisions and decision-making techniques.

In a 1970 review article, Schwartz speaks of the possibility that the computer as an intellectual tool can reshape the present system of health care, fundamentally alter the role of the physician, and profoundly change the nature of medical manpower recruitment and medical education--in short, the possibility that the health-care system by the year 2000 will be basically different from what it is today. [Schwartz, 1970]

The key technical developments leading to this reshaping will almost certainly involve exploitation of the computer as an 'intellectual,' 'deductive' instrument--a consultant that is built into the very structure of the medical-care system and that augments or replaces many traditional activities of the physician. Indeed, it seems probable that in the not too distant future the physician and the computer will engage in frequent dialogue, the computer continuously taking note of history, physical findings, laboratory data, and the like, alerting the physician to the most probable diagnoses and suggesting the appropriate, safest course of action. [Schwartz, 1970]

This vision is only slowly coming to reality. The techniques needed to implement computer programs to achieve these goals are still elusive, and many other factors influence the acceptability of the programs.

This book is an introduction to the field of Artificial Intelligence in Medicine, (abbreviated AIM) which is now taking up the challenge of creating and distributing the tools mentioned above. This introductory chapter defines the problems addressed by the field, gives a short overview of other technical approaches to these problems, introduces some of the fundamental ideas of artificial intelligence, briefly describes the current state of the art of AIM, discusses its technical accomplishments and current problems, and looks at likely future developments. The other four chapters each describe one of the current AIM projects in some detail, pointing out

not only the accomplishments of the programs built so far but also what we have learned In the process of creating them.

It is at this particular juncture in her text that Montgomery reflects on the nature of artificial intelligence (AI) in order further to illustrate her argument. Noting the progress that has been made via information technology, computer science and medical informatics in the codification of clinical expertise, she observes that such tools are able to work well really only in the hands of an already reasonably skilled practitioner. Are such limitations inherent or might they, perhaps, be overcome by further software development? Not for Montgomery, or indeed this essayist. Why not? To answer this question Montgomery points to the seminal volume *From Novice to Expert: Excellence and Power in Clinical Nursing Practice* [**Benner,1984**], a text which many years ago advanced the notion that the development of clinical skills, while it has its origin in the learning and observance of rules, later demonstrates an ability to look beyond basic formulas and to comprehend a given clinical scenario more holistically. Montgomery did well here, I thought, to quote Feigenbaum, one of the early fathers of AI. When, observing the typical inability of doctors to describe the specifics of their decision making in the context of the individual patient, Feigenbaum states, with some frustration: ‘At this point, knowledge threatens to become 10 thousand special cases’ [**Feigenbaum, 1983**]. Not that Feigenbaum has remained alone in making such an observation. Indeed, as Montgomery notes, on these points academics of often very varying backgrounds and disciplines find themselves able to agree. For example, within the volume *Interpretive Social Sciences: A Second Look*, Hubert Dreyfus [**Dreyfus, 1987**] (a philosopher whose work has consistently criticized AI as insufficiently contextual) and Stuart Dreyfus (an applied mathematician whose work on expertise, as Montgomery reminds us, Patricia Benner has used), are both in agreement that those individuals satisfying the definition of ‘expert’, reason ‘holographically’ [**Montgomery, 2006**] and *not* by methodical inference. For Montgomery, this quite simply underpins the perhaps intractable

difficulty which confronts those who would model clinical expertise. So what is Montgomery's conclusion in relation to AI in this context? She certainly does not dismiss computerized expert systems as useless. On the contrary, she is clear that a good computer program is perfectly capable of suggesting potential diagnoses. But her central point is one with which this essayist agrees; that to function usefully in Medicine, AI systems need to base themselves on precisely those rules that, were they absolute, would establish medicine as a science. Given that such rules are far from absolute, certainty is impossible. So why is it, then, that many clinicians continue to accept descriptions of medicine as a science? The prevailing dogma of EBM has certainly led some colleagues to appeal to probability values derived from epidemiological studies as surrogate markers of certainty. Other colleagues accept the inherent uncertainty of medical practice, but seem to 'optimistically predict that Medicine's non-scientific subjectivity is a temporary flaw, an irrationality that will disappear when the last biological puzzle has been solved' (p. 36). I suspect that many readers will join with Montgomery in considering such a prediction wildly optimistic. Medical practice remains as one hundred years ago, in spite of massive pharmacological and technological progress, an inherently uncertain activity, with scientific reasoning of the positivistic, objective and replicable sort, continuing to play only a small part in clinical practice. Indeed, clinicians cannot possibly rely on an effect size calculated from an epidemiological study to determine of itself the most appropriate course of care for the given individual [**Dreyfus, 1987**]. On the contrary, they must: 'Understand human biology, investigate the patient's condition attentively, reach a diagnosis, understand the clinical research and its relevance to the particular individual who is the patient, and then weigh the benefits and burdens of therapeutic choices and adjust the treatment as events unfold. *Such a practice is certainly rational, but it is not (especially by medicine's own positivist definition) science.*' (Italics mine) (p. 36)[Malterud,1995].

The complexity of clinical rationality

I found Montgomery's discourse on the complexity of clinical rationality particularly interesting. Opening this section of her volume, she reminds us that clinicians must, given the substantial uncertainty of medical practice as a 'science-using practice that must diagnose and treat illnesses one by one', use a more detailed concept of rationality than a 'sparse, physics-based, positivistic account of scientific knowing'. Drawing upon Kirsti Malterud's thinking [Malterud,1995], which argues that traditional medical epistemology is an inadequate representation of medical knowledge given that the human interaction and interpretation which constitutes a considerable element of clinical practice cannot be investigated from that epistemic position [Malterud, 1995, 1998, 2002, 2004, 2006], Montgomery proceeds to demonstrate the misrepresentation of knowledge that positivistic reasoning can result in. She agrees with Cassell [Cassell, 1991, 1997] that clinical judgement is 'experienced knowing', the 'exercise of practical reasoning in the care of patients'. For her, this 'clinical knowing' will always be necessary, with scientific advances unlikely to change the necessity for doctors to exercise such practical reasoning in the care of patients, irrespective of the science base that (increasingly, admittedly) informs decision making. For Montgomery, it is the *phronesis* or clinical judgement that is indispensable in this context and which 'is the essential virtue of the good physician' (p. 37).

The radical uncertainty of clinical practice

"Some questions cannot be answered, no matter how diligently one searches the literature, no matter which expert one consults."

For all its advances, the practice of modern medicine involves a great deal of scientific uncertainty and therefore involves a great deal of discretion on the part of doctors and other clinicians. Healthcare providers operate at best within what Simon termed "bounded rationality". Reasoned

decision-making based on fully-informed assessment of all possible contingencies is beyond health professionals' reach. The call for development of "evidence-based medicine" reflects the limits of the science base upon which current clinical practice is founded. In many - perhaps most - medical situations, clinicians lack the systematic health outcomes data necessary to compare, in scientific fashion, the expected efficacy of diagnostic and therapeutic alternatives. Neither health insurance contracts nor ethical and legal rules do a great deal to narrow the resulting clinical discretion. Contractual language in private health plans does not set clear limits. Insurance contracts typically require that a plan provide coverage for "medically necessary" services, subject only to provider network restrictions and to the requirement that care not be "investigational" or "experimental." The opaque term "medical necessity" is not defined in health plan contracts; it therefore must be subject to the interpretation of providers and utilization managers. Medicare and Medicaid are similarly nondirective about providers' decisions; the statutory language establishing both programs requires coverage when "medical necessity" is present. Incorporation of detailed clinical practice protocols into health insurance contracts (and the regulations that govern public programs) could in theory constrain providers' discretion. But, this rule-based approach encounters serious practical obstacles. Uncertainty about the efficacy of many diagnostic and therapeutic alternatives makes it impossible to base comprehensive clinical practice protocols entirely, or even largely, on science. This makes use of such protocols easy to challenge and difficult to defend. Moreover, uncertainty and subjectivity in the assessment of particular patients' conditions leave much space for discretion when doctors decide which practice protocols to apply.

Medical ethics, in theory, could constrain healthcare providers' discretionary judgment, but the evolution of ethical theory has not taken such a course. The Hippocratic ethical tradition emphasizes physicians' loyalty (to patients), good intentions and commitment to learning and good craftsmanship, but it does not set forth principles or rules to channel

clinical discretion. The contemporary bioethics movement's emphasis on patient autonomy entails an effort to keep provider discretion within the bounds of respect for patient preferences, but providers have broad scope for discretion in their presentation of risks, benefits and alternatives to their patients. Likewise, medical tort law's approach to the setting of legal standards of care defers to physicians' practice norms as sources of standards. The U.S. Supreme Court's recent decision in *Rush Prudential HMO, Inc. v. Moran* extended this deferential approach to the law governing health insurers' coverage denials in most states. The Court characterized state-mandated independent review of insurers' "medical necessity" determinations as akin to a medical "second opinion" and thus a matter of professional judgment. By deferring to physicians' practice norms and professional judgment, medical malpractice and insurance law allow for a wide scope of physician discretion.

Treatment of prostate cancer illustrates the uncertainties that providers and patients routinely face. The American Urological Association and the American College of Physicians hold that radical prostatectomy, radiation therapy and watching and waiting without intervention are all valid treatment options because there is insufficient evidence to establish that any one of these approaches is better than the others. Empirical studies have yielded conflicting results, and countries with similar prostate cancer mortality rates have very different standard treatments. On the other hand, particular surgeons have individualized, sharply differing views about the value of surgery versus other approaches. Uncertainty, along with consequent lack of agreement on a single, standard treatment, leaves room for individual doctors with varying views to advise their patients in differing ways without acting contrary to established, evidence-based practice. Similar uncertainty persists in many areas of medical practice, engendering wide variation in medical practice norms within and across different regions of the United States. Physician discretion influences the care that patients receive even when ample evidence bears on the comparative efficacy of clinical alternatives. A doctor's knowledge and

skills, past experience, perceptions of her patients' values and preferences, and financial and other personal incentives are among the factors that shape physician judgment. Empirical studies confirm the importance of these factors, even when scientific evidence for and against particular therapies is strong. Much of the variation in what happens to patients--in how their evaluation and treatment is managed--is associated with clinical discretion. Evidence for racial and ethnic disparities in healthcare is essentially a demonstration that such variation systematically correlates with the race and ethnicity of patients [**Wiles, et, all, 1999, 2000, 2001, 2002, 2003, 2004, 2006a, 2006b, 2007**].

Montgomery does not exaggerate when she talks of the 'radical uncertainty' of clinical practice which so often manifests itself in the face of the incompleteness of medical knowledge. She acknowledges the efforts of the protagonists of EBM and the various colonies that collectively constitute the Cochrane Collaboration in their attempts over long years to evaluate and reconcile the results of often conflicting studies, but she is in my view quite right to caution that the perception that 'invariant precision – real certainty – in dealing with illness is just around the corner', is essentially illusory. I disagree with Montgomery, however, when she states that '... EBM has never claimed [this]'. On the contrary, and as the JECP has extensively documented and discussed, the EBM community had claimed precisely this, particularly during the rhetorical outbursts that were seen at its inception, although the change in direction of the EBM debate steered by the JECP can be seen to have led to more intellectually measured claims and profoundly less hyperbolic rhetoric in recent years [**Wiles, et, all, 1999, 2000, 2001, 2002, 2003, 2004, 2006a, 2006b, 2007**]. Clearly, the collapse of EBM's core philosophies and so-called practical methodologies that is now in evidence does not in any way obviate the need to continue to search for other more sensible approaches to increase diagnostic, therapeutic and prognostic skills, but such endeavors may need to learn to temper the scale of their ambitions, precisely because '... the distance between Achilles and the tortoise, the gap between invariant,

reliable, universal laws and the variable manifestations of illness in a particular patient remains' (p. 38).

Medical educators and the misrepresentation of medicine

Montgomery uses the phrase 'a science of individuals' in this context, which recalls in part her description in a much earlier work of the patient as providing 'the text that medicine must read and make sense of and explain' [**Montgomery, 1991**]. The concept of a 'science of individuals' provides an important hypothetical basis for advanced study of the whole nature – and purpose – of clinical judgment, and reminds us vividly of the uniqueness of the individual patient in an era where advances in clinical epidemiology and the not altogether unrelated return of utilitarian health philosophies, threaten to view the individual patient as nothing more than a component part of a statistical population. So will advances in science – more randomized controlled trials, more mega-trials, more meta-analyses and more systematic reviews, change this? For Montgomery, and for this essayist, the answer is a simple 'no'. Even in what she refers to as 'that ideal future when the pathophysiology of disease is thoroughly known and the epidemiology of every malady established, and both are at the fingertips of the experienced practitioner', she is clear that medicine can only remain a practice. What brings her, then, to this conclusion? A unique insight into the future? Some sort of special prospectoscope? Of course not. Simply the common sense appreciation of a series of immutable facts which Montgomery details so elegantly that I quote her here *verbatim* and at length:

'Diagnosis, prognosis, and treatment of illness will go on requiring interpretation, the hallmark of clinical judgment. Physicians will still be educated and esteemed for the case-based practical reasoning that is situated, open to detail, flexible, and reinterpretable, because their task will continue to be the discovery of what is going on with each particular patient. Even with the last molecular function understood, the genome fully

explicated, and cancer curable, the care of sick people will not be an unmediated ‘application’ of science. People vary; diseases manifest themselves in varying ways. The individual patient will still require clinical scrutiny, clinical interpretation. The history will be taken, the body examined for signs, tests performed, and the medical case constructed. Patients will go on presenting demographically improbable symptoms of diseases; some will require toxic therapy, and sometimes treatment will come too late. Tests will have to be balanced between their sensitivity to marginal cases and the specificity with which they can identify disease. Therapies of choice will be second choice for some patients and will never cure quite everyone. The attentive focus on the particular patient that is the clinician's moral obligation will continue to compel the exercise of practical reason. Because the practice of medicine requires the recollection and representation of subjective experience, physicians will go on investigating each clinical case: reconstructing to the best of their ability events of body, mind, family and environment. For this task scientific knowledge is necessary and logic essential, even though the task itself is narrative and interpretive. Clinicians must grasp and make sense of events occurring over time even as they recognize the inherent uncertainty of this quasi-causal, retrospective rational strategy. Piecing together the evidence of the patient's symptoms, physical signs, and test results to create a recognizable pattern or plot is a complex and imprecise exercise. It is subject to all the frailty of historical reconstruction, but it remains the best – the logical, rational best – that clinical reasoners can do. It is not science, not in any positivist sense, nor is it art.’ **[Dreyfus, 1987]** (pp. 38–39). Many medical educators insist that a belief that medicine is a science is essential to proper medical education. In doing so, they therefore contribute directly to the faulty labeling of medicine, and it is noteworthy that many of these colleagues are converts to the ‘EBM cause’ as a means of developing their own professionalism and in order to lay claim to be innovators and scientists in their own field, rejecting sound concepts that have served medicine well, in favor of novelty and fashion. With others, this essayist has previously noted

that many medical educational curricula have been, and continue to be, heavily influenced by EBM philosophies in the absence of any significant evidence that medical students educated in this way make better doctors than those who are not. My own view is that no such progress is achieved by EBM-influenced curricula. Indeed, I believe the *reverse* to be the case and I hypothesize that as time elapses, and the relevant experience and data are accumulated, it will become possible to show this quite definitively. By that time, however, I believe that an essentially irreparable damage will have been occasioned to the historic nature of medicine, especially as over-politicized and over-regulated health services increasingly embed the EBM-inspired practice guidelines and standardization culture into the minds of clinicians, for largely regulatory purposes, steadily converting medical professionals into health service technicians, as part of this process [Timmermans, 2003]. How will clinical judgment be exercised then? How will it be described? As an interesting facet of medicine's history – something illustrating medicine's ‘pre-scientific’, ‘pre-economically rationalized’, ‘pre-unpoliticized’, ‘pre-unstandardized’ past, perhaps? Certainly, there is a wealth of indicators within the developed world which strongly suggests this to be the case [Dreyfus,1987] .

Why does medicine collude in the misrepresentation of its rationality?

If one accepts Montgomery's general thesis, as does this essayist, then one is bound to ask the question as she herself does: ‘Why does medicine collude in the misrepresentation of its rationality?’ Montgomery appears at first sight here to state that all doctors collectively assert the nature of medicine as science. Such would not be true, although it must be acknowledged that a considerable body of doctors certainly misrepresents the rationality of medicine in precisely the manner that Montgomery describes. Her argument that these doctors do so because medicine's status in Society depends in considerable measure on the scientific nature of much of its information, is compelling, given the authority, respect and, in

modern times, television and newspaper ‘celebrity’, that the figure of the doctor-scientist commands.

Such power systems worked well for doctors in Victorian and Edwardian times – *sed tempora mutantur et nos in eis mutant*. Indeed, patients now expect clinical certainty to be the norm and typically show unrealistic expectations of doctors as a direct result, generating as Montgomery points out, malpractice claims which result from such misplaced expectation and a perception by the patient of error and neglect. A proper appreciation by patients and society more generally of the nature of clinical judgment would prevent such misunderstanding and would show doctors to be what in reality they are: ‘human and fallible, but still trustworthy authority (ies)’ (p. 39). But doctors recoil still from such admissions, perhaps less as a means of maintaining societal status than of a need for certainty when making important, sometimes vital, decisions in the context of the individual case. This entirely understandable quest for certainty, if it leads to rigor and care in the diagnostic, therapeutic and prognostic process is, without doubt, to be welcomed and is a professional and moral obligation on the doctor. The danger in my own view is where a particular system or philosophy in Medicine purports to provide the certainty for which doctors rightly strive, but where, in reality, no such certainty is provided or possible.

The EBM movement, in having made such claims – usually implicitly but sometimes explicitly – has vividly demonstrated its epistemological, ethical and moral flaws [**Loughlin, 2003, 2006a, 2006b, 2006c**] within a framework of illogicality that has been both unscientific and antiscientific [**Miles,1997,1998,1999,2000**]. EBM is constituted by a concept and a method and can only be regarded as an experimental approach to clinical practice yet to be properly tested through quantitative and qualitative inquiries into any potential usefulness. It is certainly not some form of model illustration of what good clinical medicine is or should be, that much is now incontrovertible [Milws,2000;Loughlin,2006; Tonelli, 2006, Djalbegovic,2006; Miettinen, 2006; Porta, 2006; Lipman,2006;

Tanenbaum,2006; sacouto,2006; Upshur,2006; Gupta, 2006; geanellos et all, 2006; Buetow, 2006; Tonelli,2007; Miles,2007a,2007b; Timmermans et all, 2003]. If future investigations of EBM show it to be of benefit to some groups of patients, then it may come to be regarded as a tool of value in the making of decisions in particular contexts. However, at the time of writing, it shows no proven potential and has little to do with good clinical judgment if we accept Montgomery's definition and explication of the same, as do I. Curiously, Montgomery does not make this observation and develop her argumentation accordingly and this, perhaps, is in my own opinion one of the very few shortcomings of her monograph and the principal one on which I would take her to task. It appeared odd to me that in noting that science is often regarded as the 'gold standard' of clinical medicine 'precisely because it promises reliability, replicability, objectivity', and in noting that medical students, indeed doctors, 'seem to need the honorific label "science" as a warrant for their clinical acts' (pp. 39,40) she failed, or chose not, to discuss the drivers of such indoctrination and faulty labeling that the protagonists of EBM have represented and indeed continue – through their involvement in medical education – to represent.

Medicine's irreducible uncertainty and the over-reliance on science

I return now to the nature of certainty in medicine and ask with Montgomery: 'Should we ask students in whom we inculcate the absolute need for observation of detail, the need for continuous update of knowledge, the need to provide optimal care to the individual, to acknowledge medicine's irreducible uncertainty?' When we are patients, Montgomery asks, do we want doctors to disclose to us that their knowledge is incomplete, its application to our case imprecise and its usefulness uncertain? I have to confess to laughing out loud when she answers 'Not unless our complaint is very minor we don't'(!). But in such humor lies the truth that patients want, and in situations of distress *need*, to

think of their doctors as learned, assured and quintessentially infallible figures. Herein, again, rests the allure of science for doctors as a means of achieving such a lofty perfection in practice and which leads many doctors to an over-reliance on science which is at once as absurd as it is dangerous. But, as Montgomery says, ‘Few clinicians – or patients – for their respective reasons – have imagined challenging this *folie a deux*.’

If a lucid understanding of the limits of science leads the reader to recognize, with Montgomery, that science can only be a tool, rather than the soul, of medicine, then should we be educating doctors (and patients) accordingly? For Montgomery, as for this essayist, the answer is an unequivocal ‘yes’. If we were to ask ‘how?’, then Montgomery answers us by describing a formal moral framework where the foundational teaching urges the student, in a long and scrupulous preparation, to act wisely for the good of the patient in an uncertain field of knowledge. Thus, how to go about this? For Montgomery, the process would begin with a scrapping of the unexamined description of clinical medicine as both a science and an art, as it is her conviction that that essential duality succeeds in ignoring all that medicine shares with moral reasoning and reinforces a contemporary tendency to split ethics from medicine, hardly a good idea if one accepts that in medicine, morality and clinical practice require *phronesis*, the practical rationality that characterizes both a reliable moral agent and a good doctor [Dreyfus,1987] (p. 41).

Clinical judgment and the interpretation of the individual case

Acknowledging that the intrinsic limitations of EBM mean that it cannot by its nature turn medicine into a science – not least because its methods require a clear clinical question and given that the formulation of such questions is the essence of clinical judgment – Montgomery goes on to consider clinical judgment as it is exercised in the interpretation of the individual case. In this context, she notes that doctors use both the scientific or hypothetical-deductive approach *and* the practical or interpretive and

narrative approach [Geenhalgh, 1998; Hurwitz,2004], but she is clear that for her it is the latter which defines them as clinicians. Indeed, she emphasizes that while clinicians rely in considerable measure on the biological understanding of disease, talking of the medical ‘knowledge base’, it is the application of scientific information in a rational, science-using process, which characterizes the work of a doctor. Yet Montgomery is equally emphatic that the nature of biological knowledge – general, variable, evolving – that is so fundamental to medicine, at the same time limits its usefulness in the care of individual patients, such that biological knowledge cannot be, in any sense, directly applied to individuals in some sort of formulaic manner. Indeed, at this juncture she importantly reminds us that while scientific generalizations play an important part in the practical reasoning of medicine, ‘neither biological facts nor epidemiological probabilities go very far alone’ (p. 45). In talking of what can only ever be an ‘approximate applicability’ to individual patients of these sources of knowledge for practice, I found much of interest in Montgomery’s reflection of how ‘general truths’ have always required *particularization*, as it were, not only in medicine itself, but also in another two professions which emerged definitively from the Middle Ages: law and moral Theology. Here, also, generalizations have required ‘particularization’ through interpretation and judgment as they are ‘put into action’, or applied, to given individuals in varying, changing and often incompletely specified circumstances. It is the appreciation by Montgomery that these ‘abstractions’ sometimes fit well or badly (but never in detail) to the individual and her worry as to *which* general principle, law or maxim *is* applicable to the given individual case, that leads her on to the recognition that such thinking and decision-making processes demonstrate clinical judgment in action: the creation of a list of clinical possibilities, through differential diagnosis, to the making of a clinical decision. It is here that she turns to clinical judgment as narrative rationality [Geenhalgh,1998; Hurwitz,2004] (p. 46).

Doctors do not reason as scientists do

Montgomery, when looking more closely at the reasoning process through which doctors make clinical decisions, is clear that doctors do not reason as they imagine scientists do. She is clear that doctors – whether diagnosing or making a decision on treatment or examining options deriving from the field of so-called ‘bioethics’ [Loughlin, 2002; Loughlin, 2004] often eschew the ‘top-down’ deductive, scientific model in favor of case-based reasoning instead. Interestingly, this mode of thinking continues to characterize medical practice, despite the invective of recent years that has been directed against so-called ‘anecdotal knowledge’, such that case narration remains a principal means of thinking and remembering – of *knowing*, as Montgomery puts it, in medicine. It is easy to dismiss this *modus operandi* as a vestige of the past, as many members of the EBM community have done, but for Montgomery, as for this essayist, it in reality illustrates the exercise of clinical judgment. Not that Montgomery is unaware of the dangers of over-reliance on ‘narrative-based medicine’, but having reviewed some examples of these, she is confirmed in her view that narrative remains essential in medicine as the mechanism through which insight from practice is accumulated for immediate and subsequent use [Greenhalgh, 2004]. If this is accepted, then diagnosis and the selection of treatments become not merely the products of ‘cold’ logic, but ‘a more contextual consideration intertwined with history, identity, culture and the meaning of an individual's life’. By such a process, medicine can take account of cultural, social, familial and psychological detail, such that illness and disease become ‘bio-cultural’, as Montgomery notes in reflecting on Morris' work [Morris, 2000].

Generalization and Particularization

In Chapter Five, *The Simplification of Clinical Cause*, Montgomery proceeds to look in greater detail at ‘generalization’ and ‘particularization’,

processes which she describes vividly as ‘lumping’ and ‘splitting’, the ‘doctor–reasoner’ moving between them and utilizing both. She sees in this oscillation, as it were, an intellectual tension, with medicine’s counterbalancing movement between the patient’s clinical presentation and the taxonomy of disease leading to the noting of exceptions to every ‘established’ rule. For Montgomery, this ‘counter weighing’, as she puts it, represents a central characteristic of clinical judgment, here illustrating the exercise of practical reasoning in an attempt to reason retrospectively under conditions of uncertainty, such that each move – ‘lumping’ or ‘splitting’, functions to test and curb or refine the other (p. 87). For Montgomery, this whole and undoubtedly ‘risky’ process of generalization satisfies a human need to categorize. Thus, experienced doctors make observations and accumulate information with which to test their initial hypotheses in order to arrive at a diagnostic conclusion as the basis of therapeutic intent. Moving to ‘particularization’ – the opposite or reverse of generalization – Montgomery examines how this process, essential to clinical judgment, is utilized in clinical decision making, framing this ‘activity’ in terms of how the clinician, faced with a wide range of generalizing studies of varying quality and uncertain relevance, determines which ones, if any, may be applicable to the individual patient.

Montgomery is clear that these processes of ‘generalization’ and ‘particularization’, the ‘lumping’ and ‘splitting’ as we have noted that she has termed them, pose inevitable difficulties for the clinician. In terms of generalization, the ‘first half of clinical reasoning’, its limitation derives from what appears to be a narrative instinct: humans are predisposed, it seems, to construct accounts of cause and effect from the evidence available to them and, indeed, sometimes from random events. Montgomery cautions against the error of generalizing from inadequate, flawed or insufficient evidence such that *post hoc; ergo propter hoc* – what follows an event is therefore caused by it – is always to be regarded as a ‘suspect’ conclusion. She views particularization, the ‘other half of clinical knowing’, as ‘the essential act of clinical reasoning’. She describes it as

beginning with the interpretive question that is the essence of the initial clinical encounter: 'What is going on with this patient?', thus placing the patient within a general scheme of illness. But particularization, by its nature, precedes generalization, in that it is chronologically and methodologically secondary to particularization, such that 'lumping' precedes splitting' (p. 88). This is not to say that the particulars do not remain centrally important. Indeed, using the example of her daughter, she points out that clinicians *must* have an appreciation that a very small number of 28-year-old women *can* develop breast cancer, before they can sensibly ignore the studies of its statistical improbability. Indeed, as Montgomery properly emphasizes, 'an understanding of the individual in light of the general is, after all, the clinical point'.

“Every lion is different”

Montgomery's story of the zookeeper in illustration of medicine's epistemological predicament (and perhaps indicative of why Aristotle declared the impossibility of a science of individuals) is illustrative in this very context. The zookeeper, who was renowned for breeding lions in captivity, was asked the secret of his success. In response to the question, he answers: 'You must understand lions.... You need to understand: every lion is different' (p. 89). It is at this juncture that Montgomery returns to a discussion of how EBM has contributed, in her view, to the problem of knowing in an uncertain practice, the problem of particularizing from generalized knowledge. While the ability to do so (and any method which refines such an ability) is most definitely a contribution to medicine's 'phronesiology', I do not agree with Montgomery that EBM has made a major contribution to medicine in this way. My own view is that EBM *has* promoted wholesale epidemiological solutions to clinical problems, while paying lip service to the need to particularize such information to individual patients and the difficulties in doing so. In this sense, I do not believe that EBM has contributed anything of substantial or lasting value to

medicine's progress and my view is that history will show it as having been of disservice, rather than service, to patients and indeed to doctors whose professionalism has already been adversely affected by EBM-associated, and EBM-inspired, innovations in health services. I agree, however, with Montgomery's summary in this context that:

‘Because clinical knowing arises from individual cases (however well aggregated in clinical studies) and must ultimately be applied to an individual patient, that knowledge is necessarily circumstantial and radically uncertain. Competent clinicians must simultaneously know the general rules of their practice and recognize exceptions when they occur. They must entertain the possibility of anomalies without letting that possibility distort their judgment. Yet even the best residency followed by a fellowship in the very smallest possible subspecialty cannot provide a physician with an example of every manifestation of disease he or she will need to recognize over a lifetime of practice. People differ, diseases change, and new information floods the academic journals. Clinical judgment, when fueled by reliable information and a store of related experience, enables physicians in an unfamiliar situation to work out the best thing, under the circumstances, to do.’ (p. 90)

What, in real terms, has EBM contributed to this process? While Montgomery is correct in stating that the methods of EBM *do not* supply ‘correct’ answers, she must surely recognize that, in fact, they *cannot*. EBM does not in my view assist the refinement of clinical judgment, but on the contrary, acts to denigrate it, as the JECP has repeatedly and variously illustrated [[Tonelli,2007](#)]. As Montgomery says: as the deduction that rules out unlikely diagnoses on the differential diagnosis list, the ‘answers’ supplied by EBM depend on the doctor's fund of knowledge and experience. It is in this context that I would argue that such a fund of knowledge and experience, if properly formed, actually serves to recognize the errant philosophies and methods of EBM for what they are: erroneous. Thus, the more experienced the doctor, the more likely he is to see the limitations of EBM and to reject this concept and its methods accordingly

as having any useful place in his practice. Conversely, the less experienced the doctor, the more likely he is to find the ‘certainty’ promised by the EBM paradigm alluring – which ‘certainty’, is not certainty at all, but rather a false certainty, far more likely to preclude excellence in clinical practice than to enable it [Miles,2006,2007]. It is on this basis that medical students or junior doctors who find themselves seduced by the promise of ‘greater certainty’ in decision making through EBM should be advised – and taught – to: (a) think for themselves (that is to say, avoid using other peoples' thinking); (b) collect and use their own evidence from a variety of sources (that is to say, not to treat summaries of evidence produced by the ‘EBM Community’ as anything other than just one source of potentially relevant evidence among many others) and (c) always to see their patients as utterly unique individuals (that is to say, as they would see their mother or father, child or partner, and thus never to see the patient as a statistic deriving from an epidemiological subpopulation).

EBM, the individual and the exercise of clinical judgment

The ideology and pseudo-authority of EBM would reverse this advice; indeed, the position of EBM has always been to urge juniors to accept the ‘authority’ of EBM summaries of knowledge in preference to other sources of information and most especially to reject the advice of highly experienced doctors – those, that by virtue of their knowledge and experience, could most effectively foster a talent in their juniors for good clinical judgment. Not that commercial ventures have failed to see the considerable benefits of such an errant philosophy [Upshure et al,2006]. Indeed, the ideology and pseudo-authority of EBM promotes the concept of the epidemiological subpopulation, as it is these very subpopulations which form the experimental samples from which their ‘guidance’ on treatment decisions originates. It is ironic indeed, that the method of the randomized controlled trial ritually fails one of the cardinal requirements of experimental validity: – reproducibility. Why? Because the experimental

population of the RCT is constituted by individuals, and individuals differ, it is as simple as that. And because individuals differ, they must be *treated differently*, if care is to be optimal, that is to say, tailored to the individual. But then, the same epidemiologists and biostatisticians who are the most enthusiastic proponents of EBM are also those who would talk of the need to achieve ‘reasonable’, rather than ‘optimal’, health of populations, thus advocating an approach to clinical practice that is utterly incompatible with the ethics and historic mission of medicine and which continues to be completely contrary to society's requirements of its health care systems. It seems almost unarguable, then, that EBM is unable to enhance clinical judgment, as Montgomery defines it, but, on the contrary, would normatively act to disable it.

Only in very recent years, following vigorous and sustained intellectual and clinical challenge [**Buetow** et al, 2006], has EBM grudgingly begun to consider the need for ‘particularization’ of generalizable knowledge; indeed, this mutation of its original philosophy was noted, and related to a new political environment which emphasized the need to take into account patient choice as part of the modern ‘patient-centeredness’ movement. In such circumstances, what could EBM do? Insist on its original philosophies and deny patient choice, on the premise that the ‘best evidence’ provided the ‘best decision’, irrespective of patient preference? Of course not, that would have proved immediately politically unsustainable and unacceptably paternalistic. Thus, EBM changed its original position, and has continued to change its position, with a frequency that should have proved of considerable concern to its adherents. (M. Loughlin, personal communication). What, then, has EBM to do with clinical judgment? Not a great deal, in my view, and for precisely those reasons that I have set out above. Curiously, despite some approbations of EBM throughout her text, I sensed that Montgomery seemed to feel likewise, at least in part, and I felt relieved when she came to admit that from the phronesiological position that she had discussed and advanced (p. 91): ‘To be truly valuable as a refinement in the process of clinical

specification, it (EBM) must prompt new studies of clinical variables in more and more particularized groups of patients – the very research Alvan Feinstein charged that it supplanted’ [50,51].

EBM, clinical judgment and ‘Feinsteinian’ thinking

I was privileged to discuss some of these very points with Feinstein himself around the time that he wrote on my invitation for the JECF [Feinstein, 1994, 1999, 2002]. It may be of interest to Montgomery, and to readers of her text and this essay, that Feinstein held the most definitive concerns in relation to the effect of EBM on the professional integrity and future direction of world medicine, not all of which were recorded with emphasis. Feinstein explained to me how, in his view, the ‘reductionism’ of the scientific method, as it were, had been magnificently successful in generating extraordinary insight into the mechanisms of disease and in providing an extensive array of technological interventions and novel therapies. His concern was, rather, with the seemingly relentless application of the reductionist approach to the care of patients, which for him necessitated an entirely different set of methods which readers will recall were described by Feinstein himself a quarter of a century ago [Feinstein, 1983a,1982b,1983c,1983e]. I was particularly intrigued by his description of EBM as an ‘evasion’ of the clinical responsibility to identify and classify disease presentations; that is to say, to try to understand phenomena and to use ‘soft’ as well as ‘hard’ data in exercising the medical judgments that are so foundational to effective clinical decision making. He expressed his irritation that rather than remaining focused on such foundational activities, doctors had become preferentially concerned with gazing at computer displays, digesting the quantitative aggregates obtained from meta-analyses of randomized trials and with wondering how statistical effect sizes could be applied to patient care. He saw the reorientation of medical practice – away from fashions and novelties such as EBM towards the development of ‘medicine-based evidence’ as being in the hands of clinicians

themselves, issuing the old aphoristic exhortation: ‘physician, heal thyself’. Some of this was documented and discussed in the JECP at my request, but it is, in fact, one of my enduring regrets that he did not live long enough to receive and accept my subsequent invitation to him to join the Editorial Board of the JECP in order to assist the work of the *Journal* in defining and clarifying the nature of evidence for application in clinical practice.

It certainly remains my own view, undoubtedly influenced by Feinstein, that the nature of this evidence, and the methods by which it can be generated, will never quite be grasped by the EBM community, not least, because of their ‘ideological conflicts of interest’[**Miles,2003,2004**]. Yes, as Montgomery notes, the EBM philosophy focuses via the initial clinical question on the individual (diagnosis having been established by quite different means indeed), but the evidence to which EBM would appeal to answer that question is general in nature and not immediately applicable to the individual patient. Herein consists the great dilemma for EBM: a concern on the one hand to ‘do the best for the individual’, but an appeal to sources of evidence that are quite unsuitable in strategies aimed at doing so. Again I ask: ‘what has this to do with sound clinical judgment?’ And again, I have to answer: ‘not a great deal’. As Montgomery says, questions about the individual applicability of generalized knowledge have traditionally been settled by clinical intuition, with the inherent uncertainty and imprecision of such approaches being tolerated because the ultimate problem of individualization has been insoluble and widely acknowledged to be so. In this context, she returns to ‘Feinsteinian thinking’, in recognizing that a research focus on clinical phenomena that have the potential to take us closer to understanding particular cases, is long overdue. I agree. Indeed, during our discussions, Feinstein told me that he considered this one of the most urgent research agendas for modern medicine and we agreed that genomics and its application in gene profiling was one of the most promising new technologies that might, with time, enable a particularization of general research evidence to take place at the bedside of the individual patient. To be able to speculate further on this

point, we shall have to await further analyses and clarifications of the clinical usefulness of the genomic data that are rapidly accumulating, although preliminary data deriving from the Human Genome Project suggest great clinical potential in this context. However, we are in 2007 and not in 2017 and, as Montgomery notes, the goal at the present time is to identify how best to take care of a particular patient more immediately, with direct reference to the current state of knowledge. Such a question, and the moral and professional imperative to answer it, returns us to *clinical judgment*.

Clinical reasoning: far more situated and flexible than even the most complex clinical algorithm

Opening Chapter Seven of her volume, Montgomery is clear that clinical judgment is not a skill separable from a well-stocked fund of scientific and practical information (p. 103) [Elstein et al, 1978]. She agrees, as do I, that if science were all that doctors needed, patients would have no need other than to consult an user-friendly computer program and, in such a scenario, would never need to see a doctor at all. I concur with Montgomery that sometimes it seems that medicine – at least in general practice – has almost reached this point, what with the proliferation of computerized aids, the great many of which are designed by the EBM community and adopted by health service managers who see in them not only mechanisms for cost analysis and containment, but also mechanisms to monitor every facet of decision making [Miles, 2007]. But as Montgomery notes, helpful as these diagrams of decision pathways can sometimes be, clinical reasoning is far more ‘situated’ and flexible than even the most complex clinical algorithm can ever express. As she rightly points out, these decision trees are simply aids to clinical judgment – they are in no way a substitute. Neither is the answer necessarily more and more reading of textbooks, articles and evidence digests produced by one group or another. On the contrary, Montgomery is clear that it is *experience* that

is the key to good judgment, deriving as it does, from long periods of clinical apprenticeship, the taking care of patients, the constant review of cases and the development of the power of reasoning that comes from all of this.

Clinical knowing – “Don't think zebras”

Following her excursion through the nature and utility of aphorisms, maxims and ‘old saws’ in medicine and in the fostering of good clinical judgment (pp. 104–120), Montgomery turns again to concepts of clinical knowing in Chapter Eight of her volume –*Don't Think Zebras: A Theory of Clinical Knowing*. Reflecting on the much taught ‘when you hear hoof beats, don't think zebras’, she is clear that as medicine's epidemiological watchword, it serves to remind doctors that the presence of signs and symptoms common to a number of diagnoses is unlikely to indicate the rare one on the overall list. The zebra aphorism epitomizes, as Montgomery says, the practical reasoning used by clinicians in the altogether uncertain task of caring for the sick. Indeed, as an intellectual but entirely practical activity (on which life and health often depends), medicine insists on taking into account *every* possibility. There, as Montgomery notes, on the clinical presentation of the patient, the *ordinary* is not necessarily the most *obvious* explanation (p. 123). She goes on to point out that, useful as the statistically improbable may be to clinicians in training, the genuine clinical aphorism warns *against* thinking zebras, and she uses this observation in explaining how the zebra aphorism is of significant value in understanding the fostering of clinical judgment. She observes that doctors, on a daily basis and whether in primary, secondary or tertiary care, balance their knowledge of all of the theoretical clinical possibilities, with a clear understanding of the statistical probability of any of them. She sees this imperative and its process as constituting the exercise of clinical judgment. Thus, the aphorism ‘Don't think zebras’ encourages both doctors in training, as well as their seniors, to be rigorous

in utilizing all they are learning, or have learnt, about statistical probability. Montgomery points out that when, in a clinical situation where, for example, a singular piece of evidence appears which simply does not ‘fit’ the perhaps otherwise well developing diagnosis, this mode of thinking cautions the doctor *against* the assumption that he is therefore dealing with a rare disease, but instead urges him to continue to think in terms of the working diagnosis: ‘when you hear hoof beats – don’t think zebras’. But, as she is quick to observe, ‘the zebras are (still) there, unforgotten, unforgettable, right there in the aphorism.’ In this context, not only does the advice generate its own counter-aphorism in the less experienced clinician, but also, as an injunction to forget, it is contradictory in itself. In this way, as long as the reminder not to think zebras comes to mind, zebras cannot be unthought-of. For Montgomery, this simple though highly illustrative example represents a paradoxical maxim which is the epitome of medicine’s practical rationality. It is, in effect, its quintessential interpretive rule. Indeed, because dealing with uncertainty and sometimes radical uncertainty is a fundamental reality in clinical practice, but perhaps never an explicitly taught component of the formal medical curriculum, Montgomery sees the self-contradiction of the zebra maxim as teaching common sense procedure in a field where improbabilities should not be forgotten, even as they are not actively considered. Within this scenario, improbable diagnoses will only be considered, for example, when all of the most obvious and common diagnoses have been eliminated first.

‘The research shows ... and in my experience ...’

Turning to the use of experience in clinical knowing (p. 130), Montgomery made me smile in quoting the prefatory phrases ‘The research shows ...’ and ‘In my experience ...’. She is clear that, rather than heralding weighty clinical pronouncements by experienced elders, these statements draw on strong and potentially contradictory assumptions in relation to reliable knowledge and she sees each as likely to be invoked –

perhaps by the same clinician – when discussion has become ‘unbalanced’. For Montgomery, clinical experience and research could be depicted as two poles of medicine's practical knowing, but a more detailed examination appears to identify clinical knowing as a continuum, with ‘vivid particulars burned into an individual memory at one end, the abstracted data summarized in the tables of published research at the other’. If one accepts the existence of such a continuum, as does this essayist, then it is clear that neither, as Montgomery points out, functions well without the other. Clinicians will always frame the conclusions of available research against their own patient experiences and it is in this way that a doctor's judgement is developed and refined. These observations become all the more interesting when one considers, as does Montgomery, the pre-clinical education of medical students, where a great deal of basic science teaching might well be expected to ground the student's thinking irreversibly towards a primacy of the biomedical science base. But this does not appear to be the case and, for very good reasons in my view, explains the decrease in enthusiasm and appetite for the concept and practice of EBM as the junior doctor increases in knowledge and experience.

As Montgomery notes, doctors may be scientifically educated, *but they also have responsibility for other people's lives*, and this very considerable responsibility is exercised under conditions of uncertainty in a changing field of knowledge. Clinicians typically exercise considerable caution in clinical decision making, much of which, on analysis, can be seen to be entirely justified. Thus, in life-threatening clinical scenarios in particular, the so-called ‘therapeutic initiative’ can override information from so-called ‘sound’ research and it is the phenomenon (if it may be properly described as such) of doctors' confidence in their own experience that underpins their reluctance to modify their established habits in certain circumstances. As Montgomery says: ‘The strength of experience works against newfangled strategies like evidence-based medicine as well’ (p. 132).

Habits of practice

If we talk in terms of ‘habits of practice’, as indeed we have done immediately above, then how do we explain how doctors acquire such habits? Here, Montgomery refers to the traditional Flexnerian division of medical education into scientific and clinical halves, which was originally designed to introduce clinicians to science. Now, however, and as she observes, it marks the struggle to turn students of science into doctors capable of making ‘wise’ decisions under conditions of uncertainty. As has been touched on above, this ‘daunting pedagogical task’, has been traditionally undertaken in the third year of undergraduate medical training, in the absence of any useful discussion of the character of medicine’s rationality. Indeed, Montgomery is clear that after struggling to recast the biomedical sciences in terms of the care of sick people, every clinician comes to understand – and fairly rapidly I would suggest – that ‘scientific knowing’ is not at all the same as ‘clinical knowing’. In this context, I particularly liked Montgomery’s observation of doctors that: ‘They may choose to honour their profession by calling it science, but they quite reasonably resist efforts to dislodge what their experience has suggested is efficacious.’ She goes on to view as equally reasonable, the tendency of the medical profession as a whole to counterbalance this essentially conservative position with the injunction to ‘keep up with the research’. I agree with Montgomery, here, that good clinicians know what the studies show and at the same time what their own experience has been. As she rightly says, *both* are valuable and she concludes this particular section of her volume by stating that in good clinical practice and the so-called ‘theory’ of EBM, each is shaped by the other.

The overarching paradox of medicine's theory of knowledge

Montgomery’s preoccupation with the nature of clinical knowing returns strongly as we approach the final quarter of her text. Here (p. 133),

she describes the overarching paradox of medicine's theory of knowledge as the 'habitual description of medicine as both a science and an art'. As earlier in her volume, she emphasizes her view that, as a practice, Medicine is neither. Rather, her position is that this paradox illustrates medicine's recognition of the importance of phronesis, the practical reasoning which doctors use in the care of a sick person following a request for help. She emphasizes the truism that patients present to their doctor in the hope of recognition by him of their predicament, their malady and with the anticipation that, consequent upon that recognition, he will act to assist them. Within this context, patients as the human beings that they are, seek some idea of what they can expect as a consequence of their diagnosis and treatment, but while science has become essential to medicine within the last one hundred or so years (or perhaps for a little less), Montgomery is clear that 'the unavoidable reality of its practice is the uncertainty of applying general rules to particular patients'. This observation leads Montgomery to conclude that while much of its knowledge in modern times is derived from biological science. Medicine is 'at its best (when) exercised with an experiential skill that may feel or look like art' (p. 133).

Counterbalancing as a practical theory of clinical rationality

I remain inspired by Montgomery's late development of her thesis in the section: 'Counterbalancing as a practical theory of clinical rationality'. Within this section, she notes that the later stages of undergraduate medical study (followed by the pre-registration and post-registration year internship and residency in North America), are usually referred to as 'training' – a term deplored as behaviorist and anti-intellectual by some teachers. For Montgomery, however, as for this essayist, 'it marks the difference between lectures, laboratories and examinations in human biology and the learners' long, slow stages of apprenticeship to those above themselves on the educational ladder.' Indeed, from the start to the finish of apprenticeship, the apprentices learn

how to judge, how to act and how to behave as doctors. Towards the end of this particular chapter of the volume Montgomery is able authoritatively to observe:

‘Medicine resolutely ignores the contradiction between its claims to be a positivist science and its interpretive practice even as the potentially contradictory, but always situational, rules of practice enable physicians simultaneously to express and to negotiate the contradiction. Clinical discourse and educational methods are guided by these counterweighted rules and shaped by their tension.’ (p. 134)

Montgomery sees one of the central components of this type of reasoning (‘believing two things before breakfast, as the use of contradictory maxims seems to require’), as a brilliant and invaluable resource. She believes that, given medicine’s proverbial wisdom, which like clinical practice itself, is always situational, always interpretive, it seems to make sense that its theory of practical reasoning should be expressed in maxims that – even as they offer support for a way of knowing – can be countered by maxims that are their opposite. As she reminds us, as lawyers, literary critics, historians and other students of evidence know well, rules are *not* self-interpreting. Thus, for Montgomery, the maxims that theorize clinical knowing are relentlessly contextual and incapable of generalization to all similar cases, and with the exception of the zebra aphorism they come, like the maxims for the clinical encounter, in counterweighted and contradictory pairs (p. 134).

Towards the conclusion of this, Chapter Eight of her text, Montgomery goes on to make clear that within medicine, these counterweighted assumptions about the nature of knowing, serve as clinical medicine’s substitute for a comprehensive, reflexive account of practical reasoning and its uncertainties. For her, informal though these are, they nevertheless constitute a theory of clinical practice, a phronesiology of medicine. Importantly in my view, she highlights the fact that they raise the question as to whether medicine (especially medical education) is well served by (typically) ignoring the counterbalanced tension of its rationality.

I liked what Montgomery describes as the ‘take home lessons’ at the end of this particular chapter. She gives, in fact, two such lessons which, unsurprisingly, she provides as counterbalanced pairs. The first, she says, is intended to justify the continual review of cases in clinical medicine’s practical, Deweyian education: ‘Experience is the best teacher’, ‘Learn from others’ mistakes’. Her second such lesson is concerned with a difficulty particularly associated with learning in a hierarchical discipline: ‘Pattern your practice on that of your clinical elders’ and ‘Question everything you are told and much of what you see’ [Levinas, 1989; Gcertz, 1983, Boursieu, 1990].

Knowing one's place: the evaluation of clinical judgment

It is at this point that we move on to Chapter Nine of Montgomery’s text. Opening this particular chapter in her volume, Montgomery asks: ‘If a kind of visual defect obscures not only medicine’s knowledge of the nature of its knowing, but also an awareness of that lack, how is clinical judgment evaluated?’ Her own answer to this question is rather simple. ‘If medicine were only a science, physicians could establish their clinical competence by answering test questions correctly. But because it is a practice, its evaluation is a much more complicated exercise.’ She recounts how she stumbled upon this realization by chance when she invited second year medical students in her ‘Sherlock Holmes and Clinical Judgment’ seminar, to attend a hospital case conference in internal medicine, so that they could observe residents and attending doctors solving clinical problems [Elatein, 1978; Breshahan, 1989; Montgomery et al, 2003]. After recounting various details, she goes on to acknowledge that ‘because clinical medicine is not a science, knowing the biological and clinical facts that appear on a test is only a start towards being a good clinician’. Clarifying her position, Montgomery is clear that, doctors, a world away from experimental laboratories – which have their own ethos and behavioral norms – learn

how to behave in ways that exhibit an awareness of their knowledge and experience and signal their status as doctors (p. 139).

On the matter of how to evaluate clinical judgment – a question of no small interest to the JECF, Montgomery acknowledges that there is no good, single test of its quality. Indeed, she is right in noting that while clinical skills can be tested, as can the capacity to absorb and retain clinical information, the evaluation of how these ‘abilities’ interact together in the making of good clinical decisions is far from easily described and assessed. I agree with Montgomery that the assessment of clinical outcomes in this context, as a proxy measurement of effective clinical judgment, would fail to generate data of any relevance. While intuitively one expects (and while it remains probable *to an extent*) that ‘good care’ produces ‘good outcomes’, in reality, this relationship of variables is essentially unreliable. I found Montgomery's excursion in this chapter into the relationship between seating patterns within lecture theatres and their relationship to hierarchical status, at best a distraction and of questionable relevance in a book on clinical judgment, although I appreciated the basic point she attempted to make. Certainly, those who have been medically trained will immediately recognize – and smile or laugh out loud – at Montgomery's sociological analysis and discussion, but I did feel, on balance, that this section represented misplaced and irrelevant argumentation within the wider thesis of this important volume and might best have been omitted in order to create additional space for her more substantive thinking [Durkheim, 1957].

The ‘self’ in medicine: the use and misuse of the science claim

The fourth and final part of Montgomery's book is concerned specifically with clinical judgment and the nature of medicine. The first chapter of this part examines the concept of the ‘self’ in medicine and the whole question of the use and misuse of the ‘science claim’. I was immediately intrigued by Montgomery's opening story describing her

encounter with an established researcher in art who had decided to train as a doctor. The professor of English, after announcing to Montgomery his intention to train in medicine, asked her: 'Is it going to change me?' To which she replies: 'Sure. It's going to turn you into a doctor.' Montgomery is clear that while she is convinced that individuals 'change' during their long period of learning and clinical apprenticeship, she herself cannot describe the nature of that change definitively, simply because she herself is not a doctor and therefore lacks the necessary insight to be able to discuss any such change with the necessary authority.

A transmogrification of 'self'

While I accept Montgomery's assertion that certain defining characteristics of an individual can change as a function of medical training and the direct and frequent clinical experience of, for example, distress, disease and death, I do not accept that the process of 'becoming a doctor' involves some sort of wholesale transmogrification of personality and behavior. Those of us who trained as priests, in addition to training as doctors and/or scientists, expected the same, but were in general sorely disappointed (!). It is, then, perhaps 'overplay', to suggest some sort of metaphysical transfiguration of the individual consequent upon 'becoming a doctor'.

Nevertheless, Montgomery is convinced that some sort of 'change' does, in fact, take place. For her, two things quite apart from doctors' professional knowledge and skill, 'set physicians apart from the rest of us'. Two things, she continues, 'shape them as people'. For Montgomery, these are a familiarity with death and an odd relationship to science, which for her are not at all unconnected. As she says, doctors have an early experience of death – from the dissection of bodies when medical students in pre-clinical anatomy, through a 'mere presence' at death at the bedside as students in the undergraduate clinical years, to the pronouncement of death at the bedside when qualified as junior doctors. Reminding the reader

of the same, Montgomery continues by pointing out that against this ‘onslaught’, the juniors function, using what clinical skills they have developed by this time, in accordance with ‘the profession's goal of exercising a cool, rigorous, scientifically informed rationality for the good of the patient’.

At the same time, she is clear, as am I, that they have *not* become scientists, but they have certainly by this point acquired crucial intellectual and behavioral skills and a rational clinical method (p. 159). Indeed, as she says, they have absorbed a commitment to objectivity which might be described as close observation, the suspension of judgment until information is gathered, skepticism about information they have not acquired or witnessed themselves, and, when results don't make sense, skepticism about their own procedures. Indeed, as Montgomery argues:

‘They have learned a careful, rational method that enables them to sort through what once were bewildering signs and symptoms and now make medical sense of them. As they gain a capacity for clinical reasoning, they can begin to diagnose and treat an array of diseases with a fair degree of reliability. Their commitment to objectivity and their mastery of clinical method, both essential to clinical reasoning, enable them to do what is best for the sick people whose care is their responsibility. This is not science but clinical judgment. It is the exercise of phronesis, the situational reasoning necessary in practical endeavors. It is not just the possession of information or the ability to infer it from circumstances (although both are important) but the practical ability to select the right pieces of that knowledge for determining the best course of action in a given case.’ (p. 159) [Taylor, 1989]

Science: not a synonym for ‘rationality’

Given this, Montgomery observes that ‘science’ is not a synonym for ‘rationality’, despite the temptation to label doctors' rational procedures – exercised with direct reference to the needs of the individual and firmly

within the context of a biological framework – as ‘science’. Indeed, for her, clinical reasoning – with its commitment to the quest for objectivity and often extraordinary detail – often generates an ‘acceptable level of certainty’ within the context of the general ‘uncertain undertaking of clinical medicine’. My own view is that she is absolutely correct in recognizing that it is precisely this sort of reasoning that enables doctors to ‘ignore torn and distorted bodies, awful sights, nauseating smells, the patient's misery and pain, and the promise of worse to come in order to do what must be done to ameliorate – often repair or cure – such conditions’. It is by this ‘circuitous route’, that Montgomery sees the claim that medicine is science as helping to sustain doctors in the face of uncertainty, helplessness and death. [Kassirer, 1991]

The ethos of medicine

At this juncture in her text, Montgomery turns to the ‘ethos’ of medicine, beginning with a quote from Emile Durkheim where that author observes that each profession in this World of ours has its own moral reasoning and framework, noting that Medicine is by no means an exception to this rule [**Durkheim,1957**]. Montgomery, agreeing with Durkheim's position, returns again to Aristotelian philosophy as expounded within the *Nicomachean Ethics*, in order to explain how, in her view, this process ‘works’. Within this logical framework, *phronesis* (or practical reasoning) is acclaimed as one of the characteristics of the ‘virtuous person’, to the extent of being foundational in nature, such that it is envisaged that the practitioner will be a ‘good person’ in order to possess practical reasoning and that, conversely, the habit of *phronesis* will promote virtue in the practitioner. Thus, so *entwined* are *ethics* and *practice* that it is unsurprising, as Montgomery notes, that they then appear to be one and the same. Indeed, the values of clinical practice (and on the basis of these we should probably be designing and operating routine audits) include attention to the patient, reliance on perception, awareness of skill levels,

careful observation and thoroughness, together with an accurate representation of what has been seen and done. As Montgomery says, because these values are held to be essential to good patient care, they are identified with clinical goals and obscured as moral virtues possessed by individuals. Thus, medical students absorb these clinical values – and junior doctors are judged by them – without their ever becoming taught in a formal sense. As she says, while clinical medicine shares *some* of its core values with science, the overlap between the two is far removed from the constitution of an identity (p. 160).

The nature of knowing as it relates to ethical discourse

I was stimulated by Montgomery's reference to Levinas' work where she draws upon this philosopher's thinking on the nature of knowing as it relates to ethical discourse. Emmanuel Levinas became convinced that our response to one another constituted our identity as persons and that when faced with the immediate experience of our neighbor we are compelled to recognize and acknowledge him. Montgomery derives from this philosophy the conclusion that a doctor becomes a doctor only on the basis of taking care of patients. Thus, medical education, by its nature, confers, as it were, a social identity and a 'way of looking at the world'; such that a doctor without a patient cannot meaningfully be described as a doctor in the same sense that a patient without medical attention cannot be described as a patient. It is herein that Levinas is able to describe this dyadic relationship – the patient's presentation to medical attention is just such an *en face* encounter; the moral claim at the heart of the medical encounter (p. 161).

What counts for Montgomery within this overall context is what she describes as the ability of a doctor to sort through incomplete and potentially imprecise information to determine what is going on with a particular patient and then – under conditions of uncertainty – to determine an effective course of action. Montgomery guides the reader away from the

tempting conclusion that this is simply ‘common sense’ by pointing out that if it were so, then it would be common sense about very uncommon matters. She draws on Geertz’ thinking in suggesting that wherever common sense occurs, it appears to be ‘natural, practical, thin, immethodical, proverbial, accessible’, all of these representing qualities that ‘are bestowed by common sense on things, not bestowed by them on it’. Thus, for Montgomery, clinical medicine operates as if it were a common sense cultural system, with a fundamental aim of medical education being to make it so, such that medicine can be described as an acquired rationality – culturally engendered, communally reinforced, interpretive, situation-sensitive and therefore dialogic and aphoristic in character (p. 165).

Habitus, phronesis, judgment, rationality, positivism

Montgomery is careful to distinguish between the essentially different concepts of common sense, *habitus* phronesis and clinical judgement. For her, Bourdieu’s habitus [**Bourdieu**, 1996] and Geertz’s common sense [**Geertz**, 1983] are useful concepts because, as with Aristotle’s phronesis, they enable a characterization of a kind of knowing that is not hypothetical-deductive or scientific, but which could nevertheless be seen as warranting the description of ‘rational’. She observes that those colleagues who appear to possess this ‘rational capacity’ (or virtue, even), in significant measure, are often held in esteem, indeed considered ‘wise’. It is at this juncture that Montgomery makes, in my view, a particularly important observation: that in Western society, general concepts of rationality appears to have, as a whole, in some quarters, come into ill repute, because there has been a wholesale genuflection to science as providing the absolute standard of rationality [**Taylor**, 1989]. I feel strongly, personally, that this commonly observed refusal to admit any other form or concept of rationality outside of the so-called ‘biomedical scientific paradigm’ is an intellectually absurd

reductionism which can accurately be described as scientism. Montgomery notes the same in observing that since the mid 20th Century, substantial contributions to philosophical and anthropological thought have been preoccupied with describing ways of knowing that fail to support such a positivist stance. I agree with Montgomery that those who would study clinical judgment, if they have not already done so, should consult Taylor's work forthwith. Indeed, what has science to do with the lessons that junior doctors must rapidly learn: how to behave and how to determine what action to take in situations of confusion, worry, crisis, disappointment, suffering, grief, deep human need and occasional joy? (p. 166).

‘Medicine is science’: a rhetorical flourish?

Montgomery's conclusion to Chapter Ten of her volume contains much of considerable importance to the ‘science claim’ of modern medicine. In making clear that EBM has the potential to inform – but never replace – clinical judgment, Montgomery continues by attempting to explain why many doctors take frequent recourse to the ‘science claim’. In the context of clinical education, for example, Montgomery sees the ‘science claim’ as deriving directly from a behavioral and intellectual norm that expresses medicine's overwhelming imperative to act on behalf of patients in a manner that is immediately well reasoned and as certain as humanly possible (p. 171). I agree wholeheartedly with her that the claim ‘medicine is science’ is essentially rhetorical in nature, an attempt, perhaps, to appeal to and affect attitudes and habits, which Montgomery sees as perhaps a form of moral exhortation of the doctor to do his best for his patients. Certainly, as Montgomery points out, the reproducibility and certainty of scientific knowledge represent a central ideal in medicine, but they are (and as she touches upon, albeit parenthetically), essentially unattainable. Doctors therefore aspire to the title of ‘scientist’ in vain – unless they leave the clinic or bedside *and become one* – a ‘real’ scientist, that is, within, say, the laboratory setting. I applaud here, an instance of

clarification that Montgomery advances, that the aspiration of many doctors to the title 'scientist' illustrates, really, the customary failure to distinguish between 'scientific' (which correctly describes much of medicine's knowledge) and the substantive 'science' (which falsely describes the fundamental nature of medicine and its practice). Montgomery does well here, in my view, to expose, as it were, the fact that medicine thrives by advancing its moral and intellectual goals as 'science', while covertly accomplishing them by interpretive, narrative, discursive means' (p. 171).

Medicine as science: vested interests and professional benefits

I found useful at this point, Montgomery's consideration of the powerful advantages that doctors can enjoy by identifying medicine as science. Indeed, it must not be forgotten that science has come to acquire an 'ethos'— an ethos that embodies rigor, openness and objectivity, all of which characteristics medicine has shown itself historically jealous of, and which it has in relatively recent times directly appropriated as descriptions of itself and its practice. I agree that this process has resulted in nothing apart from a specious triumph, immediately deceptive in nature, for both patients and doctors alike and Montgomery provides a concise, but perfectly detailed exposition of the direct benefits to medicine of its identification with science in the concluding paragraphs of Chapter Ten. What, then, Montgomery effectively asks, are these benefits? She sees three.

The *first benefit* Montgomery describes as the emotional support 'on offer', as it were, as part of the intellectual assurance that science by its nature offers. In this sense, medicine is quite unlike any of the other professions in which knowledge is uncertain. Intellectual rigor remains essential, but as Montgomery points out, that despite a determination on the part of the doctor to be as careful and rational as possible, clinical reasoning remains inferential and susceptible to misjudgement and error. As an illustration, she importantly cites Kassirer and Kopelman's text

Learning Clinical Reason[Kassirer and Koelman, 1991] which provides more than a few good examples of how the so-called ‘rational mind’ can err. Montgomery is clear here that, even when supported by the ‘best available evidence’ and the latest tools in medical decision making, it remains possible to observe neither deduction nor induction, but rather abduction. For her, the claim that this is science acts to screen clinical reasoners from a variety of pitfalls.

The *second* benefit Montgomery sees in ethical terms, such that science provides doctors with an easily described and defended ethical stance. She reminds us that the ethos of science is the open and unbiased pursuit of the truth of natural phenomena, with the tacit assurance that the methods of inquiry involved in this process, and their conclusions, are value free. Of course, they are no such thing and Montgomery rejects any such notion by appealing to the observations of generations of historians and philosophers of science. She insists, rightly, that ‘science is as much a product of its time and place as any other aspect of culture’. Science strives to control bias and, as she says, medicine does well to share this ideal, among many, of science. Montgomery is clear that while doctors’ knowledge is always ‘situated’ and at its best, ‘reliably intersubjective’, these facts alone do not obviate the goal of fairness or the need at times for a suspension of emotional involvement. These things considered, and acknowledging that it shares some of the goals of science, she does not see a need for the profession of Medicine to label itself either morally neutral or intellectually objective and neither should there be an imperative for its practitioners to think of themselves in this way either.

The *third* and last benefit of the ‘medicine as science’ belief is, for Montgomery, the ‘boost’ it gives to clinical detachment, the ‘professional façade maintained in the face of illness, pain and human disasters of every sort, especially a patient’s untimely death’. One truism here is that all doctors practice medicine in circumstances which are at once the focus of human emotions, such that fear and the sense of mortality are ever present. As Montgomery says, clinical detachment has been the interpersonal goal

of doctors for centuries and centuries [Osler, 1932; Charon, 2001], and so it is entirely understandable, indeed to be anticipated, that doctors will have recourse to whatever aid they can access in this particular context. As she vividly puts it: ‘After all, how to be attentive to another human being without losing oneself is a problem every human being struggles with in one way or another: how to care for children, spouse, parents, friends, without being overwhelmed.’ Indeed, if we *do not struggle* in these circumstances, it may be, as she says, because we have been able to reinforce ourselves with something like the doctor's detachment (p. 173).

Medicine, professional detachment and the ideal of science

While at this juncture Montgomery has quite succeeded in making her definitive points, she continues, valuably, to look in a little more detail at the consequences of this ‘professional detachment’ which some writers have seen simply as a ‘description’, as it were, and not necessarily a ‘goal’ in the proper sense, at all [Charon, 2001]. Does this ‘professional detachment’ have the capacity to impair decision making? Certainly, is Halpern's view, whom Montgomery highlights as having argued that the reverse; that is, emotional rationality, promotes better patient care [Halpern, 2001]. Does the professional detachment supplied by the ideal of science deliver on its promise of protection for the doctor from emotional pain? No, says Montgomery, not without a cost to the doctor's ability to feel. Here, she quotes Reiser [Reiser, 1973] and also Lantos [Lantos, 2001], the former describing the ‘carapace’ that forms when professional detachment is not balanced by clinical engagement, and the latter more recently writing, from personal observation, of the benefits of taking a little time to mourn the death of a patient. Such sentiment, in the proper sense of that word, remains largely alien in medicine and, where emotional reactions are precipitated by a dramatic clinical event, they are almost always buried beneath the surface and dealt with either in personal time or, more conventionally, suppressed, and thus, unlike other aspects of the clinical

case, rarely discussed with colleagues. But while this may be so, Montgomery reminds us that there have been those clinicians who have been more than prepared to experiment with the admission of emotion into accounts of practice. Here, she refers her reader to the work of Branch and Suchman [**Branch** and Suchman 1990] and to a corpus of important writings in the *Journal of the American Medical Association*, in the *Annals of Internal Medicine* ('Narrative Matters'), and to related bodies of work published by the American Board of Internal Medicine (p. 173). It is, in my view, impossible to overstate the relevance of such work to the current exercise of effective clinical practice and to its evaluation and development. Montgomery is clear, as is this essayist, that emotion has a fundamental place in rational life [**Callaghan, 1988**]. Indeed, contrary to some bodies of opinion, emotion is not irrational, and I join with Montgomery in emphasizing the reality that emotions can directly assist rationality in medicine and thus directly assist clinical judgement and the making of sound decisions within the context of the individual patient [Connelly,1998].

Montgomery is convinced that 'far from providing a safe way to be in contact with patients, medicine's science claim is a frail defense against uncertainty, death and human emotion'. Indeed, she believes that there is a price to pay, as it were, for this claim, which she describes in terms of the personal development of medical students and junior doctors, the lives and psyches of doctors more generally, the aid and comfort of patients and the role of medicine in society. She sees the medical profession's ideal of an objective, stable and certain knowledge base as having resulted in a frequently brutalizing medical education and an impoverished clinical practice. Montgomery believes that contemporary medical education appears largely to ignore the individual gifts of students, including their sense of *vocation*. Indeed, when I used that word a little earlier above, I was struck, momentarily by how 'quaint' it sounded when used in the present context of contemporary 21st Century utilitarian, secular, economics-driven, service-orientated Western culture [**Timmermans** and

Berg, 2003], but it remains my own view, and I suspect Montgomery's, that it is the students who feel, and articulate, and demonstrate, a vocation to medicine, that are the most valuable to select, the most worthy of our attention, the ones who will go on to make the 'best doctors'. And somehow, just somehow, I do not think that patients would disagree, even though such students may well represent the polar opposite of the 'types' that modern politicians would wish, for their own purposes, to select.[Nussbaum, 2002]

Types of doctors

What type of doctor is most useful? One who spends time with patients – the amount of time *necessary* and *sufficient* to provide good, humanitarian medicine, or a functionary who enacts technical processes and procedures to ensure the fastest possible, almost industrial, throughput within modern healthcare environments? Doctors and patients are likely to answer in the affirmative to the former, while economists, managers and politicians seem predisposed to affirm the usefulness of the latter. It is easy to see therefore how what I might term 'humanitarian medicine' can be modulated by – rather than itself modulate – cold political imperatives that seem, ever increasing in health services, and indeed everywhere outside, to dictate how we should think and act in all aspects of our professional and personal lives. I will talk further in the JECF, with others, on the effects of this malignant politicization of medical and health services and how it relates to a surveillance culture more broadly, later this year. But in the context of medical education – the shaping of those who will come to think and act in the interests of the sick – the continuing inattention to what it is to make and to be a 'good doctor' remains gravely worrying. Gravely worrying whether it takes the form of a failure to recognize and foster a true vocation to the practice of medicine in the early years ('sense of calling'), or whether it results from a bastardization of the historic nature of

medicine through an over-reliance on the ‘science claim’ of *some* within medicine, or from strategic political maneuvers [Damasio, 1994].

The positivistic scientific stance of modern medicine: a ‘wrong warrant’ for doctors' authority

Montgomery considers many of these questions and observations when she reflects directly on how impoverished medical practice has become. She is right to lament that the belief that medicine *is* science (or *ought to be* science as the EBM movement has sought to inculcate) can act to demonize, as it were, the possession and exercise of those real qualities that are the appreciation of the individual person and the anecdotal event, the recognition of a person's pain, the attention to feelings, the awareness of one's own emotional life and participation in the lives of others and a healthy understanding of the provisional nature of much of clinical knowing (p. 174). It says a great deal, I think, that these characteristics, as Montgomery herself says, are often regarded as flaws in the care of the sick individual, rather than being wholeheartedly celebrated as part of medicine's foundational nature and purpose. The positivistic scientific stance of much of modern medicine is thus, for Montgomery and for this essayist, a ‘wrong warrant’ for doctors' authority – this much is surely illustrated by the propensity of the idealization of science to result in a disregard for many of the most important characteristics and actions of clinical medicine, some of which have been described in outline immediately above. It is for this reason that I continue to disagree with Montgomery's assessment of EBM. When she advances that ‘rightly understood, evidence-based medicine promises a far better defense against the perils of clinical practice than an unexamined idealization of nineteenth century physics’, she describes a concept and practice of EBM that continues to be rejected by the greatest part of the body of its protagonists. Of one thing I can assure the reader of Montgomery's text, this essay and Montgomery herself: Montgomery's conception of the real nature, value

and potential of EBM is not shared by the majority of those who use the term or who consider themselves ‘evidence-based practitioners’. The extraordinary thing, perhaps, is that while the protagonists of EBM do not overtly or explicitly claim that EBM is a science, even during episodes of their most hyperbolic rhetoric, their writings and actions confirm such beliefs covertly and implicitly [**Preamble**, 1946].

I am, ‘with Montgomery’ and wholeheartedly, when she posits this exhortation which closes Chapter Ten of her volume: ‘It would surely be better – for patients, for physicians, and for medicine as a part of society – if physicians understood medicine's practical rationality, described its strengths and limits realistically, and acknowledged the quest for unbiased, certain knowledge not as a scientific imperative but as a moral and clinical one. Surely the ideal of science is not so essential to the selfhood of the physician that it cannot be replaced. Science has mistakenly come to represent both the rationality and the ethos of medicine, the professional commitment to do one's rational best for the good of the patient. In time, these have become the beliefs that count most both for the people who are physicians and for the profession as a whole. Giving up the idea that medicine is or soon will be a science and the dream of certainty and victory over death would require an awareness of method, recognition of personal and professional limits, and, especially, an examination of the profession's attitude toward death. But it need not in anyway diminish the commitment to rationality, technology, or best evidence. On the contrary, recognition of the nature of medicine's rationality, its phronesiology, leads straight to a lifelong commitment to professional self-awareness and self-education. Anything else would be irresponsible. Giving up the science claim would also entail a new look at medical education and a consideration of both the personal qualities it fosters, including the qualities essential to the care of the self and the care of the patient that it currently disvalues and neglects. Medical education would still turn students, even middle-aged English professors, into doctors, but it might perform that extraordinary feat more effectively and more humanely.’ (p. 175) [Montgomery, 2006].

A medicine of neighbors

Chapter Eleven, the penultimate chapter of the volume, sees Montgomery inverting the ‘medicine as science’ claim to ask: ‘What would happen if medicine disavowed the claim to be a science and emphasized instead its character as a practice?’ Answering the question, she does not anticipate any change in the way in which doctors think and work, neither does she see some sort of ensuing reduction in the importance ascribed to biomedical science and technological advance and neither does she predict any resulting change in the doctor’s moral duty to the patient or his intellectual obligation to diagnose, treat and prognosticate. But she does wonder if a change in the doctor’s social role might occur in these circumstances (p. 176). The phenomenon of what Montgomery goes on to describe as a ‘medicine of strangers’ will be immediately recognized by the majority of doctors working within modern healthcare systems today. She refers, of course, to the fundamental changes which have taken place in the doctor–patient relationship contingent upon a variety of factors, but most notably perhaps, those that have resulted directly from patients’ increased geographical mobility (between as well as within countries) and the increased direct management of the ‘transaction’ of the consultation by influences external to the clinical encounter and which, until relatively recently, have properly had no place within medicine. Thus, she is able to lament, as do I, that the practice of medicine we look for when we or our loved ones become ill, has become, whether in general practice or hospital medicine, a ‘medicine of strangers’, with the clinical encounter becoming ‘a brief, almost mechanical *ad hoc* meeting of strangers ...’ Since this situation directly supports the maintenance of ‘professional detachment’ discussed above, it tends to foster a lack of clinical interest in the psychosocial nature of medicine and in public health in general.[May, 1977].

External management of the consultation: patients' problems as diagnostic and technical versus human and social

Montgomery is right to recognize that the external management of the consultation, resulting as it now has, in the seeing of patients, one after another, as quickly as possible, reduces the person of the patient to an individual posing only diagnostic and technical, rather than also human and social problems (p. 177). She is clear that the advances of biomedical science and medicine's own goals of increased precision and efficacy are not responsible for this essentially reductionist result. Nor does she believe that the 'medicine as science' claim has itself led doctors to view their work mechanically or estrange them from their patients. However, she does assert, and I think it very true, that when the 'science ideal' is held with tenacity, doctors become a great deal less concerned with the current moving away of medicine from its traditional status as a 'caring profession' and with its seemingly increasing disinterest in the wider public health environment in which they practice. As there is an increasing tendency in the developed world to view patient-care technocratically, as it were, with the measurement of the 'efficiency' of medicine being the judging of its product – health – my own view is that we need to keep the proper definition of *health* firmly in mind. Here, I refer to the definition of health not simply as the absence of disease but rather, as the World Health Organization definition has it [**Preamble**, 1946], and thus not simply as the absence of disease or infirmity, but rather a state of complete physical, mental and social well-being, to which I would argue we must now add 'spiritual'. Thus, doctors must *remain* concerned not solely with successful cure (i.e. the renewed absence of disease), but rather with what might be termed the 'general health status' of their patients. That is to say, society (which gives doctors their license to practice) [**80**], should be concerned to ensure that a holistic, rather than a reductionist, approach to patient care, remains normative for clinical practice and to this end, the content of the

undergraduate medical education curriculum is of particular importance as is a proper ‘ethos’ as part of the early postgraduate training years.

It has been previously noted that while the scientific evidence linking biological, behavioral, psychological and social variables to health, illness and disease is substantial, the translation and incorporation of this knowledge into standard medical practice has been, and remains, notoriously unsuccessful. Within this context it is interesting to observe that the exhortations that innovations in medical education which take explicit account of these factors should be introduced during and after medical school training have been largely ignored. Indeed, the astute reader will call to mind the document *Improving Medical Education: Enhancing the Behavioral Social Science Content of Medical School Curricula* [**Downie**, 2000] published some 3 years ago by the Institute of Medicine of the National Academy of Sciences, Washington, USA. The Institute enthusiastically recommended that innovation in medical education – during and after medical school training – should take explicit account of six specific areas of emerging knowledge of immediate relevance to clinical practice. These include: (a) a focus on ‘mind–body’ interactions; (b) patient behavior; (c) doctors' roles and behaviors; (d) doctor–patient interactions; (e) social and cultural issues in health care; and (f) prevailing health policy. A full discussion of the theoretical basis of these recommendations is beyond the scope of this essay, but I for one am convinced that if such innovations were successfully to be implemented we would finally be able to see what Downie and Macnaughton have referred to as an ‘amalgam’ of scientific, technical and humane judgments, enabling the exercise of clinical judgment [**Downie** and Macnaughton, 2000], illustrating what I would term the clinical use of clinical evidence and directly resulting in changes in health processes, improvements in health outcomes and increases in patient satisfaction.

A medicine of friends

If the changing nature of consultation - resulting in a 'medicine of strangers' - disturbs Montgomery: Then, why should she be similarly disturbed by the idea of a 'medicine of friends'? For Montgomery, the idea of the doctor as 'friend' although giving the reassurance of the doctor as 'trustworthy and solid', seems a 'bit too simple'. It is self-evident that the nature of friendship varies, so what underpins, then, the concept of the doctor as a friend? Some authors, as Montgomery explains, see friendship in this context as related to the medical virtue of compassion. Here, a good doctor would always be compassionate, like a friend, but brings to the relationship a competence not required of friends [**Pellegrino** and Thomasma, 1993]. Other authors develop the explanation further, describing 'friendliness' as the 'key virtue in medicine' [**Drane**, 1994] and insist that the doctor-patient relationship requires a foundation of 'loving friendship'. Can 'friendship' between the doctor and patient be regarded as an ethical standard? Yes, for some thinkers that Montgomery cites [**Lysaught**, 1992] while others advance the ideal of friendship in models of the doctor-patient relationship which call for the clinician to engage in 'values clarification' and 'moral persuasion' as a teacher or friend [**Emanuel** and Emanuel; 1992]. So, if 'the secret to the care of the patient is to care for the patient' [**Peab**], then should the creation of friendship between doctors and their patients be a goal of medical practice (p. 180)? Montgomery is clear that it should not. Tellingly, she points out that the idea of a 'medicine of friends' is held more by those who are members of the medical profession than those who are not, that is to say, those that doctors serve. For her, the concept has real flaws as an ethical goal for medicine, quite apart from having the potential to be emotionally exhausting, even perilous for the clinician. If this is so, then from where does the concept derive and what maintains the idea in the medical consciousness? Is the concept 'all bad' as it were, or are there elements of its general philosophy which should be rescued and prized?

Compensatory rhetoric?

I agree with Montgomery that the concept of the doctor as a friend is what might be termed a ‘compensatory rhetorical turn’, which is based in part on the anxieties clinicians increasingly experience as they see medicine becoming less and less of a caring profession and more and more of a business. But there is more to it than this. Clinicians should celebrate – and in my own view never suppress – the occasions on which they become ‘touched’ by occurrences in the personal lives of their patients. Indeed, compassion, *one* of the ethical obligations on a clinician, can also be described as ‘co-feeling’. The core matters of importance here are the limits within which such ‘co-feeling’ (and its extent) is exercised, limits which are as important to the patient as to the doctor and which act to define the proper and enduring nature of the doctor–patient relationship. Montgomery does well to consider these limits and the factors which do or should define them in a concise, yet impressively comprehensive manner. Thus, in addition to having considered ‘impersonal medicine’, and having reviewed some possible benefits of a more ‘personalized’ clinical care, she balances her overall exposition by discussing the idea of friendship in this context as ‘simply bad medicine’ with the capacity to violate the autonomy and dignity of the patient (p. 181), in addition to reflecting upon the inherently unequal relationship within the consultation and how that very inequality is often integral to the efficacy of medical practice. So, despite attempts by some doctors to become the patient’s ‘friend’, and however, incautious or misguided these may be, can the doctor, in reality, ever *actually* realize such an ambition? Montgomery does not even, on reflection, think so [Montgomery, 2006].

In continuing her exposition, and in explaining her position further, Montgomery poses the question: ‘What do patients want?’ She is convinced that it is *not* friendship. Clearly, they would wish to see courtesy and friendliness, but even those patients who seem to see their doctors as friends, do not advocate friendship as a goal of their care (p. 183). This is

not to say that some sort of friendship might not evolve over time – especially in the context of chronic illness – but even here Montgomery sees such friendship as an ‘accidental reward and not a precondition or goal of the relationship’. Contemporary illness narratives confirm the patient’s need and Montgomery discusses these as well as quoting a particularly illustrative section from Broyard’s account of his uncommunicative surgeon [Broyard, 1992].

The ‘de-contextualization’ of the patient and its remedy

So if patients do not want doctors as their friends and if it is accepted that a doctor’s attempt to create a doctor–patient ‘friendship’ is incautious or hopeless, and if we are not to have a ‘medicine of strangers’, then to what should doctors and patients be aiming? Montgomery recognizes that the ideal of friendship is an attempt to redress medicine’s necessary de-contextualization of the patient, but also acknowledges that doctors long not only to exercise their skills, but also to have a safe way to be in a relationship with their patients (p. 184). Mindful of all of this, and the preceding, she recommends a ‘medicine of neighbors’ (p. 185). Neighbors, after all, are people in an ‘accidental almost gratuitous relationship, but are no less full of possibility for all that’. Indeed, ‘neighborliness is a duty, especially in times of need, but a limited duty that leaves considerable room for both self-preservation and performance over and beyond its call.’ Moreover, ‘the fulfillment of neighborly duty is judged by acts rather than by motives or emotions ... (and) ... distinct from love and liking, being a neighbor requires only a fundamental respect, involved in one human being’s recognition of another. Above all, in its randomness it is a relationship open to time, chance, difference, surprise’ (p. 185). With these musings, Montgomery sets out the basis on which she is to argue, very successfully in my view, for a form of doctor–patient relationship situated somewhere in between the polar opposites, as it were, of a ‘medicine of strangers’ and a ‘medicine of friends’, and one which at

once expresses much of what is most valuable in the ethos of medicine (p. 185) [Groopman, 2007].

Some readers may reflect on what is written here in summary and analysis of the penultimate chapter of Montgomery's volume, and may be forgiven (without reading the original in its entirety) for asking: 'but what exactly has this to do with clinical judgment?' How doctors think about their relationship with a patient(s) will determine in no small measure how they act, and that has everything to do with clinical judgment. I reproduce here, *verbatim*, Montgomery's intellectual conclusion which closes Chapter Eleven of her volume:

'Seen as a science rather than a practice in the service of the ill, medicine easily appropriates a detachment that defends against emotion, intimacy, and death. Biomedical science focuses on altered structures and malfunctions of the body, and if medicine has the same focus its responsibility narrows to the study of disease in laboratories and in the living containers that are patients. Although friendship may seem to be the antidote to this view, especially at a time when the social and economic organization of clinical practice has made patients strangers, the physician's responsibility is larger. Good clinical practice requires neither detachment from patients nor their adoption as friends but rather responding to them with attention and respect. Medicine already is or should be the care of neighbors. It is a norm that was available to medicine long before clinical practice incorporated science. We are challenged now to extend the benefits of medicine not only to those we live among, our literal neighbors, but more widely to figurative neighbors with whom we share the planet. We could do worse than to imagine the physician not as a scientist or a science-using technician but as a neighbor, and to evaluate both our beliefs about medicine and the public policy to which we consent by the degree of neighborliness they permit and encourage.' (p. 188) [Peabody, 1027]

Uncertainty, the ethics of practice and the limitations of statistics

We reach at this juncture, the final chapter of Montgomery's volume. Returning at the outset to her daughter's diagnosis and care, she returns also to further discussion of the nature and effects of uncertainty in medical advice giving and decision making. Particularly interesting in the first sections of the chapter were Montgomery's thoughts on the often symbolic nature of test results and on the limitations of statistics and statistical extrapolations to the individual. She is clear that patients and their families want more than information – they want ‘the something’, as it were, that science cannot provide. This is true even where there can be an educated grasp of statistics – numbers, as Montgomery reminds us, are only a substitute for the re-assurance patients need (p. 195). It follows, then, that in order to provide the reassurance that patients need, doctors must understand the limitations of statistics in their advice giving and decision making, and use in good measure all those other indices for clinical practice at their immediate disposal and these include experience, expertise and judgment, the ‘listening’ to hunches, intuition, an acknowledgement of the enduring importance of anecdote and narrative and the ability to ‘connect’ and ‘co-feel’ with the patient [Emanuel and Emanuel, 1992].

I agree with Montgomery that ‘a richer, more complex understanding of clinical medicine and its characteristic rationality could readily replace the flawed idea of medicine as a science’ (p. 198). What, then, might such a ‘richer understanding’ involve? For Montgomery, it would admit the pivotal need for the exercise of clinical judgment required for the resolution of the constant tensions of practice in resolving what she describes as the ‘tug of war between case-based knowledge and the abhorrence of the anecdotal’. It would, in addition, assist the resolution of the conflict between dependence on the patient's self-reported history and the skepticism which habitually surrounds this. It would, also, assist in dealing with the uncertainties inherent in the need for generalized knowledge to care for particular illnesses (p. 199) [Lysaught, 1992].

Montgomery emphasizes the urgency with which we need to understand the practical importance that the ideal of science has as a counterweight in clinical medicine's system of balances, simply because left unexamined or misunderstood, it endangers that balance. For Montgomery, and for this essayist, when the belief that medicine is a science dominates, it upsets the balance of information and experience in clinical medicine and, in direct consequence, undermines and corrupts proper medical practice. In my own view, Society must come urgently to understand this and thus to mandate the necessary revisions to the content and ethos of undergraduate and postgraduate medical training, so that students in the undergraduate clinical years and junior doctors in the early postgraduate years can be properly educated in the nature of medical practice, so as to predispose them to competence in proper medical conduct and therefore to the skilled exercise of clinical judgment in determined attempts to be 'a good doctor' and to do the very best for their patient [Lysaught, 1992]

PART I - MEDICINE AS A PRACTICE

CHAPTER ONE: MEDICINE AND THE LIMITS OF KNOWLEDGE

I set out to write a book about clinical judgment: how, given the uncertainty of its knowledge, medicine is taught and practiced and how its identification with science affects both patients and physicians. Before I was well into it, my 28-year-old daughter found a breast lump and had an excisional biopsy. [Aristotle, 1985; Julian 1996]

Physical symptoms are read as a narrative, contextually, and interpreted within a cultural framework. A physician's diagnosis is a plot summary of a socially constructed pathophysiological sequence of events. The lump is there. It is a sign, a clue to a natural history that is unfolding. Science describes and explains it and determines what can be done about it. But the importance of that lump, the acts its discovery entails, and what those acts will mean are social and cultural matters. [Atenry and Silver, 1982; George, 1977] Although for turn-of-the-millennium North Americans, culture is shaped by Western scientific medicine. Within that culture, as Lynn Payer pointed out, there are significant national variants. The French like breasts, she observed, and not surprisingly, surgeons in France regularly performed lumpectomies long before the English and Americans, who like randomized clinical trials. Is there a fixed, invariant truth about breast cancer and its treatment, a reality that has nothing to do with culture? Certainly there are scientific facts, refinements in knowledge, and improvements in care. Mastectomy is no longer the automatic treatment regardless of tumor and breast size. But women in the United States who 20 years ago were led to have modified radical mastectomies rather than lumpectomies were not duped by their surgeons. Then everyone— patients, surgeons, families—felt more secure trading breasts for what they were convinced was a higher degree of certainty: “They think they got it all.” American medicine moved very slowly to investigate the alternatives because the choice was posed as a matter of life or death.

“Invasive ductal carcinoma, moderately differentiated . . .” a pathology lab in Beijing and New York City might both report. But would it be the same? Breast cancer is not common there. One imagines, that the meaning of breast cancer in that half of the world might have more to do with maternity and women’s social citizenship than sex and the self. The therapy might differ—if not the primary treatment, then the treatment of side effects. The United States has “the best medicine in the world.” But, just as U.S. surgeons adopted the German practice of giving valium preoperatively (once it was clear, the benefits went beyond calming the patient to lessening the measurable side effects of surgery), might the Chinese know something that U.S. medicine could usefully borrow? [Lewis, 1974; Susan, 2000].

Millions of woman-hours are spent anguishing over the possibility of breast cancer, lump or no lump. Mammograms are never truly routine, even for women fortunate enough to afford periodic screening. But for many the test is a final exam that poses ultimate questions about the relation of self and body, about death and the meaning of life. The obvious answers to these questions are answers in the aggregate. They are common knowledge: we are embodied selves in a strongly gendered, body-conscious society, and those bodies—we ourselves—will die. A mammogram suggests that the ultimate questions also have particular answers and that it may be time to work them out in our own lives. [Larry, 1994; Rose, 2001] When the results are normal, we go back to normal too. We are again immersed in our ordinary lives and their more immediate concerns.

I wanted to shield my daughter from all this. She was only 28, married not quite a year, absorbed in interesting work. I quoted her the statistics for lumps, the age-weighted probabilities. If not quite negligible, they are minuscule. And besides, this happens. “Large-breasted women often have lumps,” I said, putting it in the big, epidemiological picture. I didn’t want her to have both a suspicious lump and a mother who teaches in a medical school alarmed about it. [Lester et al, 1993].

Two days later the surgeon left a message on her answering machine: he'd call her the next day. I had spent the last 20 years puzzling out what doctors do, and I summoned up a narrative into which his non-message fit. "He needs to make you a speech, wants to be sure you go on following these up," I said. "Besides, someone probably once told him surgeons shouldn't communicate by answering machine."

She called the next day: "It's not a fibroadenoma. It's real cancer." My perspective on medicine has changed since then. Although some of what I knew about medicine and the uncertainty of its knowledge was helpful, much of it I completely forgot. Friends were the real help. The ground of ordinary life opened up, and I fell through to the breast cancer world, an alternate reality. Colleagues appeared at my door and on my computer screen to talk about their wives, their sisters, themselves. Everyone and everything became a reference to breast cancer.

Young women don't do well. Their cancers are as lively and energetic as they are. Most are estrogen-receptor negative, which means that tamoxifen—the only therapy that, if not quite benign, is at least not dangerous in itself—for them is useless. And if a devout agnostic pleads with fate that bone and brain scan be clean, that the lymph nodes that surgeons continue to remove be cancer-free, and that plea is granted, then how can she not be grateful for the best odds a 28-year-old can have? Stage One: a 75% five-year disease-free survival rate, improved by chemotherapy to 82%. I rejoiced. I am thankful nonstop. Still, 82% is terribly uncertain. [David, 1993, 2000].

The perception of statistics is notoriously subjective. I complained to my physician colleagues about breast cancer's relatively rotten statistics. A one-in-five chance of recurrence in five years—who knows beyond that— and, with microcalcifications all through the biopsied tissue, a second, equally strong chance—a new toss of the coin, unbiased by this occurrence—of a new cancer down the road. This was the best they could do? It was the best they could do. The best it can do is, at its best, what medicine does.

We make a great, even dangerous mistake about medicine when we assume it is a science in the realist Newtonian sense. Assuming that medicine is a science leads to the expectation that physicians' knowledge is invariant, objective, and always replicable. Although nowadays biological research provides the content for much of medicine, clinical knowing remains first of all the interpretation of what is happening with a particular patient. Such knowledge is still called an opinion; the skill used in arriving at that opinion is called judgment. In this, physicians resemble lawyers and judges, and medical rationality resembles jurisprudence. Without a doubt, biology provides essential knowledge and promotes valuable technological advance, but medicine, like other practices—engineering, architecture, and law—has a body of experiential, detail-driven wisdom. In this, clinicians are far more like naturalists or archeologists than like biochemists or physicists.

Meanwhile, the lump was undoubtedly there, and it was cancer. She would die if it stayed. Or would she? Bernie Siegel, Andrew Weil, Caroline Myss, and Christian Science promise that mind and spirit can alter flesh, and I do in part believe it. But I wouldn't want to bet on it until I had to, not for my child, not on faith alone. What should be done for a 28-year-old's breast cancer? It's widely held to be different from breast cancer in older women, but no one knows entirely how or why. Because there are very few cases in young women, research is difficult. As a result, breast cancer in very young women is treated like other breast cancers. For the time being this makes sense. There is no reason (yet) not to, and besides, there is nothing else to do.

Surgery then. Lumpectomy and radiation? Or a modified radical mastectomy? Mastectomy with or without reconstruction? What sort of reconstruction after the never-quite-proven failure of silicone? Immediate reconstruction so as to minimize the sense of loss and mutilation? Or a delay so as to deal with the sense of loss and mutilation? Opinion varies. [David, 1993; 2000].

Patients and their families have access to the statistical uncertainties of

breast cancer's treatment and prognosis, and because the therapeutic choices bear different weights in different lives, people with breast cancer undergo a sudden, staggering education aimed at enabling them to choose well.

Some of this included: The possibility of a lumpectomy depends on the relative size of breast and tumor. There are no clear choices beyond that. No rules, not many obvious bets. Just preferences and available clinical proficiency. Chemotherapy, indeed everything, depends on the stage of the disease, determined not only by tumor size but also by metastases and the presence of cancer cells in the lymph nodes beyond the breast in the armpit and upper arm. Positive nodes are the clue to a not-yet-identifiable metastasis: tumor cells have left the breast, ready to colonize. And, the meaning of negative nodes? Researchers now think malignant cells have been leaving the tumor all along, but, if the nodes are negative, not in such numbers that they've taken hold—or not in an identifiable way. The number of positive nodes modified radical mastectomy that 'leaves enough arm tissue for most people, after rehabilitation, to approximate normal movement, and on and on.

The thicket of nightmare possibilities, some of them contingent on others, puts breast cancer in the category of disease Lewis Thomas described "halfway technology": high cost, elaborate and uncertain therapy, "at the same time highly sophisticated and profoundly primitive." The aim is not prevention or cure but "making up for the disease or postponing death." The drive for information led her and her husband to read textbooks and the *New England Journal of Medicine's* recent summary article on breast cancer. By the time of her surgery, they knew all the pathophysiology and had a good grasp of the pharmacology and sound instincts about the social customs. When I went to find recent studies done, I read everything and found no comfort. "Higher mortality in young women is not completely accounted for by the known prognostic factors." Still, the science journals were somehow reassuring. They're working on it, I told myself.

What is hard to think about is how uncertainly any of these numbers apply to one particular woman. In my relations with my

physician-colleagues, I had gone over to the other side. I watched them shift, sometimes in the middle of a conversation, to regarding me as one of those others: a patient, a patient's mother. I battered them angrily with the facts of illness, vulnerability, medicine's imperfection. [Susan et al, 2000]. Some of the imperfection is society's. While we often speak of medicine and society as if they were entirely distinct, encapsulated "influences" on one another, they are inseparably enmeshed. The United States took a long time to acknowledge breast cancer. It was a shameful secret until the 1970s, when Rose Kushner wrote *Why Me?*, and Betty Ford and Happy Rockefeller held press conferences in startling succession to talk about their diagnoses. They urged women to do self-exams, get mammograms but above all to regard breast cancer as a disease and not a failure of womanhood. Since then, the disease rate has risen from one in eleven to almost one in eight.

The question of cause consumed me. What had gone wrong? A gene had mutated, cells had proliferated unchecked, but what had caused that? The possibilities—genetic inheritance, environmental and dietary carcinogens, stress—were numerous and slippery at best. If the causes of breast cancer are inaccessible, what is known about encouraging recovery, preventing recurrence? My daughter changed her eating habits, exercised, learned biofeedback. Friends suggested meditation, visualization, prayer. Anxious for something, anything, that could be controlled [Lewis, 2001]. At the heart of the quest for certainty is a longing for control. Or, to look at it the other way around, we disguise the need for control as a need for knowledge. We don't have control. Nor are we likely to achieve it.

She had a lumpectomy, chemotherapy, radiation. The usual. Or, as Odetta keens through the first act finale of the Bill T. Jones/Arnie Zane dance suite, *Still/Here*: slash, poison, burn. I sat next to her as the Adriamycin snaked into her body. It is an antibiotic so toxically opposed to life that the nurse didn't let it drip along with the rest of the mix—saline, Cytoxan, Zofran, Decadron—but sat to push it slowly into the plastic tubing that ran into her arm. If a drop leaked it would destroy her flesh to the bone.

Through the fall and winter, the *New England Journal of Medicine* regularly included ads for Kytril, the second of the new, “miracle” antiemetics. The first, Zofran, had changed the use of Adriamycin from a nearly intolerable treatment to (with Cytosan) a real alternative to the old six-month-long warhorse, CMF, and here was an improvement. I tore out one of their ads and pinned it above my desk as a promise that biomedical knowledge is advancing and that she’d be all right.

But she wasn’t all right. She took the miraculous drug (\$78a pill) along with Ativan, and the tranquilizer Compazene, but she had total-body nausea and vomiting that, while far short of the esophagus-rupturing damage Adriamycin is capable of, was still terrible. Despite adjustments in dosage, it worked even less well the second time, and her husband bought Zofran, the “old” wonder drug, now reduced to \$29 a pill. \$740 spent on antiemetics in five hours. “What do people without insurance do!” my daughter exclaimed, knowing the answer. Zofran worked little better. With the third round of chemo, Compazene was replaced with a drug that unfocused her eyes and numbed her lower jaw. The vomiting went on [Henry, 1982].

Before the fourth round, I resolved to find some marijuana. Scientific research has cast doubt on marijuana as an antiemetic. To be reliably therapeutic and work immediately, pot must be smoked and is easily adjusted. But it needs to be started before chemotherapy “It’s time for your pot,” I heard myself saying once and added a quick, ironically maternal “dear.” It worked. “It keeps the nausea down where it belongs,” she reported “Almost controls it.”

She has done well. She went on working, taking a few days off for surgery and each chemotherapy session, and a half day to be fitted for the radiation mold and marked for the lasers. Her bald head was shockingly beautiful. She observed. She thought. She learned. She was cut but scarcely mutilated. She recovered from the poison. The burning left small, ineradicable tattoos but no scars. Her energy, her creativity slowly returned. She and her husband were told to wait to have children.

Back at my writing table, computer on, notebooks open, I was afraid to read, really read, anything I had ever written about medicine's uncertainty. I would easily have given it up in exchange for the certainty of her cure; I would deny everything I know about uncertainty if that could revoke its truth. But it also seemed that not to write the book would be a challenge to fate: a kind of hubris, still hoping for control. My daughter donated an aliquot of blood to a study of the disease in very young women. We will know more: we already know more in the time since she made her choices. Will we know more in her lifetime? In time to save her if her cancer recurs? There's the question. No one knows [Aristotle, 1985].

In its response to a suffering human being, medicine works upon the body, attends the person, at its best buoys the spirit. There is always the hope of going on, of knowing more. When we know more, will we have control? And, for everyone? There will always be mistakes, delays, and, worst, the persistent assumption that a lump in a 28-year-old's breast—or a man's—is surely nothing to worry about. Tumors will be more and less accessible; breasts will vary in size and density. The red Adriamycin now and then will leak. Radiologist will differ in the interpretation of scattered calcifications: some will be "insufficiently suspicious"; some will cross a line and be biopsied. Where, what is that line? For which physician? With regard to which women?

Biomedicine will know much more: about the etiology, the genetics, the immunology, about timely and non-mutilating diagnosis, effective treatment, cultural variants in diagnosis and treatment, and the psychosomatic components of the disease. Medicine will even learn more about the sensitivity and specificity of radiologists' interpretations. We may adopt a therapeutic practice from another country or discover for ourselves a prophylactic herb. Someone may demonstrate, as David Spiegel was believed to have done for support groups, that meditation or prayer increase life expectancy for the seriously ill. All we learn will work better than what we know now. But it will never be certain knowledge. [Julian, 1996]

For now, breast cancer is forever. Five-year disease-free survival is

just that. There is no cure. Further discoveries will not grant certainty to a particular patient. Far from being an objective observer of medicine, for a long time I alternately raged at it and wanted to give up all I know in exchange for simple trust.

My daughter has had the best medical care there is. But the best treatment for breast cancer is still primitive, barbaric, and uncertain. Some day the women who have survived it will regale their granddaughters with accounts of the weird things done back at the turn of the millennium. How can I have faith in those treatments? Someone whose child is in peril and who knows too much about medicine is challenged by a version of the awful awareness that physicians somehow manage to overcome or ignore. It is the irony of medicine. Medicine is not a science; physicians must act. They must do the best they can, even when it is inadequate, even when they don't know all there is to know, even when there is nothing to do. So must we all. [Julian, 1996].

She set out to write a book about clinical judgment: how, given the uncertainty of its knowledge, medicine is taught and practiced and how its identification with science affects both patients and physicians. Physical symptoms are read narrative, contextually, and interpreted in cultural systems. A physician's diagnosis is a plot summary of a socially-constructed physiological sequence of events. Different cultures look at medicine in different ways according to what they value [Aristotle, 1985]. She thinks that people make a great, even dangerous mistake about medicine when we assume it is a science in the realist Newtonian sense we learned in high school—even that it is, as Lewis Thomas described it, “the youngest science.” The words are noble and the aspirations praiseworthy, but assuming that medicine is a science leads to the expectation that physicians' knowledge is invariant, objective, and always replicable. Although biological research now provides the content for much of medicine, clinical knowing remains first of all the interpretation of what is happening with a particular patient and how it fits the available

explanations. Such knowledge is still called an opinion; the skill used in arriving at that opinion is called judgment.

Without a doubt, biology provides essential knowledge, and promotes valuable technological advance, but medicine, like other practices—engineering, architecture, and law—has a body of experiential, detail-driven wisdom. In this, clinicians are far more like naturalists or archeologists than like biochemists or physicists.

The author of the book is driven to think about these issues when her young daughter is diagnosed with breast cancer. Her thoughts in Chapter One focus on many issues within medicine.

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As recently as the 1980s, if a tumor was small with no metastases and negative nodes, chemotherapy was thought to be unnecessary. But, some people with small tumors had unexpected metastatic recurrences years later, and the cells from the new biopsy matched the old cancer. No one knows what the cancer cells were doing all that time. They were not “just circulating”; they were there somewhere, quiescent. No one knows what made them begin to grow again. Guidelines were changed in 1988. Now almost everyone with the most common kind of breast cancer, no matter how small, is treated with chemotherapy. It’s not the tumor that’s treated. By then it’s gone. What is treated is the possibility that the cancer cells have left the tumor and migrated to the rest of the body. That’s why it’s called “adjuvant” treatment [George, 1977].

The author focuses on the connection between society and medicine. Some of the imperfection is society’s. While we often speak of

medicine and society as if they were entirely distinct, encapsulated “influences” on one another, they are inseparably enmeshed. The United States took a long time to acknowledge breast cancer. Meanwhile, in the United States, medicine was slow to give up the Halsted radical mastectomy, slow to adopt the breast-conserving lumpectomy, slow to devise new chemotherapy regimens, and then slow to limit the number of nodes removed for staging, now slow to develop new tests.

The practice of medicine, even in the era of postmodern cultural studies, is irreducibly material, real. The body is there: alive, beyond construction or representation, although unknown without those human acts. Bodies bear our identity, are our selves; they are socially constructed but not out of nothing. Bodies are language, mute appeal for recognition, for attention and care. Knowledge may be contingent, and existence may be too, but bodies are given: needy, playful, pleasurable, healthy, ill. They are interpreted, treated, sometimes cured. In its response to a suffering human being, medicine works upon the body, attends the person, at its best buoys the spirit.

Knowing in medicine, a science of individuals is a two-way, bidirectional matter. What can be drawn from the individual experience? Can it be generalized? Abstraction from the particular case is always a problem in medicine. What did her sudden loss of energy 10 days after the first chemotherapy mean? Why did her hands bruise easily for a long time afterward? Biomedicine will know much more: about the etiology, the genetics, the immunology, about timely and non-mutilating diagnosis, effective treatment, cultural variants in diagnosis and treatment, and the psychosomatic components of the disease. Medicine will even learn more about the sensitivity and specificity of radiologists’ interpretations. We may adopt a therapeutic practice from another country or discover for ourselves a prophylactic herb.

The author follows the biological research, and her daughter has received the best medical care there is. But the best treatment for breast cancer is still primitive, barbaric, and uncertain [David, 2000].

CHAPTER TWO: THE MISNAMING OF MEDICINE

If medicine is not a science, what is it? Once in the mid-1980s, at a clinical research conference, I observed aloud that medicine has the methodology, the rationality, of the social sciences. I meant to make a useable point about my colleagues' approach to some matter at hand, but it was quickly brushed aside as the mistake of a clueless outsider. I did not know then that the eminent medical historian Henry Sigerest, himself a physician, had made the same observation. "Medicine," he said, "is not so much a natural as a social science." My colleagues were clinical researchers concerned with establishing a solid academic reputation for what was then a new whole-patient, primary care specialty, general internal medicine.

Twenty years later, the description of medicine as a social science still has little appeal. Within the profession and in society at large, the everyday understanding of physicians' work is still lodged in descriptions that are crude, incomplete, and unreflective. Medicine is described as a science, and if that description is qualified, it is with the assertion that it is also an art. "Medicine is a science," graduating physicians are reminded, "but it is an art as well." Or the duality is posed the other way around. "Medicine is an art, adding soon after, "but above all, of course, it is a science." These descriptions are not so much wrong as ill-defined and shallow. They are a reminder that medicine, site of modern miracles, is poorly defined and poorly described by those who nevertheless practice it quite well [Henry, 1960].

Medicine as a science and an art? The paradox of "art" and "science" in descriptions of medicine points to a tension in medicine itself. Good medicine is a rational practice based on a scientific education and sound clinical experience. It is neither an art nor a science. Or, it seems, if it is one of them, it must also be the other.

The terms themselves are slippery and almost entirely unexamined. The "art of medicine" may refer to behavioral attributes such as bedside

manner, the display of professional etiquette, or moral values or virtues manifested in demeanor or habits of communication. It can be any or all of those aspects of physicianhood that seemed squishy and inessential during medical school. All are recognizably different from the knowledge of biology. More usefully, “art” stands for the relatively subjective skills of physical diagnosis or, more precisely, for tacit knowledge, the hunches that experienced physicians have without quite knowing how. Described as intuition essential to good practice, those “gut feelings” are a sort of know how: as non-science, this must be art.

The common understanding of “science” in medicine is equally odd. “Science” denotes the laws by which the physical world works; laws so regular that particular details can be invariably deduced from them. With medicine, the intellectual anachronism seems justified by the years physicians spend studying human biology: anatomy, histology, physiology, microbiology and virology, pathology, pharmacology, and, more recently, molecular biology. But biology is more complex and variable than the physical sciences that medicine idealizes, and human biology is even more multilevel than that. “Science,” especially in its limited, old-fashioned physics-based sense, is neither an adequate description of what physicians do nor a good characterization of how they think [Aristotle, 1991].

Medicine is different. When physicians who conduct research turn to their clinical duties, they are no longer scientists but clinicians: physicians who take care of patients. The language reflects the distinction: “Medical science” is what goes on in laboratories and on computers, while “scientific medicine” means the well-informed care of patients. In Sinclair Lewis’s novel *Arrowsmith* (1925) a clash between science and medicine fuels the crisis for its hero, who has adopted both callings. In the midst of a bubonic plague epidemic on a Caribbean island, Martin Arrowsmith abandons his investigation of a promising new therapy and allows desperate people in his control group to receive the test vaccine. He cannot be sure he is saving lives, but he endangers his scientific career to respond to people who come to him for help. The Tuskegee study went the other

way. Patients—or, the men who were its subjects—were denied the newly discovered penicillin so as not to interrupt a study of the natural course of untreated syphilis. It stands as a reminder of the inescapable, necessary difference between science and medicine [Caroline, 1999].

Physicians start from the demands of the patient's condition and not from the demand for generalizable knowledge, and their goal is just as particular: to treat the patient's illness, not to test the therapy. They cannot begin by reasoning from the general rule to the particular case but they must reason from the particular to the general and then (for confirmation) back again. They start with the details of the present illness—is the pain sharp or dull? what makes it better?—all the while fitting the answers into a complex and general taxonomy of paradigm cases of disease. Because understanding an individual instance of illness requires an inquiry into its circumstances, diagnosis is an interpretive negotiation of the particular signs and symptoms and their development over time. The goal is their narrative coherence in a diagnosis that accounts for all the evidence. Medicine, if it is a science, is a science of individuals [Edmund, 1993].

The extent of the effect this misrepresentation of medicine has on its practice is difficult to appraise, but the science-art paradox has one consequence that is probably unintended by the honored medical elders who invoke it. It creates distinct and difficult-to-reconcile aspects of medicine—unequal ones at that—and suggests that they function as alternatives.

The exercise of clinical judgment. What is neglected by the science-art duality is medicine's character as a practice. It is far more than a body of scientific knowledge and a collection of well-practiced skills, although both are essential. It is the conjunction of the two: the rational, clinically experienced, and scientifically informed care of sick people. Its essential virtue is clinical judgment, the practical reasoning or phronesis that enables physicians to fit their knowledge and experience to the circumstances of each patient.

Aristotle describes *phronesis* in the *Nicomachean Ethics* as the intellectual capacity or virtue that belongs to practical endeavors rather than to science. As an interpretive, making-sense-of-things way of knowing, practical rationality takes account of context, unpredicted but potentially significant variables, and, especially, the process of change over time. Yet, in most accounts of medicine, *phronesis* or clinical judgment is set aside in favor of the conventional binary split between knowledge of the hard, reliable stuff and the mushy but unavoidable ineffabilities. Still, there it is, at the intersection of scientific knowing and craft-skill: clinical judgment, the goal of medical education and the pride of expert physicians [Benner, 1984].

Why is clinical judgment not celebrated? A celebration of clinical judgment is likely to be seen as ignorance or the dismissal of science, a disregard for evidence, if not an outright return to the days of bleeding and leeches. For the profession as a whole, there remain clinical puzzles to be solved and scientific advances to be made. But the assumption that everything about disease and injury in individual patients eventually will be known, quantified, and predicted is an unwarranted leap. Evidence-based medicine promises to refine knowledge and its application but not to supply complete information for every patient in each phase of any condition. Yet when doubt about the possibility of the ultimate perfection of knowledge enters the physician's mind, it is more likely to be prompted by the unyielding puzzle of a patient with a fever of unknown origin [Hubert, 1987].

If medicine were a science in the old-fashioned positivist sense, its laws could be programmed, and diagnosis could be determined and choice of treatment decided entirely by computer. There would be no need for physicians. But even if computer programs worked most of the time, they would still be an inadequate substitute for clinical attention. The need for human contact by both parties to the patient-physician encounter goes well beyond the patient's need for reassurance and support. Clinicians need to examine the patient for themselves. What experienced clinicians possess,

with or without information gleaned from the latest journal article, is an immense and well-sorted catalogue of clinical cases and the clinical judgment to know how to use it, and that store of knowledge is activated by seeing, touching, and questioning the patient.

Such knowledge is varied and extensive enough so that the bottom-up rules of practice or maxims that the cases collectively embody are hedged and qualified, layered in memory with skepticism about their applicability to any particular patient. The acquisition of clinical skill is a process that goes beyond mastery of rules, to a stage where the rules are no longer recalled; each case is comprehended holistically. The inability of clinical experts to identify general rules that guide them once prompted Edward Feigenbaum, an originator of artificial intelligence, to remark of physicians, “At this point, knowledge threatens to become ten thousand special cases.”

Physicians go on accepting descriptions of medicine as a science. They dismiss doubts about its scientific status by appealing to the probability calculations of epidemiology as a surrogate, approximate certainty; or they optimistically predict that medicine’s nonscientific subjectivity is a temporary flaw, an irrationality that will disappear when the last biological puzzle has been solved.

If clinical medicine is not an invariant and wholly predictive science now that it has become highly scientific and supremely technological, then further advances in science and technology are not likely to make it one. This is in part because scientific reasoning of the positivist, objective, replicable sort has only a small place in clinical practice. As patients, we know this. We don’t look for a scientist when we are sick, not unless we are dying without recourse and there is news of some long-shot, potential remedy taking shape in the laboratory. Physicians are expected to care for their patients and treat them comprehensively. They must understand human biology, investigate the patient’s condition attentively, reach a diagnosis, understand the clinical research and its relevance to the particular individual who is the patient, and then weigh the

benefits and burdens of therapeutic choices and adjust the treatment as events unfold. Such a practice is certainly rational, but it is not (especially by medicine's own positivist definition) science.

Medicine, then, is a learned, rational, science-using practice that describes itself as a science even though physicians have the good sense not to practice that way. What goes unspoken is that, because medicine is a practice in which rules must be applied interpretively, they must learn to negotiate the intersection of the two. They need to have developed the beginnings of good clinical judgment, sound practical reasoning. The science-art duality persists way after graduation, and the custom of splitting medicine into two parts shortchanges both the neglected phenomenon of clinical reasoning and the difficult practical education in which new physicians are still immersed [David et al, 1987; 2000].

The complexity of clinical rationality. Given the radical uncertainty of clinical medicine as a science-using practice that must diagnose and treat illnesses one by one, the complex reasoning physicians use requires a richer concept of rationality than a spare, physics-based, positivist account of scientific knowing. Kirsti Malterud argues that traditional medical epistemology is an inadequate representation of medical knowledge because “the human interaction and interpretation which constitutes a considerable element of clinical practice cannot be investigated from that epistemic position.” In view of this misrepresentation of clinical knowing, Eric Cassell has called instead for a bottom-up, experience-based theory of medicine: “Knowledge . . . whether of medical science or the art of medicine, does not take care of sick persons or relieve their suffering; clinicians do in whom these kinds of knowledge are integrated. “

Such experienced knowing is clinical judgment, the exercise of practical reasoning in the care of patients. It is essential to medicine and its characteristic tasks: first (as Edmund Pellegrino enumerates them) to diagnose the patient, second, to consider the possible therapies, and finally to decide what is best to do in this particular circumstance. By their nature,

these are complex and potentially uncertain tasks; no matter how advanced the science that informs them, and the prudence or clinical judgment they require is the essential virtue of the good physician. It is the goal toward which clinical education and the practice of medicine strive. [Edmund et al., 2000].

Complexity and uncertainty are built into the physician's effort to understand the particular in light of general rules. If physicians could be scientists, they surely would be. The obstacle they encounter is the radical uncertainty of clinical practice: not just the incompleteness of medical knowledge but, more important, the imprecision of the application of even the most solid-seeming fact to a particular patient. The development of epidemiology and strategies for its use with individual patients such as evidence-based medicine (EBM) have reduced this uncertainty and vastly improved patient care. Although EBM has never claimed that real certainty in dealing with human illness may be imminent, its impossibility is no reason not to work toward greater reliability in diagnosis, treatment, and prognosis. But, the gap between invariant, reliable, universalizable laws and the variable manifestations of illness in a particular patient remain. That is the nature of a science of individuals [Linda, 2000].

Scientific advance will not change this. Diagnosis, prognosis, and treatment of illness will go on requiring interpretation, the hallmark of clinical judgment. This attentive focus on the particular patient that is the clinician's moral obligation will continue to compel the exercise of practical reason [Hans-Georg Gadamer, 1996].

As the practice of medicine requires the recollection and representation of subjective experience, physicians will go on investigating each clinical case: reconstructing to the best of their ability events of body, mind, family, and environment. For this task scientific knowledge is necessary and logically essential, even though the task itself is narrative and interpretive. It is not science, not in any positivist sense, nor is it art.

The misrepresentation of clinical rationality. Why does medicine collude in the misrepresentation of its rationality? One obvious explanation is that medicine's status in society depends in large part on the scientific character of much of its information. But physicians suffer the ill effects of this hubris: as patients and as citizens, we expect them to be far more certain than either their practice or the biology on which it is based can warrant, and, for many reasons, they are likely to take these expectations for their own. Malpractice suits that arise more from anger over misplaced expectations and perceived neglect than from genuine mistakes are the result. As for power, it arises more strongly from human need in time of illness than from science. A widespread appreciation of clinical judgment would provide physicians a human and fallible but still trustworthy authority.

Another less obvious reason for describing medicine as a science is a practical requirement of clinical medicine, its need for certainty when taking action on behalf of another human being [Harold, 1990].

One other reason for medicine's misdescription is an ethical one. Physicians argue that the belief that medicine is a science is essential to medical education. Clinical knowledge, although evolving, is at any given moment fixed and certain, and as teachers they want to foster in their students and residents a nearly obsessive attention to detail, a drive to know all that can be known, and a dedication to the best possible care for each patient. These are the marks of the good clinician. It might seem outrageous to ask them simultaneously to acknowledge clinical medicine's irreducible uncertainty—although, as I will show, covertly they manage to do exactly that at every clinical turn. Patients are resistant too. Do we want physicians to tell us as they enter the examination room that their knowledge is incomplete, its application to our case will be imprecise, and its usefulness uncertain? Not unless our complaint is very minor we do not. We want to think of them as powerful, dedicated, perfect figures. Patients, even when they know the assertion is suspect, still want to go on hearing: "We've done everything possible."

Is it possible to educate good physicians while recognizing that science is a tool rather than the soul of medicine? I believe it is, especially if that education was framed formally, as it now is tacitly, as a moral education, a long and scrupulous preparation to act wisely for the good of patients in an uncertain field of knowledge. A first step would be to scrap the unexamined description of clinical medicine as both a science and an art. The duality ignores all that medicine shares with moral reasoning and reinforces the contemporary tendency to split ethics from medicine. Moral knowing is the essence of clinical method, inextricably bound up with the care of the patient. In medicine, morality and clinical practice require phronesis, the practical rationality that characterizes both a reliable moral agent and a good physician [John, 1981].

Medicine's goal is the cultivation of phronesis, the practical reason essential to clinical judgment. The practice of medicine requires knowledge of human biology, a store of clinical experience, good diagnostic and therapeutic skills, and a familiarity with the vagaries of the human condition. Their intersection in the care of patients—the practice that makes physicians who and what they are—is neither a science nor an art. It is a distinctive practical endeavor whose particular way of knowing—its phronesiology—qualifies it to be that impossible thing, a science of individuals [Hilary, 1984].

Henry Sigerest, himself a physician, had made the same observation. “Medicine,” he said, “is not so much a natural as a social science. Medicine is described as a science, and if that description is qualified, usually on ritual occasions, it is with the assert medicine. The paradox of “art” and “science” in descriptions of medicine points to a tension in medicine itself. Good medicine is a rational practice based on a scientific education and sound clinical experience. It is neither an art nor a science. On ritual occasions, “the art of medicine” may refer to behavioral attributes such as bedside manner or the display of professional etiquette. The common understanding of “science” in medicine is equally odd.

With medicine, the intellectual anachronism seems justified by the years physicians spend studying human biology: anatomy, histology, physiology, microbiology and virology, pathology, pharmacology, and, more recently, molecular biology.

“Science,” especially in its limited, old-fashioned physics-based sense, is neither an adequate description of what physicians do nor a good characterization of how they think. As scientists, the individual case is of necessity not their first concern.

Medicine is different. When physicians who conduct research turn to their clinical duties, they are no longer scientists but clinicians: physicians who take care of patients. Even if every one of a physician’s patients is enrolled in an experimental protocol, the ethics of medicine decrees that with regard to those patients the physician is first and foremost a physician and not a research scientist. The language reflects the distinction: “Medical science” is what goes on in laboratories and on computers, while “scientific medicine” means the well-informed care of patients

Medicine is not a science, not in the positivist sense that is customarily meant. While diagnosis and treatment have become intensely science-using activities, those activities are not in and of themselves science. Nor does the unavoidably experimental nature of clinical practice qualify medicine as a science [Hayden, 1980; 1987].

It is true that no treatment prescribed to an individual patient is ever entirely certain in its effect, but that is clinical, not scientific, experimentation, with variables that are beyond control. Physicians start from the demands of the patient’s condition and not from the demand for generalizable knowledge, and their goal is just as particular: to treat the patient’s illness, not to test the therapy. The science-art duality is surely inspired by a sense of this oddity. It signals that medicine is recognizably different from science pure and simple.

What is neglected by the science-art duality is medicine’s character as a practice. It is far more than a body of scientific knowledge and a

collection of well-practiced skills, although both are essential. It is the conjunction of the two: the rational, clinically experienced, and scientifically informed care of sick people. Its essential virtue is clinical judgment, the practical reasoning prognosis that enables physicians to fit their knowledge and experience to the circumstances of each patient. Still, there it is, at the intersection of scientific knowing and Craft-skill: clinical judgment, the goal of medical education and the pride of expert physicians. Why is clinical judgment not celebrated? These days, physicians may no longer see a comparison of clinical medicine with social science or skepticism about its claims to be a science as attacks on their profession, but those views are still regarded as the peculiar opinions of a non physician [Charles, 1989]

What experienced clinicians possess, with or without information gleaned from the latest journal article, is an immense and well-sorted catalogue of clinical cases and the clinical judgment to know how to use it, and that store of knowledge is activated by seeing, touching, and questioning the patient. The acquisition of clinical skill is a process that goes beyond mastery of rules, she claims, to a stage where the rules are no longer recalled; each case is comprehended holistically. If clinical medicine is not an invariant and wholly predictive science now that it has become highly scientific and supremely technological, then further advances in science and technology are not likely to make it one. This is in part because scientific reasoning of the positivist, objective, replicable sort has only a small place in clinical practice [Ronald, 1991].

Medicine, then, is a learned, rational, science-using practice that describes itself as a science even though physicians have the good sense not to practice that way. This complexity may be close to what those who invoke the science-art duality are trying to express.

After four years of instilling in their students both the habits of clinical reasoning and the belief that what they are doing is a science, on graduation day, medicine's elders publicly acknowledge that, although science remains the "gold standard," it is an inadequate description of all

they hope new graduates have learned. As they leave for residencies, new physicians must know the science, of course, and also grasp what is meant by the art [Alasdair, 1981].

What goes unspoken is that, because medicine is a practice in which rules must be applied interpretively, they must learn to negotiate the intersection of the two. They need to have developed the beginnings of good clinical judgment, sound practical reasoning. Yet, the science-art duality persists long after graduation day, and the custom of splitting medicine into two parts shortchanges both the still neglected. Medicine needs a systematic and disciplined approach to the knowledge that arises from the clinician's experience rather than artificial divisions of medical knowledge into science and art. Such experienced knowing is clinical judgment, the exercise of practical reasoning in the care of patients [Anne, 1994]. It is essential to medicine and its characteristic tasks: first (as Edmund Pellegrino enumerates them) to diagnose the patient, second, to consider the possible therapies, and finally to decide what is best to do in this particular circumstance. By their nature, these are complex and potentially uncertain tasks; no matter how advanced the science that informs them, and the prognosis or clinical judgment they require is the essential virtue of the good physician. It is the goal toward which clinical education and the practice of medicine strive.

But despite medicine's miracles—and they are legion—clinical knowing is not certain, nor will it ever be. Scientific advance will not change this. In that ideal future when the path physiology of disease is thoroughly known and the epidemiology of every malady established, and both are at the fingertips of the experienced practitioner, medicine will remain a practice of diagnosis, prognosis, and treatment of clinical judgment. Physicians will still be educated and esteemed for the case-based practical reasoning. [Hans-Georg Gada Mer, 1984].

The individual patient will still require clinical scrutiny, clinical interpretation. The history will be taken, the body examined for signs, tests performed, and the medical case constructed. Patients will go on presenting

demographically improbable symptoms of diseases. The practice of medicine requires the recollection and representation of subjective experience, physicians will go on investigating each clinical case: reconstructing to the best of their ability events of body, mind, family, and environment. For this task scientific knowledge is necessary and logic essential, even though the task itself is narrative and interpretive.

Piecing together the evidence of the patient's symptoms, physical signs, and test results to create a recognizable pattern or plot is a complex and imprecise exercise. It is subject to all the frailty of historical reconstruction, but it remains the best—the logical, rational best—that clinical reasoners can do. It is not science, not in any positivist sense, nor is it art [Martha et. all, 1973, 1980, 1986].

A more interesting, less obvious reason for describing medicine as a science is a practical requirement of clinical medicine, its need for certainty when taking action on behalf of another human being. Science is regarded as the “gold standard” of clinical medicine precisely because it promises reliability, objectivity—in short, what certainty is available in an uncertain practice [Wayne, 1988]. One other reason for medicine's misnaming is an ethical one. Physicians argue that the belief that medicine is a science is essential to medical education. Clinical knowledge, although evolving, is at any given moment fixed and certain, and as teachers they want to foster in their students and residents a nearly obsessive attention to detail, a drive to know all that can be known, and a dedication to the best possible care for each patient. These are the marks of the good clinician [Corrina, 1993].

Do we want physicians to tell us as they enter the examination room that their knowledge is incomplete? We want to think of them as powerful, dedicated, perfect figures. This rigid expectation carries over into the smallest details of education and practice. Work shifts for physicians and 80-hour weeks for residents have been resisted because they might limit their all-out dedication to patients [Renee Fox, 1957].

Is it possible to educate good physicians while recognizing that science is a tool rather than the soul of medicine? I believe it is, especially if that education was framed formally, as it now is tacitly, as a moral education, a long and scrupulous preparation to act wisely for the good of their patients in an uncertain field of knowledge.²⁴ A first step would be to scrap the unexamined description of clinical medicine as both a science and an art. The duality ignores all that medicine shares with moral reasoning and reinforces the contemporary tendency to split ethics from medicine. Accounts of clinical medicine should celebrate clinical judgment and not the idea of science that physicians borrow from Newtonian physics. Nor should they appeal to a vaguely defined “art” to modify or enrich that outmoded idea of science. Clinical medicine is best described, instead, as A practice. Accounts of physicians’ work, especially celebratory ones, should emphasize the exercise of clinical reasoning or prognosis, the deployment of clinical judgment on behalf of the patient. In equipping physicians to perform that essential task, medical education is necessarily a moral education, for it is training to choose what is best to do in the world of action. Its goal is the cultivation of prognosis, the practical reason essential to clinical judgment [Gregory, 1989].

The practice of medicine requires knowledge of human biology, a store of clinical experience, good diagnostic and therapeutic skills, and a familiarity with the vagaries of the human condition. Their intersection in the care of patients—the practice that makes physicians who they are—is neither a science nor an art. It is a distinctive practical endeavor whose particular way of knowing—its phronesiology—qualifies it to be that impossible thing, a science of individuals [Stephen, 1993].

Chapter THREE: CLINICAL JUDGMENT AND THE INTERPRETATION OF THE CASE

In a hand-written chart my daughter, her husband, and the oncologist laid out her treatment options and what was known about the side effects of each. But about her particular experience or her fate the chart had nothing to say. Clinical medicine could diagnose her breast cancer and provide information about its treatment, even offer a choice among several possibilities, but it could not tell what had caused her tumor or say whether she would be among those who survive. She had her choice of treatments precisely because so much was uncertain and because, in the judgment of her physicians, none of them had a better clinical outcome than another.

The human need for certainty obscures the circumstantial nature of clinical medicine. Patients and physicians alike want medicine to be more certain than it is, and as a result, few of either group are motivated to understand how physicians acquire and use their knowledge. An account of clinical judgment—the practical reasoning necessitated by the absence of certainty—is central to that effort [Eric Cassell, 1979, 1986].

To understand the nature of clinical judgment, we start with Aristotle's account of practical reasoning in the *Nicomachean Ethics* which *compares* knowing in moral matters to knowing in medicine and describes practical reasoning or phronesis as their characteristic virtue. In the process, practical reasoning is distinguished from wisdom and from scientific knowledge: inquiries into ethics and health, Aristotle writes, are particular, circumstantial, and therefore necessarily uncertain. It is not that medicine and moral inquiry have no use for certainty or "fixed and invariable answers", but for moral questions about the care of patients, absolute or invariant answers are unobtainable. For this reason, scientific reasoning, or episteme, is inappropriate in like medicine, which is interpretive because it is radically uncertain. Episteme belongs to stable physical phenomena that can be known through necessary and invariant laws. Medicine calls for phronesis or practical reasoning, the ability to determine the best action to

take in particular circumstances that cannot be distilled into universally applicable solutions. Practical reasoning seeks the best answers possible under the circumstances. It enables the reasoner to distinguish, in a given situation, the better choice from the worse.

Physicians use both the scientific or hypothetical-deductive and the practical or interpretive and narrative, but it is the latter that makes them clinicians. To be knowledgeable, a physician must keep up with the results of both scientific and clinical research and to add that information to the store of knowledge about the body, healthy and ill, through the study of human biology [Julia, 1986].

Yet the very certainty that makes biology essential to medicine limits its usefulness in the care of patients. That use is never mere application and the relevance of any given scientific fact to a particular patient is always potentially uncertain. Science generalizes and abstracts. Its rules have a timeless rigor, while patients, diseases, and therapeutic results are astonishingly, obstreperously variable.

Scientific generalizations are useful for practical reasoning in medicine, but neither biological facts nor epidemiological probabilities go very far alone. Just to decide which general principle, law, or maxim is applicable to the present case, a reasoner must begin with a preliminary, provisional interpretation. The sound is a heart murmur or the bumps a rash. The situation is seen as one to which some generalization may apply. Is this patient's chest pain from heart or gut or chest muscles? Are these reddish bumps a contact rash or the beginning of measles? Deduction may decide the question—erythematous belly rashes in childhood are a sign of measles; this child has an erythematous belly rash and has not been immunized; therefore, this child almost certainly has measles. But the construction of the syllogism on which that deduction depends requires clinical judgment for both the recognition of the patient's symptoms or physical signs and the creation of the list of possibilities, the differential diagnosis. And that is a circular, narrative, interpretive undertaking [Georg Henrik, 1971].

Clinical judgment as narrative rationality. Despite medicine's appeal to the canons of physical science as a model for its work, physicians do not reason as they imagine scientists do. Whether making a diagnosis, deciding on treatment, or working out the choices that have in the past 25 years come to be known as bioethics, physicians when face to face with a patient do not proceed as they and their textbooks often describe it: top-down, deductively, "scientifically." They use case-based reasoning instead [Jerome Groopman, 1977].

Although the medical case is often regarded as a scientific report, it is nevertheless a strongly conventional if minimalist narrative. Despite all the prohibitions against "anecdotal knowledge" in medicine, case narration is the principal means of thinking and remembering—of *knowing*—in medicine. The interpretive reasoning required to understand signs and symptoms and to reach a diagnosis is represented in all its situated and circumstantial uncertainty in narrative. This is the best means of representing the exercise of clinical judgment, medicine's phronesis. Physicians must know the facts of pathophysiology, the biological "laws," but they cannot start there. They start instead with the individual patient: the symptoms and signs and answers to questions that fill out the story of the illness presented to medical attention. Narrative accommodates far more variability than, say, the principles of human biology that describe the narrowing of coronary arteries. And it starts, where medicine must, with the odd details that sometimes go unrecognized as a heart attack. Narrative's sequential presentation unfolds the tactful, tactical deployment of knowledge and experience relevant to determining what is wrong with one particular patient and deciding what action to take on her behalf [Jerome, 1997].

In medicine, case narrative captures and represents clinical reasoning. Recorded in the chart and presented orally for teaching and review, the case is the template for a clinician's diagnostic thinking. It enables clinicians to consider the relevant abstractions—in this instance, the biological "plots" of disease mechanisms for possible diagnoses that

can explain a 43-year-old woman's particular set of symptoms. Could a woman so young be having a heart attack? The received pathophysiological accounts of disease at once test clinical experience and are tested by it, both in the moment as the physician calls up analogous cases from a store of experience and later through the case presentations that make up the discourse of academic medicine. Cases are narratives created to organize, record, and think about practical experience.

One of narrative's chief values for medicine lies exactly in the indeterminacy that makes it suspect. Even with the most linear, conventional, chronological plots—think of a recent explosive action film—the conclusion is never entirely predictable. As narrative depicts events embedded in the lives and concerns of its protagonists, circumstances unfold through time in all their contingency and complexity. Endings may seem inevitable—but only after the fact. Whether a medical case, a person's life story, or a nation's political history, narrative explores the way cause and effect are entangled with the imponderables of human character and motivation, and with luck and happenstance. Narrative, however, remains mired in the circumstances of human experience. From a scientific point of view, this is a weakness, but it is also narrative's practical strength. In medicine, narrative is essential for the transfer of clinical knowledge and insight gained from practice. The clinical case history not only provides a means of working out and remembering what is best to do for a given patient but also captures experience and presents it to its audience. As a result, case narrative is the primary, vicarious means of shaping clinical judgment for new learners and experienced practitioners alike. Given the essentially moral character of clinical judgment—the intellectual virtue of determining what best to do for a sick patient—construction of the medical case is a specialized instance of narrative more generally: an essential means of moral knowing.

Case narrative has not disappeared from medicine or medical education, nor is it likely to.

The narrative character of clinical knowledge owes its tenacity in

an era of scientific medicine to the profession's duty to make sense of the signs and symptoms of illness in every particular patient. With a grasp of human biology, clinical epidemiology, and medical decision-making, a physician is, above all, the person who takes the patient's history—and, transforms it into a medical case. At its richest and most skilled, this act of narrative perception and construction requires the capacity to understand the patient and recast his or her story of illness into a medical narrative that can be matched with the diagnostic taxonomy and lead to appropriate treatment. Case narrative draws on several clinical abilities: the elicitation of useful information from the patient, the performance of a good physical examination, a focused and parsimonious use of tests, the prescription of efficacious therapy with minimal harm to the patient, and attention to the psychological, moral, and social problems that may arise in connection with the illness and its treatment. The clinical judgment these tasks require is not science or scientific reasoning but practical, interpretive reasoning, the exercise of phronesis.

An education for clinical judgment. The education meant to cultivate phronesis or clinical judgment in future physicians replicates medicine's complex negotiation between biological science and particular experience with patients. As students recast the biology they have spent years learning into clinically relevant cases, they move toward the acquisition of clinical judgment. It is a confusing time, and clinical teachers are regularly heard complaining that, while their apprentices may be the cream of the educational crop, they don't seem to know very much at all. Yet, as students participate in the care of patients and construct the cases that are part of that care, they learn very quickly, spending their days in the hospital interpreting not from science to disease or from clinical generalizations to the patient's symptoms but the other (and at first confusing) way around: from symptoms to diagnosis and then, if necessary, to the science [Alvan, 1967]. The principal tool in this process, both for students learning clinical reasoning and for the experts teaching them, is the

case. It organizes clinical observation and investigation and models the analogical process by which clinical reasoners reach a recognizable diagnosis. As students of medicine gather details, they begin to make medical sense of patients' signs and symptoms and to construct, record, and report their case histories. Starting as nearly as possible from the beginning with each patient, they observe—experience—the evidence first-hand and put it together with only conditional certainty. They construct professionally acceptable narrative accounts of what they observe and learn which normal findings to include and which to exclude in order to buttress their reasoning. They take time to invoke biological science for explanation only when the clinical details do not fit a well-known pattern or when they have a teacher who demands it. By means of this clinical method, they begin to acquire the rudiments of clinical judgment, and in the process they learn to be skeptical of every sort of information, a skepticism that is integral to medicine's practical rationality.

They are not scientists or artists but practical reasoners, exercising clinical judgment as they see patients and work out what ought to be done for each one of them [John Ladel, 1985].

Meanwhile, the goal of medical education is clinical judgment: the interpretive tact or educated common sense that sometimes rises to intuitive insight, even genius, when exercised by a master clinician in the diagnosis and treatment of a person who is ill. Neither science nor art, it is an intellectual capacity carefully cultivated through the rigors of a long apprenticeship spent dealing with radical uncertainty. It is clinical judgment [Marsden, 1984].

The human need for certainty obscures the circumstantial nature of clinical medicine. Patients and physicians alike want medicine to be more certain than it is, and as a result, few of either group are motivated to understand how physicians acquire and use their knowledge.¹ An account of clinical judgment—the practical reasoning necessitated by the absence of certainty—is central to that effort. To some, the days of clinical judgment are numbered. For them, evidence-based medicine (EBM) and its

emphasis on the results of clinical research promise to clarify and rationalize clinical reasoning to a point of certainty, and expose clinical judgment as a disguise for old-fashioned appeals to custom and authority it will not turn medicine into a science. Neither EBM's method nor the information it yields can do the work of clinical thinking alone. The answers it provides are useless without a clearly asked clinical question, and that is the province of clinical judgment.

To understand the nature of clinical judgment, Aristotle's account of practical reasoning is a useful place to start. The *Nicomachean Ethics* compare knowing in moral matters to knowing in medicine and describes practical reasoning or prognosis as their characteristic virtue. In the process, practical reasoning is distinguished from wisdom and from scientific knowledge: inquiries into ethics and health, Aristotle writes, are particular, circumstantial, and therefore necessarily uncertain [Aristotle, 1991].

The type of accounts we demand should reflect the subject matter, and questions about actions and expediency, like questions about health, have no fixed and invariable answers. And when our general account is so inexact, the account of particular cases is all the more inexact . . . and the agents themselves must consider in each case what the opportune action is. It is not that medicine and moral inquiry have no use for certainty or "fixed and invariable answers": nothing would make physicians or moral reasoners happier. But as objects of knowledge, health and morals differ from physical phenomena, about which certainty is available.

For this reason, scientific reasoning, or *episteme*, is inappropriate in fields like medicine, ethics, law, or meteorology, disciplines that are interpretive because they are radically uncertain. Episteme belongs, instead, to stable physical phenomena that can be known through necessary and invariant laws. Medicine and morals (like navigation, law, and meteorology) call for prognosis or practical reasoning, the ability to determine the best action to take in particular circumstances that cannot be distilled into universally applicable solutions. While scientific reasoning

has precision and replicability as its goals, practical reasoning seeks the best answers possible under the circumstance [Caroline, 1999].

Aristotle is not alone in describing a kind of thinking distinct from the rationality of science. Since the eighteenth century, the West has so privileged scientific reasoning that we in the twenty-first are still working free of the assumption that quantitative science is the only valid kind of knowing. Yet a numbers of thinkers have described another mode of knowing that in various ways resembles prognosis. William James described rationality as larger than scientific hypothesis and verification. “To say that all human thinking is essentially of two kinds—reasoning on the one hand, and narrative, descriptive, contemplative thinking on the other—is to say only what every reader’s experience will corroborate,” he wrote. Hermeneutics, from Wilhelm Dilthey to Hans-Georg Gadamer, describes the interpretive circularity that characterizes the negotiation of a fit between general and particular [Edmund, 1993]. Patients and physicians alike want medicine to be more certain than it is, and as a result, few of either group are motivated to understand how physicians acquire and use their knowledge. 1 An account of clinical judgment—the practical reasoning necessitated by the absence of certainty—is central to that effort. To some, the days of clinical judgment are numbered. For them, evidence-based medicine (EBM) and its emphasis on the results of clinical research promise to clarify and rationalize clinical reasoning to the point of certainty, and expose clinical judgment as a disguise for old-fashioned appeals to custom and authority. Neither EBM’s method nor the information it yields can do the work of clinical thinking alone. The answers it provides are useless without a clearly asked clinical question, and that is the province of clinical judgment. The understanding of a patient’s condition needed to formulate that question requires clinical experience, a store of well-sorted preliminary information, careful, even skeptical observation, a nuanced recognition of variation and anomaly, and the ability to put all this together [David, 1987;2000]. To understand the nature of clinical judgment, Aristotle’s account of practical reasoning is a

useful place to start. The *Nicomachean Ethics* compare knowing in moral matters to knowing in medicine and describes practical reasoning or phronesis as their characteristic virtue. In the process, practical reasoning is distinguished from wisdom and from scientific knowledge: inquiries into ethics and health, Aristotle writes, are particular, circumstantial, and therefore necessarily uncertain.

The type of accounts we demand should reflect the subject matter, and questions about actions and expediency, like questions about health, have no fixed and invariable answers. And when our general account is so inexact, the account of particular cases is all the more inexact . . . and the agents themselves must consider in each case what the opportunities. For moral questions, as for questions about the care of patients, absolute or invariant answers are unobtainable. For this reason, scientific reasoning, or *episteme*, is inappropriate in fields like medicine, ethics, law, or meteorology, disciplines that are interpretive because they are radically uncertain. Episteme belongs, instead, to stable physical phenomena that can be known through necessary and invariant laws. Medicine and morals (like navigation, law, and meteorology) call for phronesis or practical reasoning, the ability to determine the best action to take in particular circumstances that cannot be distilled into universally applicable solutions. While scientific reasoning has precision and replicability as its goals, practical reasoning seeks the best answers possible under the circumstances.

Yet the very certainty that makes biology essential to medicine limits its usefulness in the care of patients. That use is never mere “application,” and the relevance of any given scientific fact to a particular patient is always potentially uncertain.¹³ Science generalizes and abstracts. Its rules have a timeless rigor, while patients, diseases, and therapeutic results are astonishingly, obstreperously variable. Even as clinical medicine aspires to the reliability of science, it must struggle to make sense of life’s often unsorted particularities. Scientific generalizations are useful for practical reasoning in medicine, but neither biological facts nor epidemiological probabilities go very far alone.

Despite medicine's appeal to the canons of physical science as a model for its work, physicians do not reason as they imagine scientists do. Whether making a diagnosis, deciding on treatment, or working out the choices that have in the past 25 years come to be known as bioethics,¹⁴ physicians when face to face with a patient do not proceed as they and their textbooks often describe it: top-down, deductively, "scientifically."¹⁵ They use case-based reasoning instead.

Although the medical case is often regarded as a scientific report and even has been described as mere "patter," it is nevertheless a strongly conventional if minimalist narrative. Despite all the prohibitions against "anecdotal knowledge" in medicine, case narration is the principal means of thinking and remembering—of *knowing*—in medicine.

So it is in medicine, where case narrative captures and represents clinical reasoning. Recorded in the chart and presented orally for teaching and review, the case is the template for a clinician's diagnostic thinking. It enables clinicians to consider the relevant abstractions—in this instance, the biological "plots" of disease mechanisms for possible diagnose. Cases are narratives created to organize, record, and think about practical experience. Narrative, thus, is essential to thinking and knowing in clinical medicine [Harold et al, 1990]

Stories enable us to create and maintain our sense of self within our social and historical circumstances. The function of narrative in clinical medicine is no different. There the construction and interpretation of stories—natural histories of disease, accounts of the patient's illness, clinical case narratives, diagnostic plots—enable physicians to make sense of circumstances and determine, even in situations of tragic choice, what, on the whole, is the best thing to do.

Narrative, of course, is the antithesis of all that is believed to be scientific, and every physician knows it. As medical students, they learn to construct, record, and present cases—above all, to think with them—and at the same time they are taught a suspicion of anecdotal evidence, the singular occurrence that can skew perception. This only seems

contradictory. Skepticism about narrative is an entirely justified, although sometimes myopically misunderstood, part of clinical rationality. Physicians must have a means of understanding and representing illness and disease that accommodates the knower's unabashedly situated subjectivity and the disease's entanglement with time. As the case orders events of the illness both chronologically and subjectively, it asserts or implies some causal relation among those events and imputes character and motive to the actors who are very nearly effaced. One of narrative's chief values for medicine lies exactly in the indeterminacy that makes it suspect. Even with the most linear, conventional, chronological plots—think of a recent explosive action film—the conclusion is never clinical judgment and the interpretation entirely predictable [John Dewey, 1981].

Diagnosis and treatment choice, thus, are not simply matters of logic or a patient preference exercised in the moment but a more contextual consideration intertwined with history, identity, culture, and the meaning of an individual's life. Not only is case narrative the form taken by the physician's stock of clinical experience but it also embodies the process of clinical reasoning that must become second nature. This goes far to explain the suspicion with which individual assertions of clinical judgment are regarded in the medical profession.

Medicine's clinical goal is to achieve skeletal diagnostic plots and boring treatment protocols—which feel quite scientific—for every disease and for the choice and conduct of their treatment. Yet case narrative has not disappeared from medicine or medical education, nor is it likely to [John Dewey, 1981].

The narrative character of clinical knowledge owes its tenacity in an era of scientific medicine to the profession's duty to make sense of the signs and symptoms of illness in every particular patient. With a grasp of human biology, clinical epidemiology, and medical decision-making, a physician is, above all, as Stephen Toulmin has pointed out, the person who takes the patient's history—and, he might have added, transforms it into a medical case. At its richest and most skilled, this act of narrative perception

and construction requires the capacity to understand the patient and recast his or her story of illness into a medical narrative that can be matched with the diagnostic taxonomy and lead to appropriate treatment. Case narrative draws on several clinical abilities: the elicitation of useful information from the patient, the performance of a good physical examination, a focused and parsimonious use of tests, the prescription of efficacious therapy with minimal harm to the patient.

The clinical judgment these tasks require is not science or scientific reasoning but practical, interpretive reasoning, the exercise of phronesis. The education meant to cultivate phronesis or clinical judgment in future physicians replicates medicine's complex negotiation between biological science and particular experience with patients [Hayden, 1987].

The principal tool in this process, both for students learning clinical reasoning and for the experts teaching them, is the case. It organizes clinical observation and investigation and models the analogical process by which clinical reasoners reach a recognizable diagnosis.

Students write up cases in patients' charts (hence third-year "clerkships"), present them orally to instructors, and soon adopt them as their mental template for inquiry and recollection. Clinical education is thus finely calibrated to instill and reward the development of clinical judgment in the face of uncertainty. Although it bears little resemblance to the cool and objective, positivist ideal of physical science that it takes as its model, this practical rationality, the physician's exercise of clinical judgment, is likely to be taken as evidence for medicine's status as a science.

Meanwhile, the goal of medical education is clinical judgment: the interpretive tact or educated common sense that sometimes rises to intuitive insight, even genius, when exercised by a master clinician in the diagnosis and treatment of a person who is ill. Neither science nor art, it is an intellectual capacity carefully cultivated through the rigors of a long

apprenticeship spent dealing with radical uncertainty. It is clinical judgment. Such ability in clinical knowing is held to be the crowning quality of the expert clinician—and, as often as not, by the very same physicians who claim that medicine is itself a science [Wayne, 1988].

But in the absence of certain knowledge about the individual case, the goal of their professional education remains the development of good clinical judgment. It is this that will enable them to do their best for particular patients one by one.

PART II:
CLINICAL JUDGMENT AND THE IDEA OF CAUSE

Chapter FOUR: “WHAT BRINGS YOU HERE TODAY?”
THE IDEA OF CAUSE IN MEDICAL PRACTICE

My daughter’s illness sent me on a quest to understand the idea of cause. To know the cause of disease is to have control. Medicine is driven by it, and patients and their families are part of that drive. And yet, the idea of cause in medical practice bears as odd a relation to science as clinical medicine itself. The physician’s investigation of cause, even as it seems to support clinical medicine’s status as a science, undercuts that claim at every turn [Eric Cassell, 1979].

The idea of cause fits right into the misnaming of medicine because it is central to the profession’s conventional, positivist ideal of science. Yet in the physician’s office or the emergency room, cause is the object of a retrospective, narrative investigation that more nearly resembles investigation in history or economics than experiments in microbiology or chemistry. A look at the clinical uses of cause reveals some of the important ways clinical medicine differs from a Newtonian science and highlights instead medicine’s practical rationality, the clinical judgment essential to the work of diagnosis and treatment. At the same time, the importance of clinical cause suggests why physicians might claim the label “science” for their work and why that label goes unquestioned both in medicine and out [Julia, 1986].

Clinical cause. Physicians are concerned with clinical cause, and since questions of cause are essential to the sciences, that concern is assumed to guarantee medicine’s status as science. Explanation is what science is all about. Hypotheses are generated, variables controlled, experiments conducted, results analyzed; knowledge is elaborated, revised, advanced. This powerful method characterizes much of biomedical

research and is readily understood as the investigation of cause. What causes cancer? Or AIDS? Or tuberculosis? These are scientific questions about the chain of events leading to an unexpected lump or night sweats or a cough that physicians recognize as disease. Biomedical scientists work to understand some part of these causal chains well enough to suggest how they might be interrupted or altered. Their goal is to change the outcome so the disease can be cured or, better yet, prevented.

When we are ill, we go to a doctor to find out why. We want to know the cause and expect that science will supply the answer. What could be more scientific? Yet, while biology plays an essential role in clinical medicine, the idea of cause in medical practice is a far simpler, narrower concern. In clinical medicine, especially academic medicine, cause is that without which a subsequent effect would not occur. The idea can encompass a long chain of circumstance: First one thing happens, then as its consequence another. Physicians know a multitude of these causal sequences. They make up the clinical plots of hundreds of maladies and their variants. Well established in pathophysiology, these sequences are sorted into the taxonomy of disease that physicians rely on when they set out to make sense of a patient's symptoms. Biomedical science supplies the information that shapes these accounts of disease, and the knowledge of that science grounds the diagnostic expertise that prompts people who are sick to seek medical attention. The way physicians reasoned before the scientific era is, in its broad outlines, the way they reason today [Georg Henrik, 1971].

The clinical encounter focuses on a pressing, practical question: What is causing this particular patient to feel ill? This is the question of clinical cause, a more specific and targeted causal question than either the biological problem of disease etiology or the more contingent, multiplicative question of how one particular person fell ill. Both biological cause and the puzzle of individual etiology have a role to play in medical practice. If the patient's condition is recognizable, the question of cause all but disappears. It shrinks to something like a professional reflex or tacit

knowledge, as decisions are made and action taken in accord with well-established practice.

At times, however, when the diagnosis is uncertain or therapy lacks a clear indication, clinical reasoning becomes patent. Then it is visibly multiplicative and nonlinear, and its procedures themselves become the object of clinical scrutiny. Although clinical method remains the same, it widens to become more obviously contextual, as remotely plausible hypotheses are generated and engaged. Then, at moments when medicine is most uncertain, physicians are most nearly like the scientists they idealize. Then they “think outside the box”: they question received knowledge, open themselves to new possibilities, propose experiments. While physicians may profess a simple, linear idea of cause and effect, they frequently work as if cause were complex and multifaceted.

The idea of cause in clinical medicine is thus both taken-for-granted as simple and ambiguously multiplicative—and each by turns as the situation requires. These two concepts are not at all alike. One is the linear idea of ordered, necessary, and sufficient biological causality, the concept physicians always hope to rely upon. The other is a more complex, multilevel speculative and narrative assumption that comes to the fore at need. The two concepts of cause exist side by side in medical practice. When cause can be simplified, it is taken for granted: clinical practice is understood to be science, and cause tends to disappear from the experienced reasoner’s consciousness. When cause cannot be simplified, the problem is represented and examined as a hypothetical narrative of an unsolved case. This difference between medicine’s simple causal norm and its frequently more complex reality is ignored [Jerome Groopman, 1997]

Meanwhile, in the examination room, the patient poses the problem of cause in reverse: not as cause-and effect but the other way around. Effects are manifest in the patient’s body; what has caused them? Diagnosis requires a retrospective understanding of the events of illness. Clinical questions are posed backward, from effect to cause, and the data required to answer them come initially from the patient’s account of illness.

In taking care of patients, the important causal question for physicians is: What is causing this patient's symptoms?

Clinical cause is best understood as a narrative hypothesis rather than a scientific one, and as a narrative and historically is exactly how, as a practical matter, physicians explore the causal question that most concerns them. After taking the patient's history, they ask about symptoms and then examine the patient for signs in order to construct a recognizable clinical account of the patient's illness. The cause of the patient's symptoms is the cause that the medical profession exists to identify and treat. Once that cause is determined, the malady will look as simple and straightforward as a textbook account. In retrospect, illness events will fall predictably into line. But precisely because clinical inquiry proceeds backward in relative ignorance into the life experience of the patient, discovery of the cause of a patient's illness is not a simple or a linear task [A.Lvan, 1967].

Opening Questions. "What brings you here today?" The clinical encounter of patient and physician begins with a question about cause: the motive for the patient's being there, some reason for interrupting an everyday routine, or the impetus that has propelled this person into the bright light of medical scrutiny. But here, as elsewhere in clinical practice (and unlike its simple, positivist ideal), cause is complicated and not reliably linear. Physicians are well aware that illness is neither a necessary nor a sufficient condition for making a doctor's appointment. Some diseases lack symptoms; other maladies impair so slowly that the loss of function, especially past middle age, seems normal. At every age, the "worried well" present themselves for reassurance, while other people in serious pain delay seeing a doctor. And almost every physician can tell a story of a patient who has glared back suspiciously and said: "That's what I'm here for you to find out," or has answered—"My wife."

Still, the physician's opening question is a useful one. Patients are likely to answer with the symptom that most troubles them. In the language of medicine this is the "chief complaint": "Although they know that medicine

aims to intervene in a chain of cause and effect so as to alter outcome, and they go to the doctor to reap the benefits of science and medical technology, patients nevertheless are unlikely to answer “science.”

For science is only a part of what patients expect. They come to the doctor, above all, just as the expression has it, seeking medical attention. Patients come not for pathophysiological information but an interpretation of their malaise, the physician’s judgment based on cumulative experience of this particular concatenation of biological events. Patients look for understanding in its several senses, for reassurance, and, often, for a prescription. They want to know what is going on with them and what to do about it. They want the physician to grasp how they are affected and to make sense of their illness in a way that in turn will make sense to them. Even a broken arm, that exemplum of a malady without much illness, needs this sort of attention. To paraphrase the old saying, patients hope for cure if possible, relief of suffering in any case, but comfort above all [Michael Berube, 1996].

To make the diagnosis, physicians elicit clues by asking questions that are understood to be implicitly causal: “What did he have to eat?” “What sort of work do you do?” These are questions about individual cause as it maps onto known etiologies. They attempt to establish quasi-causal details, necessary if not sufficient, that can explain the illness the patient is presenting for diagnosis. Every disease has a “natural history,” and physicians during their clinical training absorb as many of them as memory can possibly hold. Diseases are narratives with recognizable variations unfolding over time. In addition to the discriminative details of the patient’s symptoms the events of the patient’s life may suggest a likely diagnosis: the illness of family members, intravenous drug use, etc. Given a well-established element in the natural history of a disease, its traces in the patient’s narrative of illness serve as signs for classification. Even if the diagnosis is not definite, its genre may be recognizable. The details of illness, its signs and symptoms, reveal to a clinical audience the kind of situation it is and what is likely to happen next. “Anyone in the family ill?”, “Was he wearing a seat belt?”, “When did the fever start?”

Narrative accounts of disease mechanisms or pathophysiological processes are the principal means of organizing symptomatic clues and their interpretive syndromes. Unlike laboratory science, which is free to use the building blocks of others' investigation, this clinical retrospection calls for the physician's first-hand knowledge of the patient's illness—not simply as a moral obligation but as an essential part of clinical reasoning. It involves confirming the accuracy of the information abstracted in the patients records, and even if no new fact or finding is discovered, the journey of listening to the patient recount his story employ's the physician's senses or hearing, touching, seeing, which can bring him to the dimension of intuition.

Diagnostic interpretation is the central act of clinical knowing. The physician's task is to decide in medical terms what has brought the patient here today. The physician's narrow causal focus fits with the patient's concerns. For people who are ill, the pathophysiological cause of the malady takes a back seat to the clinical cause. People go to the doctor to learn what their symptoms mean and what should be done about them. The pathophysiological details are, for the moment and ultimately, irrelevant. Patients want to know what is wrong, if it's serious, how long it will last, whether it will alter their life plans. These questions have brought them to the doctor on this particular day. Others want only to know that their condition is recognizable to the physician. Almost without exception patients need a name for what ails them—the clinical cause—even if it turns out to be dire. To learn that they have a recognizable disease, even a life-defining one, is less upsetting for many people than to suspect it. Worst of all is to be told without explanation that “it's nothing; it's all in your head.”

Diagnosis not only names the malady but also implies that it has a recognizable and therefore respectable cause. A diagnostic label designates what is normal in the realm of the illness, entails the treatment a patient can expect to be offered, and suggests the likely outcome [John Ladd, 1985]. The knowledge of scientific cause allows the physician to display a

trustworthy expertise and to reinforce the necessity of following treatment recommendations. Causal explanation is also needed when the etiologic story long associated with a set of symptoms has been proven wrong.

For, if medicine is not a science, it nevertheless is rigorously rational. The question that opens the patient-physician encounter begins a narrative, interpretive investigation as logical as any laboratory experiment. The difference is that physicians of necessity are retrospective practical reasoners who must test their hypotheses with the very data out of which they are formed. No wonder they want first-hand knowledge! As medical informatics confirms, they cannot diagnose reliably from a secondhand report or even from a patient's test results. The patient's presenting complaint is essential to clinical reasoning because it constitutes an initial narrowing of the world of possibility, a focus that no computerized diagnostic program could operate without or (more important) generate on its own. Physicians need a clue to begin a line of inquiry, and the symptom or concern that answers their opening question provides it: chest pain or a lump or insomnia. Recorded in the chart as the patient's chief complaint, this problem sets the agenda; the clinician's assumption is that it will point backward in time toward its cause, the diagnosis in question [Marsden, 1984]. Taken together, the questions and answers that open the clinical encounter declare willingness on both sides to undertake the process of investigation, clinical interpretation, and amelioration. "What seems to be the trouble?" and the more recent "What can I do for you?"—are not only the first lines of an interpretive investigation but also what may be the beginning of a new chapter in the patient's life. The author's daughter's illness sent me on a quest to understand the idea of cause. To know the cause of disease is to have control. Medicine is driven by it, and patients and their families are part of that drive. And yet, as I discovered, the idea of cause in medical practice bears as odd a relation to science as clinical medicine itself. The physician's investigation of cause, even as it seems to confirm clinical medicine's status as a science, undercuts that claim at every turn.

Yet a look at the clinical uses of cause reveals some of the important ways clinical medicine differs from a Newtonian science and highlights instead medicine's practical rationality, the clinical judgment essential to the work of diagnosis and treatment. At the same time, the importance of clinical cause suggests why physicians might claim the label "science" for their work and why that label goes unquestioned both in medicine and out. Physicians are concerned with clinical cause, and since questions of cause are essential to the sciences, that concern is assumed to guarantee medicine's status as science.¹ Explanation is what science is all about.

Yet the addition of science to medicine little more than a century ago, while it enormously expanded» *What Brings You Here Today?*» information, it did not much alter the procedures of clinical thinking. The way physicians reasoned before the scientific era is, in its broad outlines, the way they reason today [Marsden, 1984].

The clinical encounter focuses on a pressing, practical question: What is causing this particular patient to feel ill? This is the question of clinical cause, a more specific and targeted causal question than either the biological problem of disease etiology or the more contingent, multiplicative question of how one particular person fell ill. The idea of cause in clinical medicine is thus both taken-for-granted as simple and ambiguously multiplicative—and each by turns as the situation requires. These two concepts are not at all alike. One is the linear idea of ordered, necessary, and sufficient biological causality, the concept physicians always hope to rely upon. The other is a more complex, multilevel speculative and narrative assumption that comes to the fore at need. The two concepts of cause exist side by side in medical practice. The linear "mechanisms of disease", and the richer, more circumstantial and contingent idea of cause do not harmonize or reconcile, but neither are they doomed to conflict. When cause cannot be simplified, the problem is represented and examined as a hypothetical narrative of an unsolved case. This difference between medicine's simple causal norm and its frequently

more complex reality is ignored. The clinical inquiry is an interpretive quest that circles between biology and epidemiology on the one hand and the circumstantial details of the patient's presentation of the symptoms and clinical signs of illness on the other. Biology and epidemiology are matters of secondary, instrumental interest. They will be important, one mapped upon the other, in determining what the matter with the patient is, but they are not themselves in question. In taking care of patients, the important causal question for physicians is the clinical one they are called upon to answer dozens of times a day: What is causing this patient's symptoms?

This is a narrower, interpretive question, and to answer it, physicians use both scientific knowledge and information about individual cause supplied by epidemiology and clinical research as tools in the retrospective narrative reconstruction of events. The tools are not themselves investigated. Thus, clinical cause is best understood as a narrative hypothesis rather than a scientific one, and as a narrative and historically is exactly how, as a practical matter, physicians explore the causal question that most concerns them.

Although they know that medicine aims to intervene in a chain of cause and effect so as to alter outcome, and they go to the doctor to reap the benefits of science and medical technology, sometimes with quite specific tests or therapies in mind, patients nevertheless are unlikely to answer "science." For science is only a part of what patients expect. They come to the doctor, above all, just as the expression has it, seeking medical attention [A. Lvan, 1967].

Medical attention is more than science, and certainly it differs from science as medicine customarily portrays it. Biological cause plays a strong part in medical care but an odd one: supremely useful, but taken for granted; complex and multiplicative, but regarded as if it were a row of dominoes. For the clinician, the original or formal scientific cause is not immediately pressing; it is not even at that moment very interesting [Marsden, 1984]. As a result, because a good diagnosis is central to good medical care, scientific causality is flattened, and the clinical reasoner, if

asked, is likely to report that really there isn't any science involved. It's only a matter of understanding what is going on, she may say; just common sense.

Diseases are narratives with recognizable variations unfolding over time. Like other narratives, they are typed and categorized until familiarity reduces them to a representative scene. Infectious, autoimmune, metabolic, vascular, neoplastic, genetic: the list is just a first cut at diagnostic typology, and each genre has subspecies characterized by variations in plot [Eric Cassell, 1979]. Narrative accounts of disease mechanisms or pathophysiological processes are the principal means of organizing symptomatic clues and their interpretive syndromes. Established by biological and epidemiological research, these causal narratives are memorized in medical school and are readily available in medical textbooks.

Unlike laboratory science, which is free to use the building blocks of others' investigation, this clinical retrospection calls for the physician's firsthand knowledge of the patient's illness—not simply as a moral obligation but as an essential part of clinical reasoning [Jerome, 1997]

Diagnostic interpretation is the central act of clinical knowing. The physician's task is to decide in medical terms what has brought the patient here today. The pathophysiological mechanisms of disease are not the object of investigation in the clinical encounter, nor, beyond the diagnostic clues in the patient's history, is individual etiology a concern. It's not that biological cause and individual etiology are not important. That's clearly not the case. But they are not in question. At this moment, they are the givens, the facts, whose value for the clinician lies primarily in the clues they provide for diagnosis and occasionally in the possibilities they suggest for future prevention.

The knowledge of scientific cause also allows the physician to display a trustworthy expertise and to reinforce the necessity of following treatment recommendations. This is especially important if the malady is new or strange.

CHAPTER FIVE: THE SIMPLIFICATION OF CLINICAL CAUSE

Medicine strives for causal simplicity. Its identification with the old-fashioned idea of science owes its strength to the straightforward cause-and-effect simplicity that physicians find there. They admire that simplicity and, although their practice—for good reason—often belies it, they have adopted it as a goal [Kenneth Schaffner, 1994].

The simplification of complexity. The simple, linear causality associated with the conventional idea of science seems to be just what it takes to diagnose and treat patients successfully. Not only does medicine's commitment to identifying and treating the patient's illness confirm the profession's self-conception as a science, but so compelling is the goal of acting on the patient's behalf that it flattens and simplifies everything in its way. What physicians know about complex cause in biology and the contingent status of knowledge in physics, their accumulated insights into the human condition, individual psychology, and social complexity are all submerged. In their place, physicians develop a clinical skepticism and, its corollary, the obligation to know first-hand the imprecise evidence they must work with: the history of the patient's illness, the clinical symptoms and signs, the test results. Despite the welter of detail and the occurrence of anomalies the clinical ideal remains simplicity, a straight line from cause to effect. The goal is the identification of the patient's malady: a convincing diagnosis and a clear choice of treatment [Marsden, 1998].

This ideal is regularly challenged in everyday clinical medicine. Causal simplicity is never easy for medicine to achieve because the information it needs is social and circumstantial as well as scientific. Because living beings are harder to pin down than nonliving matter, variables are far less easily identified and controlled. And human biology is still more complicated because its objects have reasons as well as causes for their behavior. As a consequence, medicine must take account of cultural, social, familial, psychological details.

Cause—in medicine and out—is seldom simple or linear. In a simple scenario such as a boy building a tower of cards, and then the tower falling, the answer to the question what caused the cards to fall? Is – there are many probable causes (an open window, someone moving about in the room, etc.) Not only may the tower’s collapse have depended on a concatenation of events but the sequence of those events may be crucial.

To admit such contributing circumstances is to tell a story. Narrative captures the subtle, tenuous, vaguely interlocking but clearly temporal relationships among possible secondary or ancillary causes. Narrative’s causal imprecision and reinterpretability capture and preserve potential causal phenomena in all their possibility.

Illness potentially engages a similar complexity of cause, and biomedical science has done much to pare it down. To questions about how an individual fell ill, germs and viruses and genes—the advances of biomedical science—provide ready answers. The success of the germ theory shaped twentieth-century assumptions about disease causality [David Morris, 2000].

What’s going on? Despite the appeal of a magic bullet, the relationship of cause and effect we attribute to bacteria and viruses is not as linear or conclusive as we might hope. Microorganisms may be necessary to produce infectious disease, but they do not always cause illness. People exposed to a disease can harbor the pathogen—as with tuberculosis or mycoplasma pneumonia—and, though they test positive, still not contract the disease. Why did they not fall ill? And if not everyone exposed becomes ill, why did those who caught the disease catch it? “Why now?”—that quintessentially narrative question—thus becomes important for clinical research and prevention. Even genes, which seem to offer rock-bottom certainty about disease causality, present a range of contingency. If a gene does not malfunction from the start, what causes it to malfunction when it does?

To ask this question is to open the question of cause to multiplicative explanation, a move that physicians, despite their preference for linearity, are perfectly willing to make when they must [Georg Henrik, 1971].

Despite the complexity of disease causality, a complexity well recognized in medical practice, clinical medicine maintains its far simpler idea of cause. To attribute medicine's simplification of cause to its "scientism" begs the question. Indeed, medicine's most scientific moments occur when clinicians are engaged with the unknown and nonlinear, when a puzzle of diagnosis or treatment bursts its simple causal explanation and compels a more complex, multivariant narrative.

Medicine always works to simplify individual disease causality: the circumstances of the patient's presentation are examined for clues to match the givens of diagnostic etiology until both are absorbed into the obvious [Richard, 1979]

Narratability is the mark of the anomalous in medicine. Settled questions are simple; they scarcely deserve a telling. Narrative, by contrast, is the response to puzzles of diagnosis and treatment, to uncertainty, to the unsolved and problematic.

Medicine's simplification of the idea of cause is a consequence of the profession's character as a practice and its goal of acting for the good of the patient, intervening in the course of illness. Normal discourse and the simplification of cause (and with it, it seems, science itself) are the goals toward which it works. Diagnostic reasoning narrows the idea of cause to a single agent, the necessary if perhaps not sufficient *sine qua non*. Physicians need to pursue the question of cause only well (or long) enough to devise an intervention.

The misrepresentation of cause. In the ordinary course of their practice, then, physicians maintain their focus on a simple, linear cause despite recognizing a bewildering array of potential causal factors that they do not (yet) understand and cannot affect. Working to identify the malady or the variable that will enable them to intervene in the course of illness, they translate the patient's story into a narrowly focused medical account and efface themselves as its narrator so as to approximate a scientific objectivity. Multifactor or multiplicative causality is avoided unless

absolutely necessary, which is to say until diagnosis proves difficult or treatment is unsatisfactory. Only then does the idea of cause open, widen. Then the patient's history is reexamined, minutely this time, and the etiology of possible diseases becomes the object of scrutiny. The physician rethinks what is known about pathophysiology or pharmacology, seeks advice, and scours published studies. At such times scientific cause seems the central question in academic medicine. Clinical practice may take scientific cause for granted and prize the normal discourse that focuses on clinical cause, but in university hospitals and tertiary-care medical centers, the discovery of oddities and exceptions becomes the object of professional activity. Medicine comes to be regarded by its practitioners and by the patients who need their care not as scientific (which it undoubtedly is) but as a science itself [Robert, 1998].

When a diagnosis cannot be made or treatment is problematic, the case is no longer "normal." It needs redescription, rethinking, analysis. Questions of cause—What is going on here? How is it happening?—become central again. Physicians rethink—retell—the mechanisms of disease; they retrace events in the causal chain or the therapeutic pathway. They go to the library or go online and learn something known to others that they had not known; or they consult with an expert whose work on the problem offers a new way of looking at the case. Sometimes they themselves work out something entirely new about the disease or its therapy, an exception to the known rules that, after confirming research, may become a rule on its own. In this discursive, collective way, clinical knowledge is refined. New diseases are identified; deadly ones inch toward becoming chronic ones; new drugs with unexpected side effects are withdrawn from use [Carlo, 1986].

Medical education has the double task of equipping physicians for the everyday practice of "normal" medicine, when cause is so simplified as to disappear, and for the eruption of the abnormal, when cause becomes a central question, potentially complex and multiplicative. They must preserve awareness that what seems to be an ordinary malady suddenly

may be revealed as anomalous. Physicians preserve this awareness in two ways. They absorb the ideal of medicine as a science, and they rely on the narrative representation of clinical cases. Narrative captures untested causation and lays out hypothetical scenarios that will be discarded or confirmed by experiment. It represents the variables—still imprecise and unstudied—for further investigation. Not surprisingly, then, clinical medicine at its most scientific requires a circumstantial narrative that can describe all the ways the anomalous illness event frustrates established expectations. The diagnosis of the malady and its treatment, with its scientific etiology, will become obvious and minimally narrative again, part of the normal discourse of medicine [Bruno, 1981].

The representation of clinical cause. Evidential and conjectural disciplines (medicine included) have two ways of representing individual cause when variables are multiple and poorly controlled: statistics and narrative.

While statistics these days needs no apology, narrative needs some justification as a truth-seeking strategy. As a part of clinical medicine's narrative rationality, the question of cause in clinical practice can be seen as a narrative question and not a scientific one. A larger and much less deterministic sense of cause guides the clinician's interpretive inquiry: What is going on with this patient? Where can medicine intervene? How *should* it intervene, given this patient's life circumstances? Because clinical reasoning is retrospective, it needs to be represented in a way that allows a larger, looser concept of cause than linear cause and effect. What is needed is representation that can accommodate time and chance. Narrative provides for the circumstantiality of (probably) noncontributory detail and leaves room for contingency, conjuncture, and multiplicative causes that unfold over time. This partly random, partly determined concatenation of antecedent events is just what must be controlled in scientific and social science research [Edmund, 1981].

Thus, despite physicians' focus on the individual case, their backward-facing effect-to-cause rationality, and their reliance on narrative, clinical med-

icine continues to be described as a science. As a consequence—and in spite of the claim that medicine is itself a science—physicians regularly put the care of the patient ahead of the requirements of science. In their clinical encounters they habitually omit activities that might be expected of a science, including the investigation of the illness’s original cause. What’s more, they ignore or circumvent scientific method whenever it is irrelevant or potentially dangerous for the care of the patient.

Although clinicians share their reliance on narrative rationality with history, psychology, economics, and the other social sciences, their dedication to finding a cause for the patient’s symptoms and their use of biology in that effort seem to support the claim that medicine is a science. Obliviousness to the illogic of this claim and to the oddities of clinical cause enables physicians to identify with the powerful, immensely useful scientific knowledge they draw upon—even as they engage with messy human detail that is poorly controlled, complex, multiplicative, and almost surely impossible or unethical to replicate. Biology and epidemiology are irreplaceably valuable in the care of patients, but medicine’s clinical focus is the patient and not the scientific investigation of disease causality [Carlo, 1986].

Yet this epistemological blindness, however necessary in the circumstances of practice, involves a costly misrepresentation of the nature of medicine. The misnaming of medicine as a science results in a failure to understand and appreciate medicine’s strengths and limits. If the profession was in good health, medical schools were places of real education rather than (all too often) fact-stuffing feedlots, and residency programs were concerned with the character of the clinicians they train, there would be no reason to write a word about it. No one would think to ask the critical interpretive question: What is going on here?

Medicine strives for causal simplicity. Its identification with the old-fashioned idea of science owes its strength to the straightforward cause-and-effect simplicity that physicians find there. They admire that simplicity and, although their practice—for good reason—often belies it, they have adopted it as a goal [Bruno, 1993].

The simple, linear causality associated with the conventional idea of science seems to be just what it takes to diagnose and treat patients successfully.

The goal is the identification of the patient's malady: a convincing diagnosis and a clear choice of treatment. This ideal is regularly challenged in everyday clinical medicine. Causal simplicity is never easy for medicine to achieve because the information it needs is social and circumstantial as well as scientific. Not only does the knowledge drawn from the minutely detailed, complex subdisciplines of biology come in overwhelming amounts, but the objects of biological investigation, unlike those of physics and chemistry, are (or once were) living beings.

Cause—in medicine and out—is seldom simple or linear [Edmund, 1981] Despite this complexity of disease causality, a complexity well recognized in medical practice, clinical medicine maintains its far simpler idea of cause. To attribute medicine's simplification of cause to its "scientism" begs the question. Indeed, medicine's most scientific moments occur when clinicians are engaged with the unknown and nonlinear, when a puzzle of diagnosis or treatment bursts its simple causal explanation and compels a more complex, multivariate narrative. Medicine always works to simplify individual disease causality: the circumstances of the patient's presentation are examined for clues to match the givens of diagnostic etiology until both are absorbed into the obvious: In the ordinary course of their practice, then, physicians maintain their focus on a simple, linear cause despite recognizing a bewildering array of potential causal factors that they do not (yet) understand and cannot affect. Working to identify the malady or the variable that will enable them to intervene in the course of illness, they translate the patient's story into a narrowly focused medical account and efface themselves as its narrator so as to approximate a scientific objectivity. Multifactor or multiplicative causality is avoided unless absolutely necessary, which is to say until diagnosis proves difficult or treatment is unsatisfactory [Richard, 1979].

Clinical practice may take scientific cause for granted and prize the normal discourse that focuses on clinical cause, but in university hospitals and tertiary-care medical centers, the discovery of oddities and exceptions becomes the object of professional activity. Their explanation is the coin of academic exchange. Medicine comes to be regarded by its practitioners and by the patients who need their care not as scientific (which it undoubtedly is) but as a science itself.

Physicians are not alone in their need to represent cause as simple. Patients are not much engaged by the multiplicative aspect of cause, and, to judge by the news media, neither is the general public. Medical education has the double task of equipping physicians for the everyday practice of “normal” medicine, when cause is so simplified as to disappear, and for the eruption of the abnormal, when cause becomes a central question, potentially complex and multiplicative.

Physicians preserve this awareness in two ways. They absorb the ideal of medicine as a science, and they rely on the narrative representation of clinical cases. Although identifying phenomena and matching them with diagnoses in the taxonomy of disease resemble the work of naturalists more closely than that of physicists or chemists, the vision of medicine as a science nevertheless fosters openness to new phenomena [Kenneth, 1985].

As a part of clinical medicine’s narrative rationality, then, the question of cause in clinical practice can be seen as a narrative question and not a scientific one. A larger and much less deterministic sense of cause guides the clinician’s interpretive inquiry: What is going on with this patient? Where can medicine intervene? How *should* it intervene, given this patient’s life circumstances? Because clinical reasoning is retrospective, it needs to be represented in a way that allows a larger, looser concept of cause than linear cause and effect.

Meanwhile, in clinical medicine, case narrative serves as a repository of events. Written or oral, it not only assembles the history of the patient’s illness but also preserves the traces of judgments made, hypotheses eliminated and confirmed, actions taken and discontinued. The

case both accommodates the multifactoriality of cause in individual instances of illness and works to normalize events as it records them for later use, including, when necessary, their reinterpretation. Thus, clinical narrative serves the goal of diagnosing and treating illness, and all physicians—clinicians, clinical researchers, laboratory scientists—work to simplify every narrative with the hope of reducing it to the bare plot of a readily made diagnosis and an obvious therapy. When they succeed, as they often do, the automaticity - the normality that clinicians value- is restored [Georg, 1971].

The question of cause is central to this conceptual duplicity in medicine. Although clinicians share their reliance on narrative rationality with history, psychology, economics, and the other social sciences, their dedication to finding a cause for the patient's symptoms and their use of biology in that effort seem to support the claim that medicine is a science.

Perhaps the difference between the profession's aspiration to the status of a science and the way clinicians actually think and work is just an academic distinction, something visible from the outside that makes no difference to the practice of medicine. Physicians, fortunately, do not act on the scientific positivism they revere but continue to reason interpretively, retrospectively, and as a narrative rather than (as they imagine scientists do) entirely hypothetical-deductively. The misnaming of medicine as a science results in a failure to understand and appreciate medicine's strengths and limits. If the profession were in good health, medical schools were places of real education rather than (all too often) fact-stuffing feedlots, and residency programs were concerned with the character of the clinicians they train, there would be no reason to write a word about it [Edmund, 1981].

As a part of clinical medicine's narrative rationality, then, the question of cause in clinical practice can be seen as a narrative question and not a scientific one. A larger and much less deterministic sense of cause guides the clinician's interpretive inquiry [Bruno, 1993].

CHAPTER SIX: CLINICAL JUDGMENT AND THE PROBLEM OF PARTICULARIZING

If medicine were practiced as if it were a science, even a probabilistic science, my daughter's breast cancer might never have been diagnosed in time. At 28, she was quite literally off the charts, far too young, an unlikely patient who might have eluded the attention of anyone reasoning "scientifically" from general principles to her improbable case. Luckily, medicine is a practice that ignores the requirements of science in favor of patient care [A.Lvan, 1994].

But deduction is only a part of physicians' thinking. How absolute is the rule? The rule-governed deduction is easy. Doing the work that produces an accurate and reliable syllogism is the difficult part, and so is deciding what to do with its deductive conclusion. Because general rules in clinical medicine are almost never absolute, diagnostic interpretation and decision require clinical judgment. This is what consulting a physician is all about. In cases, including the obvious, easily deduced one, the clinical skill lies not in the deduction but in what comes before and after: first the detection and the interpretive description of the abnormality, then the construction of the differential diagnosis (fibrocystic disease, fibroadenoma, carcinoma of the breast), and finally weighing the probability of a negative test result against the risk of a positive one.

Clinical judgment, physicians' essential intellectual virtue, is a matter of putting all this together in a balanced way. Physicians must know the rules and when to break them, how to use logic and when to ignore its conclusions. What characterizes physicians, indeed, in some sense, makes them physicians—is their clinical judgment: a more multifaceted interpretive reasoning, including their use of C. S. Peirce's abduction—the logic necessitated by reasoning from effect to cause. They must see the big picture in the particular case, then reason backward to determine whether this patient is an instance of that biological generality, and, finally, know what best to do with all they know or suspect [Thomas, 1996].

Face to face with a patient, physicians must simultaneously call up

the potentially relevant clinical and scientific rules and calculate whether those generalizations might apply to this particular ill person. Because even the best scientific and clinical studies are inexactly related to any given individual, even the most knowledgeable and experienced physicians confront the problem of particularization with every patient in every clinical encounter. This is the ineradicable uncertainty of medicine.

Particularization in clinical reasoning. Clinical reasoning in medicine has, of necessity, two aspects: generalization and particularization. These are opposite moves—lumping and splitting—and they alternate in tension as the reasoner moves between them. Negotiation between the general and the particular gives clinical medicine its striking intellectual tension. Medicine’s counterbalancing movement between the patient’s presentation and the established taxonomy of disease is what prompts clinicians to cite exceptions to every rule and then, if needed, to entertain exceptions to those exceptions. This counterweighing is the central characteristic of clinical judgment, the exercise of practical reason needed to reason retrospectively under conditions of uncertainty. Each move—lumping or splitting—serves to test and curb or refine the other.

Generalization, with all its attendant risks, answers the human need to categorize. Practitioners must recognize the phenomena of their discipline. They have to know what’s what. Controlling for variables, statistical studies test observational hunches and common clinical practices. The results are aggregate numbers that can suggest a strong correlation, as the surgeon general’s 1964 report on smoking and lung cancer did.

The other half of clinical knowing is particularization. It is the opposite (or reverse) of generalization, and it is essential to clinical judgment. Faced with a multitude of generalizing studies of varying quality and uncertain relevance, a physician must figure out how any or all of them apply to a particular patient—and, as in cases of patients with a breast lump, decide whether the risks are great enough or the relevance imprecise enough to ignore them [Harold, 1981].

Both lumping and splitting pose problems. The difficulty associated with generalization, the first half of clinical reasoning, arises from what seems to be a narrative instinct: human beings construct accounts of cause and effect from whatever evidence is available— and from apparently random events if they must. Practical reasoners at every stage of expertise can make the mistake, often unconsciously, of generalizing from too few instances or from flawed or insufficient evidence.

The difficulty with the other half of clinical knowing is less well understood. Particularization is the essential act of clinical reasoning. It begins with the interpretive question that is the focus of every clinical encounter: What is going on with this patient? The inquiry will locate this individual in a general scheme of illness. But as important as particularizing is, it is chronologically and methodologically secondary to generalization. For example, physicians need to know clinical cardiology before they can suspect, much less reliably diagnose, a particular patient's myocardial infarction.

A story about a Dublin zookeeper illustrates the medicine's epistemological predicament supports why Aristotle declared there could not be a science of individuals. Renowned for breeding lions in captivity, the zookeeper was asked the secret of his success. "You must understand lions," he said. "What is it that you have to know about lions?" the interviewer asked. "Ah, well," replied the zookeeper, "you need to understand: every lion is different." [Robert, 1998].

Knowing in clinical medicine requires negotiating both the uncertainties of particularization and the tempting comforts of generalization. Indeed, the two give clinical reasoning its distinctive counterbalancing, tug-of-war character. The need to particularize, one half of medical knowing, exists in tension with the impulse to generalize, and that tension calls for clinical medicine's practical rationality. When one half is asserted, the other is invoked as a challenge.

The place of the individual in clinical reasoning. Clinical medicine's focus on the particular does not extend to a concern with or even an interest in establishing a phenomenological account for each instance of disease. Even for an academic oncologist, for example, the causes of a young woman's breast cancer or its recurrence remain all but irrelevant to her diagnosis and treatment. Beyond the clues it supplies for diagnosis, prognosis, and treatment choice, there is no clinical curiosity about individual variation or the history of how this particular patient acquired the disease. Once the clinically relevant details of the case fall into a diagnostic category with no leftovers that demand explanation, there is no further need for investigation. More might be learned, but it would not be useful for the care of this patient. The problem of particularization in this case has been solved [A.Lvan, 1994].

Sometimes physicians are accused of thinking reductively about patients and of seeing them only as malfunctioning body parts. They are attempting to control the variables in the thought experiment that constitutes diagnosis. This reductive method is useful for narrowing a problem, so that it can be posed syllogistically and enable them to confirm or rule out diagnostic possibilities. But, like deduction itself, the method is a part of the conventional, positivist conception of cause that by itself is inadequate for the care of patients. Biological science can establish the character and limits of a physical state, but how the variables play out for a particular human being in a given time and circumstance is largely unknown. Establishing the chain of causality for a particular patient's illness or predicting its outcome is thus far more like a replayable solitaire game than the controlled and simple linear process physicians associate with a positivist concept of science. Physicians have a limited interest in individual causality.

In the clinical encounter, then, epidemiology joins biomedicine not as an answer but as a given set of information to be interpreted and applied to a particular patient. The strategies of evidence-based medicine can focus that interpretation and help narrow its application to an individual. The

single case, even when everything is known about it that can be known, must always be viewed comparatively, historically, as a narrative.

Probabilities, risk factors, and individual cause. Occupational exposures, family history, recent travel, and what in the HIV era have been labeled “risk behaviors”— intravenous drug use and unprotected, especially anal, sex—suggest disease possibilities and render the results of tests for those possibilities more accurate and reliable for that individual [Robert, 1998].

In prevention, there exists a more hypothetical use of individual phenomena than diagnosis. Here individual causality is invoked for effects that have not yet occurred. Aspects of the patient’s life are identified that, if altered, might reduce the likelihood of disease in the future. The physician offers cautions that draw upon well-established risk factors common to many instances of the malady in question. They are good bets, but how they apply to any given patient is still a guess.

Patient-focused preventive measures have had a mixed success in the United States, but the habits of clinical thinking pose an obstacle, too. Prevention has been most successful where “risk factors,” those statistically possible contributory causes, have been reframed as diseases or, at the very least, treatable clinical conditions. Elevated blood pressure, high cholesterol, obesity, and smoking, all more or less important in contributing to a given disease, are seldom necessary causes and never sufficient ones. The question of their relevance for the individual cannot be answered conclusively. Risk factors, nevertheless, have gained a place in clinical medicine simply because physicians can do something for them. The precise role of risk factors, especially for an individual patient, remains a complex question.

Only when the diagnosis is difficult, a treatment unexpectedly fails, or a new disease like HIV or SARS emerges is the question of individual cause opened. Otherwise, pursuing the question of what caused this one individual’s illness seems perilously close to teleology: why did this person fall ill?

Teleology and individual cause. For patients, however, the question of individual causality looms large. Why me? Why now? Did I eat too much fat, overdose on saccharin or coffee or preservatives? Did I live too near a toxic waste site, an asbestos plant? The hope of regaining control is buried in these questions. The impersonality of scientific cause and the randomness it often implies—"it just happens"—is bleak and not malleable. For a suffering individual, the random injustice of the universe has little appeal. If causal agents can be identified, cure and restoration might still be possible. In the absence of answers patients turn to Aristotle's final cause: not "how" but the teleological "why". What is the ultimate reason for such an unbearable, unthinkable thing as illness? "How is it possible?" becomes "Why has this happened?" especially when treatment choices are evenly weighted or the prognosis a matter of grim statistics. This is not a question of what has caused one particular individual out of all others to fall ill but a question of ultimate purpose, a final cause. As Grace Gredys Harris discovered sick people give moral reasons for their condition—guilt, anger, and disordered, toxic human relations [Rebert, 1998]

Treatment, prognosis, prevention, the management of chronic illness all raise practical clinical questions that are a hair's breadth from the overriding existential one: How should we live the limited life we have before us? Despite their patients' need, such questions may make physicians uneasy. Neither science nor medical education addresses the problem of final cause. If the teleological question is posed directly or if they can hear the question as it is indirectly asked, physicians are in a unique position to address the problem of individual cause in a nonjudgmental, even a healing way. Physicians do not know why disease exists. And while they know a lot about patients' diseases, one of the things they know best is that every one of them is different [Harold, 1981].

If medicine were practiced as if it were a science, even a probabilistic science, the author's daughter's breast cancer might never

have been diagnosed in time. At 28, she was quite literally off the charts, far too young, an unlikely patient who might have eluded the attention of anyone reasoning “scientifically” from general principles to her improbable case. Luckily, medicine is a practice that ignores the requirements of science in favor of patient care. *Deduction* is the label Sherlock Holmes uses for his rational skill, and physicians, who find medicine’s investigative procedures mirrored in his practice, have adopted the term to describe their thinking. Certainly some of what they do is deduction [Alvan, 1994].

Clinical judgment, physicians’ essential intellectual virtue, is a matter of putting all this together in a balanced way. What characterizes physicians, indeed, in some sense, *makes* them physicians—is their clinical judgment: a more multifaceted interpretive reasoning, including their use of C. S. Peirce’s abduction—the logic necessitated by reasoning from effect to cause. They must see the big picture in the particular case, then reason backward to determine whether this patient is an instance of that biological generality, and, finally, know what best to do with all they know or suspect.

Understanding the particulars despite the inexact relevance of biology. In this, medicine differs from biomedical science, which seeks more abstract and generalizable knowledge for a more abstract and general good. Each, of course, needs the other’s work to do its own. Face to face with a patient, physicians must simultaneously call up the potentially relevant clinical and scientific rules and calculate whether those generalizations might apply to this particular ill person [Thomas, 1996].

Clinical reasoning in medicine has, of necessity, two aspects: generalization and particularization. These are opposite moves—lumping and splitting—and they alternate in tension as the reasoner moves between them. Negotiation between the general and the particular gives clinical medicine its striking intellectual tension.

Generalization, with all its attendant risks, answers the human need to categorize. Practitioners must recognize the phenomena of their discipline. They have to know what’s what. Experienced physicians make observations, gather data, test their hypotheses, apply labels, and draw

conclusions. New learners recapitulate this process of acquiring and refining knowledge, and clinical researchers extend it. Controlling for variables, statistical studies test observational hunches and common clinical practices [Robert, 1998].

The other half of clinical knowing is particularization. It is the opposite (or reverse) of generalization, and it is essential to clinical judgment. Variables, like age and gender, narrow the quest and, when warranted, prompt further research.

Until focused studies are done, treatment is guided by general research and by clinical experience with its use. Both lumping and splitting pose problems. The difficulty associated with generalization, the first half of clinical reasoning, is well understood in medicine. It arises from what seems to be a narrative instinct: human beings construct accounts of cause and effect from whatever evidence is available— Clinical judgments and the idea of cause and from apparently random events if they must. Practical reasoners at every stage of expertise can make the mistake, often unconsciously, of generalizing from too few instances or from flawed or insufficient evidence.

In clinical medicine, the error most dreaded is generalizing from a single case, and this is due in part to the anecdote's useful, suggestive power.

As protective devices, medicine has enlisted logic, "objective" clinical method, and stringent habits of investigation and reportage. Along with the skepticism that underlies them, these correctives often serve as evidence that medicine is a science.

The difficulty with the other half of clinical knowing is less well understood. Particularization is the essential act of clinical reasoning. It begins with the interpretive question that is the focus of every clinical encounter: What is going on with this patient? The inquiry will locate this individual in a general scheme of illness. But as important as particularizing is, it is chronologically and methodologically secondary to generalization. "Lumping" necessarily precedes "splitting."

Evidence-based medicine is designed to address the problem of particularization by enabling physicians to assess clinical research in light of their patients' particular characteristics. How well does a given patient fit the clinical categories that experience and research have constructed? And what should be done when, as often happens, they fit imprecisely or when two diagnostic categories coincide in a single patient? Evidence-based medicine encourages physicians to refine their clinical expertise by searching out and assessing recent studies to answer a well-framed, patient-focused question about some aspect of clinical care: prior probability, signs and symptoms, test results, diagnosis, prognosis, response to treatment, preventive measures, diagnosis, prognosis, or treatment [Harold, 1981].

This is not “cookbook medicine,” nor does it replace clinical judgment, two of the charges that EBM has provoked since its introduction.⁶ Questions about how large studies apply to an individual patient are extensions of the ordinary work of clinical medicine. The problem of particularization is not hard to grasp; the man with diabetes and high blood pressure certainly understands it. But EBM encounters opposition because clinical judgment and its relation to the problem of particularization are poorly understood. Opponents quite rightly fear—and wrongly see in EBM—a tendency toward generalization without particularization or, to put it another way, a reliance on generalization, one-size-fits-all rule-making, without the particularizing countermove required by clinical judgment and by the ethics of medicine.

EBM addresses one half of the problem of knowing in an uncertain clinical judgment and the idea of cause practice, the problem of particularizing from generalized knowledge. The method can be seen as a contribution to medicine's “phronesiology,” the theory of its practical rationality. Because clinical knowing arises from individual cases (however well aggregated in clinical studies) and must ultimately be applied to an individual patient, that knowledge is necessarily circumstantial and radically uncertain. Competent clinicians must simultaneously know the

general rules of their practice and recognize exceptions when they occur [Robert, 1998].

Clinical judgment, when fueled by reliable information and a store of related experience, enables physicians in an unfamiliar situation to work out the best thing, under the circumstances, to do. The methods of EBM do not supply “correct” answers but rather information that can improve clinical judgment. Like the deduction that rules out unlikely diagnoses in the differential list, the answers supplied by EBM depend on the physician’s fund of knowledge and experience. Still, clinical judgment is essential for formulating the clinical question and, once obtained, for knowing what to do with the answer in order to care for the patient. Knowing in clinical medicine requires negotiating both the uncertainties of particularization and the tempting comforts of generalization. Indeed, the two give clinical reasoning its distinctive counterbalancing, tug-of-war character. The need to particularize, one half of medical knowing, exists in tension with the impulse to generalize, and that tension calls for clinical medicine’s practical rationality. EBM is the most recent turn of the diagnostic, interpretive circle. To be truly valuable as a refinement in the process of clinical specification, it must prompt new studies of clinical variables in more and more particularized groups of patients. Evidence-based medicine’s quest to answer particularizing questions points out the need for such precisely focused studies which can then be mined for their relevance to individual patients. But these clinical studies are not its 92 clinical judgment and the idea of cause goal. That goal, like the goal of medicine generally, is how best to take care of a particular patient, given the current state of knowledge. It is medicine’s defining ethical and epistemological concern, central to everything else in clinical practice. Evidence-based medicine thus poses the moral questions at the heart of patient care. Given the radical uncertainty of clinical knowing, at what point does a good clinician stop? At what level of generalization? How much investigation into the relationship between the generalizations and the details of this patient’s illness is enough? Clinical medicine’s focus on

the particular does not extend to a concern with or even an interest in establishing a phenomenological account for each instance of disease. Even for an academic oncologist, for example, the causes of a young woman's breast cancer or its recurrence remain all but irrelevant to her diagnosis and treatment. Clinical medicine's duty to act on behalf of the patient subordinates everything else to that overriding concern—including the clinical focus on particular phenomena that may concern her deeply. If the particulars fit the diagnosis and the treatment is well established, that's enough. Physicians have no interest in the individual details or sequences that are not established. Once the clinically relevant details of the case fall into a diagnostic category with no leftovers that demand explanation, there is no further need for investigation. More might be learned, but it would not be useful for the care of this patient. The problem of particularization in this case has been solved. Sometimes physicians are accused of thinking reductively about patients and of seeing them only as malfunctioning body parts. They are attempting to control the variables in the thought experiment that constitutes diagnosis. This reductive method is useful for narrowing a problem so that it can be posed syllogistically and enable them to confirm or rule out diagnostic possibilities [Harold, 1981]. The strategies of evidence-based medicine can focus that interpretation and help narrow its application to an individual. Together these stores of information and the means of mining them are the best we currently know about the way the cards are dealt.

Physicians' practical stance toward the question of cause in the individual case, not surprisingly, becomes a settled attitude that makes it difficult to interest them in statistics or in preventive measures for maladies that may not befall a given patient. The concept of individual cause is valuable primarily for the clues it supplies for **diagnosis**. Occupational exposures, family history, recent travel, and what in the HIV era have been labeled "risk behaviors"—intravenous drug use and unprotected, especially anal, sex—suggest disease possibilities and render the results of tests for those possibilities more accurate and reliable for that individual.

The same details also guide prevention, a prospective, more hypothetical use of individual phenomena than diagnosis. Here individual causality is invoked for effects that have not yet occurred. Aspects of the patient's life are identified that, if altered, might reduce the likelihood of disease in the future [Alvan, 1994]. Cause, the effect in any given case remains at best a good precautionary guess. Such patient-focused preventive measures have had a mixed success in the United States, where first fee-for-service payment and then time limits imposed by managed care have worked against them. But the habits of clinical thinking pose an obstacle, too. Prevention has been most successful where "risk factors," those statistically possible contributory causes, have been reframed as diseases or, at the very least, treatable clinical conditions.

This use of statistical clinical research to treat clinical conditions that foreshadow life-threatening disease does not alter the practice of medicine. It does not challenge the accommodations clinical medicine has made with the problem of particularizing or physicians' practical lack of interest in pursuing details of individual cause. Indeed, it may extend practice as usual. Reframing "risk factors" as clinically treatable diseases calls on medicine's simplest, most generalizing causal patterns and restores uncertainty to its usual manageable position. Here in the present is a treatable condition only a little more uncertain than the rest. It fits easily with the problem of particularization that makes the whole enterprise of clinical medicine radically uncertain. The future no longer stretches into unpredictability; prognosis returns to its customary level of uncertainty. The clinician's reluctance to acknowledge individual phenomena that are "clinically irrelevant"—either useless for diagnosis or untreatable—is left in place [Thomas, 1996].

That reluctance makes good sense. First, there is the sheer logical difficulty of reaching a reliable conclusion about cause in a particular instance of disease. The idea of cause is notoriously slippery in an individual case when reasoning prospectively from cause to effect, the way scientists are believed to do. Teleology and Individual Cause How is it

possible?” becomes “Why has this happened?” especially when treatment choices are evenly weighted or the prognosis a matter of grim statistics.

This is neither the scientific question of cause nor a question of what has caused one particular individual out of all others to fall ill but a question of ultimate purpose, a final cause [Harold, 1981].

Patients often bring these teleological questions to physicians. In a secular culture, physicians are more conversant with last things than many of the rest of us. Treatment, prognosis, prevention, the management of chronic illness all raise practical clinical questions that are a hair's breadth from the overriding existential one: How should we live the limited life we have before us? Yet physicians' interest (as physicians) in individual causality is constrained by the logical limitations of their retrospective method and by their belief that medicine is a science. Neither science nor medical education addresses the problem of final cause. Intellectualizing patients readily translate the teleological questions—why has this happened?—into the puzzle of individual causality: How has this happened? Not surprisingly, physicians are likely to make the same substitution, and it is a flight to the safely tautological. Once the patient's diagnosis is established, the illness seems simply an expression of its etiology in the individual. On scientific grounds, the teleological question—and an awareness of the patient's suffering that lies behind it—can be set aside or ignored [Thomas, 1996].

But physicians are not scientists. They have a different responsibility, and their honesty about medicine's uncertainty can contribute to their care of the patient. If the teleological question is posed directly or if they can hear the question as it is indirectly asked, physicians are in a unique position to address the problem of individual cause in a nonjudgmental, even a healing way. While their use of statistics reinforces their practical certainty, they nevertheless cannot be sure how a patient became ill at this point in life.

Physicians do not know why disease exists. No one does. And while they know a lot about patients' diseases, one of the things they know best is that every one of them is different [Harold, 1981].

PART III: THE FORMATION OF CLINICAL JUDGMENT

CHAPTER SEVEN: APHORISMS, MAXIMS, AND OLD SAYINGS: SOME RULES OF CLINICAL REASONING

While the tension inherent in medical decision-making is regularly resolved, it regularly reappears. Medical schools and residency programs must cultivate a capacity for complex and flexible but often inconclusive clinical reasoning. The learners, luckily, are intelligent, but they are also (most of them) longtime students of science who are not used to negotiating ambiguous alternatives or to tolerating incomplete or uncertain answers. The solution is not more book-learning but experience: years of clinical apprenticeship spent taking care of patients and steadily reviewing cases and the reasoning that has gone into their diagnosis and treatment. To reinforce these case-based lessons, learners are encouraged to think of the work of diagnosis and treatment as science and at the same time to improve their clinical judgment in ways that ignore or subvert that claim. This contradiction is reflected in informal rules of clinical reasoning that make perfect sense one by one but, taken together, seem to cancel each other out. Chief among these contradictory rules are the old saws, adages, and aphorisms that concern the clinical encounter. They embody the practical wisdom of experienced clinicians, and almost every one of them can be opposed by another maxim, rule of thumb, or old saw of equal weight and counterforce. For example, Occam's razor, the rule of parsimony, exists side by side with the reminder that people who are old or poor sometimes have more than one undiagnosed disease. As a summary of experience, they have an authority very different from test results and statistical studies. As part of the currency of medical discourse, this colloquial wisdom passes all but unnoticed, part of the tension inherent in the clinical judgment it guides and represents [Marsden, 1971, 1984].

Discussions of individual cases embody the clinical reasoning that is the goal of medical education. They replicate the thought process

engaged by every physician. In conversation, these case discussions constitute much of the collegiality in medicine. In conferences, case presentations are the pedagogical tool for scrutinizing the rational steps of diagnosis and choice of treatment. On such occasions, senior physicians reflecting on a troublesome case will utter an aphorism or allude to a familiar maxim: “At this point,” an attending physician might say, “I’d let go of Occam’s razor.” The sayings have the ring of communal wisdom; they counsel the young and often trump the opposition. As a reminder of the weight of accumulated experience, they can be an effective means of closing a discussion or turning it in a new direction. They are medicine’s summary guidelines, the rules of thumb for clinical reasoning.

Aphorisms and maxims guide the acts of practical reasoning essential to patient care: history-taking, the physical examination, diagnostic reasoning, and therapeutic choice. In medicine, each maxim in a counterweighted pair aims for a judiciously balanced application of generalized scientific or clinical knowledge to an individual patient. Once the clinician chooses to follow one—and it is impossible to follow both at once—it is as if the opposite maxim sinks from view. Indeed, clinicians are no more likely to think of these aphorisms as paired and contradictory than the rest of us are to see nonclinical proverbs that way [William, 1967, 1992].

Taken as a whole, medicine’s paired and counterweighted aphoristic wisdom suggests that while there are clearly wrong answers in the care of patients, there is often no invariably right one. Maxims, aphorisms, and old sayings impart situational wisdom, but, even more important, they model situational, case-based practical reasoning.

History-taking. “The diagnosis is usually made from the history.” “The patient denies alcohol use.” One of the most venerable pieces of clinical wisdom concerns the patient’s account of the illness. “Listen to your patient,” young physicians are traditionally counseled. “He is telling you the diagnosis.” But this wisdom, however strongly stated or well

confirmed by thinkers in medical informatics, has uphill work to do against medicine's ingrained skepticism about the history, history-taking, and, especially, the patient as a reliable historian.

Physicians are especially dependent on the personal report of events by the individual most affected, and they are well aware that the information they gather is always narrow, incomplete, and potentially flawed. For this reason, the patient's account by custom is labeled "subjective." This skepticism does not erase the value of the patient's story. "Always record the chief complaint in the patient's own words." "If he says he has 'gallbladder trouble' . . . ignore it." Attitudes toward the patient's chief concern epitomize the tension about the reliability of the patient's history. Despised and undercut, the patient's presenting concern nevertheless can be found in the case write-ups of almost every academic medical institution, although seldom these days recorded in the patient's own words. Unlike the history as a whole, which is both unanimously revered and universally suspect, there is no consensus on the value of the chief complaint. The patient's words may mislead or they may provide an important clue—or both. Learners will hear a maxim on either side of the question [Simon, 1957].

Preliminary hypotheses. "Always do a review of systems." "A good clinician has an index of suspicion. . . ." Traditionally medical students are cautioned against a premature narrowing of the diagnostic focus. To reinforce this they are taught always to do a review of systems, in which—no matter how specific the chief complaint or how well it is supported by the patient's medical history—they ask questions about the other organ systems of the body. The review of systems is part of the suspension of diagnosis held to be essential to clinical objectivity. This survey is a pledge of the physician's refusal to jump to conclusions, a hallmark of clinical thoroughness, and the antidote to premature (and thus often inadequate) diagnostic closure. "

Physical examination. “Fit clinical observations to known patterns.” “Take account of every detail and weigh them all carefully.” Like the medical history, the physical examination poses the question of whether the clinician should focus on the immediately apparent malady or the full spectrum of bodily signs and symptoms. Students learning the procedures of the physical examination are advised to pursue their clinical suspicions. At the same time, they are warned not to ignore or fail to give proper weight to any single finding. It boils down to “Focus!” and “Notice everything!” The maxim “Fit clinical observations to known patterns” counsels reasoners to work by means of medicine’s well-established taxonomy: the pattern for heart disease, for example, may also involve impaired lung function. This is practical help in threading the thicket of clinical signs. After all, as Perri Klass observed in a moment of witty despair, “if you list every possible presenting symptom, eventually they all overlap.” But what if, in the process of fitting shortness of breath to the pattern of congestive heart failure, the clinical student fails to notice lung disease? The second rule applies: notice everything, take it all into account [Eric, 2001].

Tests. “The best medicine is to do as much nothing as possible.” “Sutton’s law “Maxims also express the clinical tension between watchful waiting and the “full court press.” Good clinical practice includes the ability to choose tests wisely and in the most efficient order so as to minimize pain, blood draws, financial cost, and time elapsed till diagnosis. Often these goals conflict, and so, therefore, does the received wisdom about testing strategy. The ideal, of course, is the diagnosis that can be made with certainty from a pathognomonic sign or symptom: Next best is the single, sensitive, specific, wholly reliable test [Morgan, 2003].

Diagnosis. Occam’s razor, or “Look for a single diagnosis that can explain all the findings”. “It’s parsimonious, but it may not be right,” or Hickam’s dictum Reaching a diagnosis engages in the most practical way

the tension between the welter of the phenomenal world and the patterns imposed on it by biological science and clinical experience. As the problem of the anomalous fact suggests when a physician considers what the details of a patient's history and physical add up to, the number and complexity of signs and symptoms occasionally raise the possibility that two disease processes are at work instead of one. But, "entities should not be multiplied unnecessarily," as William of Ockham famously declared; and Occam's razor, as this maxim is called, is the surgical instrument most favored by internists. Beginning diagnosticians are cautioned to resist the allure of comorbidity, a double diagnosis that can account for all the details of the patient's presentation. If a detail doesn't fit, the principle of parsimony will be invoked: there may be a different, better explanation for the whole. Physicians are admonished to look instead for a diagnosis that can account for all the signs and symptoms and all the test results [George, 1990].

But the quest for an elegant single solution is contradicted by the very real possibility, especially among the elderly and the poor, that one patient really does have two new diseases. The possibility of two diseases emerging at once is to be considered only in cases of demonstrated logical need when all efforts to find a simpler, single solution have failed. For a clinician, not to remember that misfortunes are sometimes multiple can be a source of embarrassment or, worse, diagnostic (and thus therapeutic) delay.

Treatment. "Relieve the symptoms." "Make the diagnosis." Treatment often resolves the tension that pervades the question of diagnosis, but it can pose problems of its own. The physician's task is to relieve suffering. But just as medicine's traditional maxim, "First, do no harm," seems to be contradicted by the pain of testing and treatment, so the therapeutic imperative is sometimes constrained by the need to obtain a diagnosis. Good treatment depends on good diagnosis.

Should residents and fellows be taught to diagnose the disease or to treat the patient? The answer, as with much else in medicine, is "both." But when "both" is a logical impossibility physicians habitually remind one

another (and themselves) of the other, unchosen half of the contradictory pair. “You really need a diagnosis,” they will say if the patient has been treated empirically. Or if the diagnosis has been pursued, “It’s also important to treat the patient’s discomfort.” Whichever rule is followed, the other is likely to be invoked [Faith, 1974, 1982].

Situational rules in case-based reasoning. Aphorisms and maxims that guide the clinical encounter are the intermediate rules of medicine’s clinical casuistry. As part of the process of considering what in good conscience can be done in troubling situations, maxims serve to fit the prevailing wisdom— authoritative and experience-based but often unstudied—to the circumstances of a particular case under consideration. Maxims and aphorisms are part of clinical judgment. They support the interpretive thinking that enables physicians to reason abductively from effect to cause and to fit a body of experiential, science-based knowledge to the predicament of a particular patient. Because clinical knowing is uncertain, clinical teachers guide rational practice and encourage good judgment with clinical maxims. Nevertheless, each of these maxims may be uttered as if it were the singular truth, and the physicians who invoke them by and large behave and teach as if there were no possible contradiction [Patricia, 1984].

Narrative and the contextual use of contradictory rules. There are good reasons for a rational science-using enterprise to use such contradictory maxims, but physicians apparently ignore them. A rationality that relies on contradictory rules seems unworthy of a profession that draws on science and aims at error-free efficacy. Yet these counterweighted situational rules embody the tension inherent in clinical knowing. They do not fit the prevailing view of medicine as a science; in fact, they undermine it. Uncertain circumstances and the lack of absolute rules do not ease the obligation to take action or the need for guidance [Jerome, 1978].

The value of the contradictory maxims is rooted in the interpretive

nature of clinical reasoning and physicians' focus on one patient at a time. Counterweighted, competing advice is neither accidental nor the remnant of a bygone era. The maxims work in the real-life care of patients and in clinical education precisely because of their contradiction. Diseases are not diagnosed and treated in test tubes but in human beings, where they develop variously over time; both diseases and patients are best understood in light of their histories. Those narrative accounts—the natural history of signs and symptoms that make up medicine's diagnostic plots, the history of this patient's present illness, the social history, the family history of disease—must be pieced together and interpreted to create the medical case that accounts for this episode of illness. Aphorisms and maxims were never meant for universal application; they are situational wisdom that has arisen out of (and proven useful in) circumstances very like those identified in a particular case. The key to their value lies in the circumstances of their use and, within a single case, their timing. Thus when one half of an aphoristic pair suggests itself, its opposite may not only seem irrelevant but does not even come to mind. A maxim is always case-based. It is contextual and interpretive, and its context is the patient's history of illness and medical attention, as well as the medical narrative of diagnosis and treatment.

The contradiction of maxims is central to the case-based reasoning that constitutes clinical judgment. By means of a collection of apparent paradoxes, students and residents are taught to balance both sides of difficult judgment calls [Raymond, 1996].

Clinical judgment is not a skill separable from a well-stocked fund of scientific and practical information. To provide good care to their patients, physicians must know human biology—both normal and pathological. Yet if science were all that physicians needed, patients would be able to consult a user-friendly computer program and never need to see a doctor at all.

Yet if science were all that physicians needed, patients would be able to consult a user-friendly computer program and never need to see a doctor at all. Sometimes it seems as if medicine is already halfway there,

especially when expert panels create algorithms that map successive decision points in a patient's diagnosis or treatment [Perri, 1986].

The solution is not more book learning but experience: years of clinical apprenticeship spent taking care of patients and steadily reviewing cases and the reasoning that has gone into their diagnosis and treatment. To reinforce these case-based lessons, learners are encouraged to think of the work of diagnosis and treatment as science and at the same time to improve their clinical judgment in ways that ignore or subvert that claim. This contradiction is reflected in informal rules of clinical reasoning that make perfect sense one by one but, taken together, seem to cancel each other out. Chief among these contradictory rules are the old saws, adages, and aphorisms that concern the clinical encounter. They embody the practical wisdom of experienced clinicians, and almost every one of them can be opposed of individual cases—narrative accounts of medical attention beginning with the patient's presentation of symptoms—embody the clinical reasoning that is the goal of medical education. They replicate the thought process engaged by every physician, in and out of academic medicine, silently or with colleagues. In conversation, these case discussions constitute much of the collegiality conferences. Case presentations are the pedagogical tool for scrutinizing the rational steps of diagnosis and choice of treatment. In this way, cases are the focus of rituals that educate students and residents and maintain the skills of experienced clinicians [James, 1986].

Aphorisms and maxims guide the acts of practical reasoning essential to patient care: history-taking, the physical examination, diagnostic reasoning, and therapeutic choice. They offer provisional rules for the decisions vital to the quality of that care. Not that they are definitive or absolute. Far from it. Alone, clinical maxims can reek of certainty, especially when uttered by a senior physician. Aphorism or allude to a familiar maxim: "At this point," an attending physician might say, "I'd let go of Occam's razor." The sayings have the ring of communal wisdom; they counsel the young and often trump the opposition. As a reminder of

the weight of accumulated experience, they can be an effective means of closing a discussion or turning it in a new direction. They are medicine's summary guidelines, the rules of thumb for clinical reasoning. Taken as a whole, medicine's paired and counterweighted aphoristic wisdom suggests that while there are clearly wrong answers in the care of patients, there is often no invariably right one. They reveal that clinical education—the demonstration and transmission of clinical judgment—is in part a tug-of-war between competing admonitions about the best course of action. Medicine could be practiced and learned without these old standbys, but their wide and regular use is a reminder that, while physicians work toward certainty, they must act in its absence. Maxims, aphorisms, and old sayings impart situational wisdom, but, even more important, they model situational, case-based practical reasoning [Mark, 1983].

One of the most venerable pieces of clinical wisdom concerns the patient's account of the illness. "Listen to your patient," young physicians are traditionally counseled. "He is telling you the diagnosis." This is often stated as a statistical rule that asserts an approximate probability: "80% [in some versions 90%, but always at least three-quarters] of your patients can be diagnosed from the history." But this wisdom, however strongly stated or well confirmed by thinkers in medical informatics, has uphill work to do against medicine's ingrained skepticism about the history, history-taking, and, especially, the patient as a reliable historian. Clinical skepticism is clearest in accounts (written or oral) of the patient's presenting narrative [Jill, 1989].

Professionalized doubt about the reliability of sources is shared by all recorders of history. Physicians are especially dependent on the personal report of events by the individual most affected, and, like political and social historians, they are well aware that the information they gather, even from a well-intentioned, honest informant, is always narrow, incomplete, and potentially flawed. Like those historians and the biographers who are their near relations, physicians must be as sure as possible of their data even if, unavoidably, they exercise creativity in putting together the

information they elicit.⁶ For this reason, the patient's account by custom is labeled "subjective," although, as critics like William Donnelly point out, it is no more subjective than the physician's observation of the clinical signs. Clinical medicine, that larger epistemological skepticism gives way to a persistent, commonsensical suspicion of the patient's reliability and an unwillingness to waste time, look foolish, be misled, or, worst of all, be duped. Attitudes toward the patient's chief concern epitomize the tension about the reliability of the patient's history. Despised and undercut, the patient's presenting concern nevertheless can be found in the case write-ups of almost every academic medical institution, although seldom these days recorded in the patient's own words. "

Traditionally medical students are cautioned against a premature narrowing of the diagnostic focus. To reinforce this they are taught always to do a review of systems, in which—no matter how specific the chief complaint or how well it is supported by the patient's medical history—they ask questions about the other organ systems of the body. Like the custom of recording the chief complaint and other symptoms as subjectively reported bodily facts rather than starting off with a diagnostic label, the review of systems is part of the suspension of diagnosis held to be essential to clinical objectivity. This survey of the rest of the body is a pledge of the physician's refusal to jump to conclusions, a hallmark of clinical thoroughness, the antidote to premature Only relatively recently has there begun to be a serious consideration of the concept of clinical intuition.¹⁵ Leaps of diagnostic insight involve the skillful reading of signs, many of which—like clubbing of the finger ends—are well established in clinical lore [Albert, 1988].

With research into clinical reasoning and the diagnostic process, the relation between clinical intuition and the review of systems has become clearer. Given that a fund of information relevant to the case at hand is essential to clinical judgment, the review of systems is an intelligent fallback strategy for those who are either not yet (or not in this instance) experts.

Given a good stock of general clinical knowledge, a physician's survey of apparently unrelated organ systems proves invaluable in the absence of the specific, detailed information and specialized experience that constitute expertise. The habit of conducting a review of systems with every patient, inculcated early, remains the default mode for clinicians who are not in the grip of an overriding, fully satisfactory hunch.

Progress in understanding diagnostic reasoning has recently led to the modification of teaching strategy. Rather than being given a procedural rule that will be contradicted by the expert practice they observe with their clinical instructors, some students are now advised to proceed as those elders do, by forming a general idea of the malady—a “working diagnosis”—early in the clinical encounter, then testing and refining it as the interview and examination proceed [Perri, 1986]. This new method abolishes the old contradiction that counseled physicians both to suspend judgment and to form an initial impression of the diagnosis. As it diminishes the traditional tension between those competing demands, it no doubt reduces the corresponding tension in the student's psyche. But it risks eliminating what was valuable in the old contradiction: its insurance for beginner and routinized practitioner alike of a certain balance, a consciousness that, no matter which way they may work through a diagnosis, there is another. Good clinical practice includes the ability to choose tests wisely and in the most efficient order so as to minimize pain, blood draws, financial cost, and time elapsed till diagnosis. Often these goals conflict, and so, therefore, does the received wisdom about testing strategy. The ideal, of course, is the diagnosis that can be made with certainty from a pathognomonic sign or symptom: a pain like an elephant sitting on a middle-aged man's chest, yellow eyeballs, or a tender, swollen temporal artery. Next best is the single, sensitive, specific, wholly reliable test. But many diagnoses are not so easily made. The goal is to avoid until necessary test. The invasive (and expensive) tests like CT scans and angiograms, technologies that have made obsolete not only “exploratory” surgery but also some of the aphorisms, maxims, and old sayings as

internist's subtle strategies of physical diagnosis and clinical reasoning. In the intellectual exercise that is internal medicine, a physician who lacks tact and judgment in testing strategy is not only wasteful and inconsiderate but inelegant, almost unsporting [Georges, 1990].

Nevertheless, when the diagnostic stakes are high or there is a strong likelihood that an invasive test will eventually be necessary, the usual prohibitions and cautionary advice are set aside. In these circumstances, the neglect of finer points of test-choice strategy in the single-minded pursuit of a diagnosis is likely to be justified. Reaching a diagnosis engages in the most practical way the tension between the welter of the phenomenal world and the patterns imposed on it by biological science and clinical experience. As the problem of the anomalous fact suggests when a physician considers what the details of a patient's history and physical add up to, the number and complexity of signs and symptoms occasionally raise the possibility that two disease processes are at work instead of one.

Treatment often resolves the tension that pervades the question of diagnosis, but it can pose problems of its own. The physician's task is to relieve suffering. But just as medicine's traditional maxim, "First, do no harm," seems to be contradicted by the pain of testing and treatment, so the therapeutic imperative is sometimes constrained by the need to obtain a diagnosis. Good treatment depends on good diagnosis [Faith, 1974, 1982]. In medicine, though it represents accurately the deduction from general law that is characteristic of science, "empirical" is the label for treatment prescribed without proof of diagnosis, the epitome of what medicine regards as "unscientific" practice. A fairly common, more painful example of this tension between the alleviation of suffering and the diagnosis of the disease is created by the detection of widespread cancer from an unknown primary site [William, 1992].

Clinical education can highlight the potential conflict between diagnosis and the care of the patient. Clinical teachers face, farther along in the patient encounter, the tension between advice and example we saw with

the review of systems. For example, the diagnosis of chronic arthritis separates patients into two categories: those with degenerative and those with inflammatory disease.

Aphorisms and maxims that guide the clinical encounter are the intermediate rules of medicine's clinical casuistry. Albert Jonsen and Stephen Toulmin, who note the similarity between case-based moral reasoning and clinical reasoning in medicine, define casuistry as the analysis of moral issues, using procedures of reasoning based on paradigms and analogies, leading to the formulation of expert opinions about the existence and stringency of particular moral obligations, framed in terms of rules or maxims that are general but not universal or invariable, since they hold good with certainty only in the typical conditions of the agent and circumstances of action. In their definition, maxims are the "formulas drawn from traditional discussions and phrased aphoristically which served as fulcra and warrants for argument." 33 As part of the process of considering what in good conscience can be done in troubling situations, maxims serve to fit the prevailing wisdom—authoritative and experience-based but often unstudied—to the circumstances of a particular case under consideration [Marsden, 1984]. Because clinical knowing is uncertain, clinical teachers guide rational practice and encourage good judgment with clinical maxims. Through their mutual contradiction, the opposed maxims remind learners faced with a difficult clinical question to consider the alternatives. The goal is not to find a middle way or a compromise between them but to choose the best—or least harmful—course of action in particular circumstances. Nevertheless, each of these maxims may be uttered as if it were the singular truth, and the physicians who invoke them by and large behave and teach as if there were no possible contradiction. By this means, teachers of clinical medicine may lay claim to science but hedge like racetrack touts.

Narrative and the context. Use of contradictory rules There are good reasons for a rational science-using enterprise to use such contradictory

maxims, but physicians apparently ignore them. A rationality that relies on contradictory rules seems unworthy of a profession that draws on science and aims at error-free efficacy. The value of the contradictory maxims is rooted in the interpretive nature of clinical reasoning and physicians' focus on one patient at a time. Counterweighted, competing advice is neither accidental nor the remnant of a bygone era. The maxims work in the real-life care of patients and in clinical education precisely because of their contradiction. Diseases are not diagnosed and treated in test tubes but in human beings, where they develop variously over time; both diseases and patients are best understood in light of their histories. Aphorisms and maxims, however wise and conclusive they may sound, were never meant for universal application. A maxim is always case-based. It is contextual and interpretive, and its context is the patient's history of illness and medical attention, as well as the medical narrative of diagnosis and treatment. Maxims guide and test this interpretive task even in an era of algorithms. Diseases are developing plots rather than static objects; they are narrative patterns that complicate themselves and unravel contingently through time. Physicians must make sense not only of signs and symptoms but also of their progression. As they do, they factor in their sense of the stage of the investigation and the reliability of the information received thus far [Albert, 1988]. If clinical reasoning were simply a matter of pattern recognition or following an algorithm, a well-programmed computer might substitute for even the best physician. But the accumulated and contradictory wisdom distilled in clinical maxims reflects the importance of time and context in the work of clinical perception and interpretation. That wisdom is honed by the case-based nature of medical practice and the narrative rationality good patient care requires. Like adages in general, good clinical maxims have their opposites. Their contradiction is central to the case-based reasoning that constitutes clinical judgment [Perri, 1986]. In spite of the claim that medicine is a science, clinical education manages both to acknowledge the inescapable uncertainty of clinical knowing and to encourage habits of rational practice. The means are represented most succinctly by the contradictory maxims that guide and teach clinical judgment.

Chapter EIGHT: “DON’T THINK ZEBRAS”: A THEORY OF CLINICAL KNOWING

“When you hear hoof beats, don’t think zebras” may be medicine’s chief interpretive rule. It reminds clinicians that the presence of signs and symptoms shared by a number of diagnoses is not likely to indicate the rare one on the list. Useful advice in itself, the zebra aphorism epitomizes the practical reasoning used by physicians in the never wholly certain task of caring for sick people. The epitome of medicine’s counterweighted method of teaching and reinforcing the exercise of clinical judgment, “Don’t think zebras” is a self-contained contradiction.

The injunction *not* to think about zebras is strange enough. Hoof beats prompt the idea of horses. Zebras represent the rare to locally nonexistent occurrence. Why would a clinical instructor waste good breath advising, even commanding, a novice physician to think obvious, ordinary thoughts and not think unusual ones? In part, the answer lies in medicine’s thoroughness in the face of uncertainty. The question in academic medicine thus becomes why an aspiring young physician would *not* want to think about the zebras [Joseph, 1992].

The answer is plain: rare diseases are rare. Nevertheless, rare diseases do occur, and students and residents learning medicine see zebras far more frequently than do most practicing physicians. The clinical aphorism “don’t think zebras” is meant to remind clinical apprentices of the ordinary, real-world epizootology that not only awaits them outside the teaching hospital but also, despite the relative frequency of rarities there, still prevails within it.

The zebra aphorism is particularly valuable in understanding the cultivation of clinical judgment. It cautions clinicians, when faced with a singular, ill-fitting bit of evidence, to assume that the cause is not a rare disease but one statistically more likely. “When you hear hoof beats,” therefore, “don’t think zebras.”

Still the zebras are there, unforgotten, unforgettable, right there in

the aphorism. Not only does the advice generate its own counteraphorism among the young but also, as a reminder to forget, it is contradictory in itself. As long as the injunction not to think zebras comes to mind, zebras cannot be un-thought. The maxim captures in a nutshell medicine's skeptical recognition of competing, potentially contradictory interpretations of essential signs and the competing, potentially contradictory choices that are based on them [Perri, 1987, 1989, 1994].

The self-contradiction of the zebra maxim teaches commonsense procedure in a field where improbabilities should not be forgotten, even as they are not actively considered. Acknowledge them, implies the aphorism, even as you set them aside.

On beyond zebras: a phronesiology of medicine The zebra maxim, like other clinical sayings, is widely used but almost entirely unexamined. As a bottom-up rule of practical knowing, it is part of the phronesiology of medicine. "Phronesiology" draws on Aristotle's distinction between episteme and phronesis to designate a theory of practical knowing that is different from "epistemology," a theory of scientific knowing. Phronesiology, by contrast, is what we know about rationality in situated, contingent circumstances. The goal of phronesis or practical reason is not to determine a law-like answer that will apply to all similar cases but to decide, on balance, the best thing to do in this particular circumstance.

Phronesiology is a secret hidden right out in plain sight. The fundamental skill of the physician is to determine a treatable cause from the evidence of its effects, symptoms and signs that are sometimes unusual or transient. A thorough knowledge of human biology is essential, but it is not enough to accomplish the task. Medical students crammed to the gills with scientific information must learn to reason clinically, "backward," by identifying diseases from their bodily clues. This involves learning to perceive and to interpret what is perceived—sometimes (but not at every stage) separate matters. Students must also learn what questions to ask of

patients, a skill that is less “natural” than it seems, and how to make sense of what they are told. This learning process is framed by scientific knowledge about how the body works at various levels: organ down to molecule. The goal is to fit all the information they gather—the patient’s history and presenting symptoms, the perceived signs of illness, the test results—with all they know about the body and what can possibly go wrong with it. And this is just for the diagnosis. Treatment, although sometimes wonderfully simple and effective, can be complicated: allergies, side effects, drug interactions, effects on other conditions the patient may have, the patient’s willingness and ability (too often in the United States a matter of money) to adhere to the most effective regimen. The task of prognosis is likewise vexed by therapeutic optimism, doubt about the relevance of statistics to the individual patient, a wariness of self-fulfilling prophecies, and the fear of death.

Fortunately, clinical guidance exists: pathognomonic signs, recognizable syndromes, criteria for diagnoses, guidelines, protocols, algorithms. Their solidity is a practical fact. Protocols are regularly given to nurses, physicians’ assistants, and emergency medical technicians, and in clinical discourse dogma abounds. But beyond basic rules like “Airway, breathing, circulation” in the care of trauma patients, clinical guides do not have the universalizability or the force of physical law. Medical practice lacks non-obvious rules that can be generally and unconditionally applied to every case, even every case of a single disease. The use of intermediate rules and algorithmic decision pathways take clinical students only part of the way [Perri, 1994].

The long clinical apprenticeship consists of, first, learning rules and then learning their limitations and exceptions in particular circumstances. As readers of signs, clinical students are also acquiring the judgment essential to an interpretive practice. As they work to identify causes for the effects they observe, they must take account of and accommodate the uncertainties of diagnosing and treating illness in particular human beings [Francis, 1989].

The goal of clinical medicine. The therapeutic imperative, or: “Always do everything for every patient forever.” / *Primum non nocere*, or: “Don’t just do something, stand there.”

Every treatment decision takes place within a tug-of-war between the physician’s pride of craft and recognition of that craft’s potential danger. For this reason and because the knowledge of those dangers is imperfect, medicine’s therapeutic imperative is countered by the oldest of clinical maxims: *Primum non nocere*; above all, do no harm. The tension between doing everything and doing nothing, particularly for people nearing the end of a terminal illness, has been scrutinized in medical ethics over the last three decades. Since the 1970s, medicine and the society that holds it in such regard have learned that therapeutic limits are not the possible but, at times, the absurd. The therapeutic imperative rightly remains central to medicine. But against a narrow, purely technological understanding of the need to act, clinical teachers now occasionally intone a new maxim, itself a counterweighted inversion, that is the motto of geriatricians and palliative care physicians: “Don’t just *do* something,” they advise. “Stand there.”

The Use of Narrative in Clinical Reasoning. “Avoid the anecdotal.” “Pay attention to stories.” Good clinicians know what studies in case-based reasoning in cognitive science and medical informatics have corroborated: stories will never be eliminated from medical practice, not even from a thoroughly enlightened medical practice. The status of the anecdote is much like that of the patient’s history: taken for granted, the object of suspicion when brought to attention, but finally essential to the care of patients and ineradicable from practice. Although always potentially misleading, accounts of single instances in an uncertain domain continue to be cautionary reminders of exceptions to the rules. A seasoned clinician may remind colleagues and students, “Still, you can’t ignore the stories.” [Aristotle, 2002]. Because the day-to-day diagnosis and treatment of sick people is an interpretive process, physicians go on relying on the narrative

organization of details in a reasoning process that starts “bottom-up,” or inductively from the particulars, and then circles between those particular observations and general rules, fitting the details to the patterned whole and testing the details in light of the known generalities. It is a practical, interpretive way of knowing in an uncertain world. Anomalies—“clues” and the stories they generate—are vitally important to the process [Nicholas, 1999].

The use of experience in clinical knowing. “The research shows...”, “In my experience . . .” Clinical experience and research can be depicted as the two poles of medicine’s practical knowing. But a closer view reveals clinical knowing as a continuum: vivid particulars burned into an individual memory at one end, the abstracted data summarized in the tables of published research at the other. Neither functions well without the other. Experience is the ground of medicine’s rules of practice, and research flows from it. A physician’s judgment is shaped and goes on being refined by the continued interaction of experience and research. How do physicians acquire their habits of practice? After struggling to recast the biomedical sciences in terms of the care of sick people, every physician understands that scientific knowing is not the same as clinical knowing. They may choose to honor their profession by calling it a science, but they quite reasonably resist efforts to dislodge what their experience has suggested is efficacious. Equally reasonably, the profession as a whole counterbalances this conservatism with the injunction to “keep up with the research.” Good clinicians know both what the studies show and what their own experience has been. Both are valuable. In good clinical practice and the theory of evidence-based medicine, each is shaped by the other [Nicholas, 1999].

The nature of clinical knowing. The overarching paradox of medicine’s theory of knowledge—or perhaps the fundamental one—is the one considered in chapter 2, the habitual description of medicine as both a science and an art. As a practice, medicine is neither, but the paradox stands

for medicine's recognition of the importance of phronesis, the practical reasoning put to work in response to a sick person's request for help.

The everyday practice of medicine takes place at the intersection of biological abstractions and the particular manifestations of disease in the individual patient. The tension inherent in negotiating uncertain possibilities is the inescapable consequence, and this is the starting point for clinical knowing. Good clinicians must recognize the authoritative order of things, including the importance of statistical data and the findings of evidence-based medicine. At the same time, they need to recognize the singular, unexpected event that is narratively organized and remembered and to evaluate its potential importance for practice. That is the achievement of the Dublin zookeeper, who successfully bred lions in captivity because he understood lions: every lion is different.

Counterbalancing as a practical theory of clinical rationality.

Beyond its traditional division into "basic science" and "clinical" halves, medical education takes little note of the mismatch between generalizable scientific knowledge and its particularizing practical rationality. Trainees in internship and residency learn how to judge, how to act, how to conduct themselves as physicians. Instead of answers, clinical education provides a preparation for practical, ethical action: how to respond, what best to do, how to discover enough to warrant taking action, which choice to make on behalf of the patient.

Medicine resolutely ignores the contradiction between its claims to be a positivist science and its interpretive practice even as the potentially contradictory, but always situational, rules of practice enable physicians simultaneously to express and to negotiate the contradiction. Clinical discourse and educational methods are guided by these counterweighted rules and shaped by their tension.

There is much to admire in clinical reasoning. The zebra maxim and the counterweighted rules of knowing are rational and ingenious ways of accommodating the uncertainty and circumstantiality of practice. Calling

attention to the way physicians think and work could be more humane and more effective than the often heard commands to “be thorough” and “keep up with research.”

Clinical uncertainty is rooted in the activity of knowing itself, and acknowledging this might reduce the appeal of subspecialty medicine as a haven from uncertainty’s discomforts [Nicholas, 1999].

Take-home lessons. Here are two take-home lessons, and—no surprise—they are counterbalanced pairs. The first justifies the continual review of cases in clinical medicine’s practical, Deweyian education: “Experience is the best teacher.” “Learn from others’ mistakes.”

The second concerns a difficulty that comes with learning in a hierarchical discipline: “Pattern your practice on that of your clinical elders.” “Question everything you are told and much of what you see.”

Contradictory approaches to clinical learning not only are expressed in competing maxims but, above all, are enacted in habitual clinical practice. Thus medicine may proclaim science as its ideal, but its theory of practical rationality is rationally guided by its dependence on contradictory and situational rules [David, 2000]. Clinical medicine shares both its epistemological predicament and its rational method with history, economics, anthropology, and the other human sciences—all disciplines less certain than the physical sciences and far more concerned with meaning. Unlike those disciplines, medicine does not reflect on (because it does not readily acknowledge) its interpretive character or the intermediate rules it uses to reach its conclusions. Instead, claiming a “technical rationality”¹ based on science, medicine takes little notice of either the tensions inherent in its practical reasoning or the ingenious means it has devised for expressing and mediating those tensions. Chief among these are the competing and counterweighted but thoroughly commonsensical maxims and aphorisms described. In uncertain circumstances, they guide the real-life clinical rationality that is ignored or wrongly described in the profession’s claim to be (or to be on its way to becoming) an old-fashioned

positivist science. Medicine also relies on counterweighted maxims—more general ones— for a comprehensive theory that can account for both its scientific knowledge and its practice. Despite its scientific basis, medicine has no overarching rule or theory of knowing that can resolve the tensions inherent in practice.

Clinicians, however, do have some meta-rules, and together these generalizations serve as an ad hoc theory of clinical knowing. Like the more particular maxims that guide the clinical encounter, they turn out to be aphorisms and other traditional nuggets of wisdom “Don’t Think Zebras” “When you hear hoof beats, don’t think zebras” may be medicine’s chief interpretive rule. As medicine’s epidemiological watchword, it reminds clinicians that the presence of signs and symptoms shared by a number of diagnoses is not likely to indicate the rare one on the list. Useful advice in itself, the zebra aphorism epitomizes the practical reasoning used by physicians in the never wholly certain task of caring for sick people [Jerome, 2000].

Unlike the paired maxims that guide the clinical encounter, the zebra maxim lacks an opposite. Instead, it generates its own competing rule. Clinical medicine prides itself on taking into account every possibility. Consequently, when a set of symptoms is presented to medical attention, the ordinary is not necessarily the most obvious explanation. The answer is plain: rare diseases are rare. They are so rare that the likelihood of any given physician on any given day finding himself or herself in the presence of rare disease is exceedingly small. The clinical aphorism “Don’t think zebras” is meant to remind clinical apprentices of the ordinary, real-world epizootology that not only awaits them outside the teaching hospital but also, despite the relative frequency of rarities there, still prevails within it. Test questions, however, present medical students and residents a different, non-epidemiological set of probabilities. Because thoroughness is a clinical virtue, learners are expected to know far more than the easily recognized, common maladies. “The zebra aphorism is particularly valuable in understanding the cultivation of clinical judgment. Day in and day out,

whether in an academic subspecialty or in a primary-care practice, physicians must balance their knowledge of the whole realm of interesting medical possibility with a firm grasp of the statistical probability of any part of it. This task, well carried out, constitutes the exercise of good clinical judgment that is every physician's goal. The maxim captures in a nutshell medicine's skeptical recognition of competing, potentially contradictory interpretations of essential signs and the competing, potentially contradictory choices that are based on them [David et al, 2000]. This paradoxical maxim is the epitome of medicine's practical rationality, its quintessential interpretive rule. Because the management of uncertainty in all its variety is the central, if never quite stated, theme of clinical education, the self-contradiction of the zebra maxim teaches commonsense procedure in a field where improbabilities should not be forgotten, even as they are not actively considered [Samuel, 1978].

A physician must not forget the rare and catastrophic possibilities, but, if the patient is not in immediate danger, the most likely diagnosis must be attended to first. Distant possibilities will come to attention only when the obvious and common are eliminated.

This practical wisdom is all the more important because most North American medical schools teach clinical medicine in tertiary-care hospitals. Special arrangements must be made to give students and residents the everyday experience of primary-care office practice. The difficult pedagogical task is to educate new physicians (and sustain good practice in experienced ones) despite the constant potential presence of rare conditions. On *Beyond Zebras: A phronesiology of medicine*. The zebra maxim, like other clinical sayings, is widely used but almost entirely unexamined.

Students must also learn what questions to ask of patients, a skill that is less "natural" than it seems, and how to make sense of what they are told. This learning process is framed by scientific knowledge about how the body works at various levels: organ down to molecule.

The goal is to fit all the information they gather—the patient’s history and presenting symptoms, the perceived signs of illness, the test results—with all they know about the body and what can possibly go wrong with it. And this is just for the diagnosis [Samuel, 2005].

They learn physical signs with eyes and hands and ears and nose, even as they absorb the concepts of disease and therapy those signs entail. They want to be doctors: they want to be able to diagnose and treat patients. If the biology textbooks they devoured in the first two years now seem distant abstractions, it matters not a whit; evidence-based medicine gurus advise clinicians to burn. As readers of signs, clinical students are also acquiring the judgment essential to an interpretive practice. The aim is a rigorous, intersubjectively replicable rationality, and counterweighted maxims play a part in teaching it. Far from learning an objective, contextless manipulation of facts, they absorb a set of interpretive guides and a sense of the situations in which to use them. Sometimes their thinking (and usually that of their teachers) is rapid, easy, even “automatic,” as if they have achieved the formal sets of laws and procedural rules that might characterize an invariant and certain science.¹¹ Yet, as they work to identify causes for the effects they observe, they must take account of and accommodate the uncertainties of diagnosing and treating illness in particular human beings

The Goal of Clinical Medicine. Every treatment decision takes place within a tug-of-war between the physician’s pride of craft and a recognition of that craft’s potential danger. For this reason and because the knowledge of those dangers is imperfect, medicine’s therapeutic imperative is countered by the oldest of clinical maxims: *Primum non nocere*; above all, do no harm [William, 1992].

We identify medicine with the therapeutic imperative but the therapeutic imperative is not invariably benign. Social forces sometimes tip the balance between activism and restraint and obscure the rational choice. Fear of malpractice litigation has kept obstetricians attached to the use of

electronic fetal monitors in normal, uncomplicated childbirth—surely an occasion for minimalism—although studies have shown they do not achieve their intended effect of preventing cerebral palsy and lead to unnecessary Caesarian sections. The tension between doing everything and doing nothing, particularly for people nearing the end of a terminal illness, has been scrutinized in medical ethics over the last three decades. Those therapeutic limits are not the possible but, at times, the absurd. The therapeutic imperative rightly remains central to medicine. But against a narrow, purely technological understanding of the need to act, clinical teachers now occasionally intone a new maxim, itself a counterweighted inversion, that is the de facto motto of geriatricians and palliative care physicians: “Don’t just *do* something,” they advise. “Stand there.” [Atul, 2002].

Chapter NINE: KNOWING ONE'S PLACE: THE EVALUATION OF CLINICAL JUDGMENT

If a kind of visual field defect obscures not only medicine's knowledge of the nature of its knowing but also an awareness of that lack, how is clinical judgment evaluated? But because it is a practice, its evaluation is a much more complicated exercise than answering test questions correctly. I stumbled on this realization by chance when I invited second-year medical students to attend a hospital case conference in internal medicine so they could observe residents and attending physicians solving clinical problems out loud [David, 1979].

The department was organized into 'firms' or teams, which divided the internal medicine faculty so that each of the three comprised a full complement of subspecialists, and in composition each was representative of the whole department. Students and residents were assigned to a firm with the expectation that its smaller size would stabilize relationships and improve teaching and evaluation. The linchpin of this increased coherence of teaching, consultation, and patient care was a weekly hour-and-a-half-long conference during which residents, students, a regular cadre of attending physicians who led the firm, and relevant specialists recounted the diagnostic process and the treatment decisions for two of the week's most interesting cases.

I initially suggested that they pay attention to where they sit. I couldn't then be much more specific. In general, I could tell them, they should sit near the back of the room where third-year students sat (also wearing short white coats but distinguished by the stethoscopes in their pockets. Later I suggested perhaps more toward the middle. (This is due to the fact that there are other considerations, such as where the telephone is located, and the exit, so that those attending physicians on call can be contacted and also leave the room without disturbing the proceedings, also in emergency cases). Because clinical medicine is not a science, knowing the biological and clinical facts that appear on tests is only a start toward

being a good clinician. . Physicians learn how to comport themselves in ways that exhibit an awareness of their knowledge and experience and signal their status as clinicians. The firm conference seemed a good place to study this. My aim of the study was to describe the hierarchical seating pattern we had encountered so that exceptions and variations could be understood and formulated on the spot.

Evaluating clinical judgment. Clinical education is finely calibrated to instill and reward the development of clinical judgment in the face of uncertainty. It is a moral education because it shapes habits of action in the real world. But there is no good single test of its quality. Clinical skills can be tested, and so can the retention of information, and both are essential. But evaluating how they merge in genuine clinical competence is more difficult. Clinical students and residents are evaluated just as they will be through the whole of their careers: on subjective but communal perceptions of their care of patients and their competence at clinical reasoning. Because internal medicine is the specialty which dominates students' introduction to the care of patients, the rituals and practices of internal medicine, although they may be modified in other specialties, are central to the clinical education of every physician. The hierarchy of knowledge and experience is tested and reinforced in everyday rituals like hospital conferences. There the acquisition of clinical competence is subjected to self-evaluation and measured by signs of the participants' willingness to accept responsibility for its quality [Paul, 1974].

Reading the signs. Because the firm system apportioned students and residents in equal numbers and assigned faculty evenly by rank and specialty, each conference offered an opportunity to observe the seating choices made by a representative sample of those engaged in the activities of an academic internal medical service. My hypothesis was that rank and level of expertise are visibly displayed throughout the seating choice of participants.

The display of hierarchy. Week after week, charts of seating choice exhibited a stable if never entirely simple pattern that exemplifies the following well-recognized general rule.

1. Professors up front, students at the back. Although seating is not assigned and is never discussed, it is ordered by academic rank on a front-to-back-of-the-room axis. Senior attendants sit at the front; residents come next; students are at the back of the room [Davidetall,1979].

Exceptions prove the rule. Some exceptions to the strict rule of seating by rank, themselves rule-like in their predictability, are as follows.

1A. *Sitting out of rank reinforces the hierarchical rule.* A person of any status may sit out of order in a higher rank—one rank only—if he or she is invited by word or gesture to do so or is presenting the case.

1B. *Invitations may alter seating choice.* A person may sit more than one rank out of order if the host—whether resident, attending, firm chief, or the chief of medicine—sits with that person the entire time.

2. *Peculiarities of the conference room may vary the pattern.* The configuration of the room—doors, telephones, location of entrance, number and mobility of chairs, and number of aisles shapes the pattern that becomes standard for each conference.

2A. *Access to the telephone influences residents' seating choice.* The placement of the telephone at the back of the room creates an area of unconformity. Where this occurs, the area nearby will be occupied predominantly, but not the residents' space.

2B. *Latecomers and those who use hall phones sit near doorways.* The number, size, and location of entrances to a conference room govern the flow of those entering late or using the telephone. Latecomers and those returning from the telephone dive into the nearest available seats permitted by their status.

2C. *Refreshments do not alter the pattern.* Coffee, fruit, muffins, and bagels, although highly valued by conference participants of every rank, do not affect seating choice [Jack, 1959, 1977].

Variation within ranks. Additional variations, especially within the three groups—faculty, residents, and students—are governed by clear rules that nevertheless work out differently each week, as follows.

3. *Lateral position is a secondary power gradient.* Seats on the center aisle outrank.

4. *Gender is overridden by status in the hierarchy.* Gender has relatively little effect on seating choice—even to a skeptical observer aware of the history of discrimination in medicine and in society at large.

5. *Individual exceptions prove the rules.* Regular attendees outside the departmental hierarchy (or with anomalous places within it) might be expected to disregard prevailing customs but instead establish habitual seating choices that express their position within the symbolic grammar of the prevailing seating pattern.

6. *A tincture of time blurs the pattern.* Divisions and intra-group distinctions are sharpest at the beginning of rotations and sharpest of all in the first few months of the academic year.

As the academic cycle moved toward its end-of-June close in both of the years I kept charts, the young became bolder in their ranks. This is an appropriate and looked-for assertiveness, for if the seating pattern in a clinical conference obliges the young to know their place, the object is not to keep them in it forever [Charles, 1979].

Hierarchy, responsibility, and self-knowledge. These observations are very narrow, particular, and local ones. They concern a single aspect of professional behavior in academic internal medicine in two North American teaching hospitals. The findings for this one fairly typical service, nevertheless, are clear. A sense of hierarchy determines behavior; in clinical medicine, hierarchy *is* behavior.

Clinical education cultivates sound judgment through the slow accretion of experience and skill and the gradual assumption of professional duties, habits, and responsibility. Learning takes place in an evolutionary hierarchy, and progress is measured against an expectation of advancing roles and status. The seemingly inconsequential act of choosing a seat at a hospital conference, involves the display of behavior characteristic of a competent medical team player, a person of good clinical judgment. This potential is signaled in a fine balance between the assertion of one's ability and the recognition of its limits.

Those who possess clinical knowledge and expertise array themselves visibly, recognizably at every hospital conference. On entering a communal room in a hospital every physician must present himself or herself as a person of trustworthy judgment, ready to sit up front and take responsibility. And, until the real thing comes along, the young must indicate that they possess a readiness appropriate to their rank, neither reluctant nor too eager, to acquire that competence. The unspoken seating rules offer a test of every attendee's self-assessment of clinical competence, and hospital conferences provide a regular, evolving opportunity for its symbolic display [Frederic, 1998].

Knowing one's place: the evaluation of clinical judgment If medicine was only a science, physicians could establish their clinical competence by answering test questions correctly. But because it is a practice, its evaluation is a much more complicated exercise.

Because clinical medicine is not a science, knowing the biological and clinical facts that appear on tests is only a start toward being a good clinician. A world away from experimental laboratories, which have their own ethos and behavioral norms, physicians learn how to comport themselves in ways that exhibit an awareness of their knowledge and experience and signal their status as clinicians [Frederic, 1998].

PART IV: CLINICAL JUDGMENT AND THE NATURE OF MEDICINE

CHAPTER TEN: THE SELF IN MEDICINE: THE USE AND MISUSE OF THE SCIENCE CLAIM

Once an English professor in his mid-thirties introduced himself to me at a conference, told me he was going to medical school the next year, and asked “Is it going to change me?”

This is a serious question, as character is both crucially important and given no overt attention. My reply was “Sure! It’s going to turn you into a doctor.”

What does becoming a physician do to the person who becomes one? This chapter will deal with the part medicine’s claim to be a science plays in the process of turning science students into physicians.

Two things—besides their professional knowledge and skill—set physicians apart from the rest of us, two things that shape them as people: a familiarity with death and an odd relationship to science. The two are not unconnected. Death is always present but is seldom discussed in medical education [Donald, 1987].

With its commitment to objectivity and thoroughness, clinical reasoning produces what certainty is possible in the uncertain undertaking of clinical medicine. It enables physicians to ignore torn and distorted bodies, awful sights, nauseating smells, the patient’s misery and pain, and the promise of worse to come in order to do what must be done to ameliorate—often repair or cure—such conditions. The claim that medicine is a science comes to sustain physicians in the face of uncertainty, helplessness, and death.

The ethos of medicine. Each profession has its own morality, and medicine is no exception. Aristotle’s *Nicomachean Ethics* explains how it works. Phronesis or practical reason is one of the characteristics of the virtuous person, even the central operational one: you must be a good

person to possess practical reason, and, conversely, the habit of phronesis will promote virtue in the practitioner. The values of clinical practice include attention to the patient, reliance on one's own perceptions, awareness of one's skills and their limits, careful observation, thoroughness, and accurate representation of what has been seen and done. Because these values are held to be essential to good patient care, they are identified with clinical goals and obscured as moral virtues possessed by individuals. Students absorb these clinical values, and residents are judged by them without their ever becoming the subject of a class [Emile, 1957].

For indirect evidence that the moral is buried in the clinical, there is the casual narrative formula that often introduces an informal case presentation. "This patient walks in . . ." a physician will begin. That moment is central to the ethos of medicine, to its identity as a profession. The physician's responsibility is to figure out what the matter is and what will be best to do for the patient. The physician-teller, responsible in the story for what was said and done to the patient, is now responsible for its accurate representation. But this is puzzling, since physicians in the United States scarcely ever see a patient walk in. "Walks in" is used despite being almost certainly the one "fact" about the patient's presentation that the physician has not personally observed.

Perhaps then the unintentional meaning of this choice of words "Walks in" suggests the patient's voluntary arrival and submission to medical attention. It designates the starting point of all clinical knowing and underlines the attention that the practice of medicine requires. Here is someone in need asking for help and a second person asking what the trouble is, what he or she can do. The power of beginning with "the patient walks in"—that is, the truth of the phrase—lies in its representation of both the physician's intellectual task and the profession's moral duty.

Even before consciousness of being, human beings are confronted with the ethical. We are face to face with another whom we are compelled to recognize and acknowledge. We are constituted as persons by our response to that other. It is our ethical duty and it precedes our own

existence. A physician becomes a physician only by taking care of patients. It underwrites the old truism that the physician's best clinical instrument is the physician herself. How in the world is that capacity acquired?

Culture and the self. "Osmosis" is a term that is often used for clinical medicine's educational process: the diffusion of a solvent into a solution through a semi-permeable membrane. The metaphor is a good one. The solution undergoes slow change molecule by molecule, and there's no going back. Despite all those science classes, the quintessential lessons in how to practice medicine are learned by immersion, absorption." Medical education, especially initiation into the culture of medical practice, is the agent [Benjamin, 1991].

Culture and individual psychology are not entirely separate. In the work of the sociologist Pierre Bourdieu he moves each half of the interaction of culture and psychology into the territory of the other. For him they meet in *habitus*, the individual's cultural predisposition to perceive or know or act. Inherited and absorbed, *habitus* is a culture's "embodied history, internalized as second nature"; as such it "gives practices their relative autonomy" and their "retrospective necessity." Such individually embedded cultural automatism is, in fact, just what clinical education aims for: an ingrained capacity for assessing the best information at hand and acting as others educated in the same culture or profession would—or at least in ways those others would recognize and accept. His concept of *habitus* is practical reasoning or phronesis understood in its cultural context; it is a kind of knowing or embedded tact that some might label intuition [Charles, 1979].

Clinicians will declare that not much of their day is spent on science. To someone who knows relatively little about the workings of the body, this seems absurd. "Five percent, tops," I've heard oncologists (of all people!) say dismissively. The rest of their mental activity, they maintain, is just "common sense." Now common sense, as Geertz points out, is uncommonly complicated. Contrary to its implicit claim, it is not common

at all. It is a “relatively organized body of considered thought,” “a cultural system,” that, while varying in content from culture to culture, characteristically denies in every culture that it is interpretive at all [Pedro lain, 1970, 1975].

So it is in medicine. What counts clinically is the ability to sort through incomplete and potentially imprecise information to determine what is going on with a particular patient and then, often without much in the way of certainty, to choose an effective course of action. This may come to seem like common sense, but, if so, it is common sense about very uncommon matters. Its givenness is based on years spent studying, and more years of hospital apprenticeship with examination piled on examination well into the physician’s late twenties and thirties. It is “common” only to others in medicine and then often only to members of the same subspecialty. Medicine is an acquired rationality that is culturally engendered, communally reinforced, interpretive, situationally sensitive, and therefore dialogic and aphoristic in character—even if, as in solo practice, the dialogue is internal and the proverbs are uttered silently.

Because competent clinicians embody a habitual and “automatic” commonsense method of responsive knowing, the idea of a rationality that is both deeply ingrained and largely unaware of itself is essential to understanding their enculturation, the formation of the professional self [Karl Marx, 2003].

The self in clinical education. Medical students have committed themselves to a self-altering course of study. An education in clinical practice is, necessarily, a moral education. It focuses on the development of good clinical judgment that will lead to the habitual good choices: the selection of the best possible action to take in uncertain circumstances. Because clinical education is an initiation into a practice, it involves the whole person: attitudes, values, behavior, habits, emotions, and ideas. Such a thoroughgoing process is necessary because the clinical practice for which students and residents are being prepared concerns above all how

physicians act on behalf of ill people. Novice physicians must learn how to conduct themselves and, especially, how to determine what action to take in situations of confusion, worry, crisis, disappointment, suffering, grief, deep human need, and occasional joy. And because practical reason, as Aristotle noted, is the property of the experienced rather than the young, clinical education is designed to age the new physician as rapidly as possible.

Professional values and attitudes and habits are not learned from lectures or textbooks. They are acquired experientially by students whose prior values are shaped and refined (and sometimes changed) by contact with the attitudes, habits, and values of medicine. Learning to exercise the virtues of good medical practice is what the clinical apprenticeship provides [John Dewey, 1988].

For medical students, becoming a physician involves the absorption of a culture and the shaping of the self. It is not the formation of the self but medical education is concerned with manifestations of that self in and through the culture of clinical medicine. Indeed, uncertainty and the threat of death pervade clinical education. They give the culture of medicine its texture, and they inform the student's accommodation to its practice. The claim that medicine is a science with an ideal of quantifiable certainty and unflinching replicability, a defense wielded against uncertainty and death, is a part of that culture.

Medical students and undergraduates hoping to go to medical school seem never to be told that the education they are undertaking will have as much to do with their character, judgment, and behavior as with their intellect. The self who is becoming a physician, almost on principle, seems to be ignored.

The neglect of the self in medicine is in part due to the honored place of self-sacrifice in the ethos of medicine. Whatever their specialty, residents are still immersed in a medical culture that puts patients' needs above the physician's. From the rigorous training physicians have the knowing that they can wake from sleep, respond rationally, appropriately to another person's need. Physicians will respond; they are responsible. It is

the ethos of medicine. Like the capacity for clinical reasoning, which this obligation reinforces and sets into practice, responsibility is communally acquired and shared. Along with their knowledge and experience, it is an aspect of the self they have assumed [Pierre, 1990].

Science and the formation of the physician. Medicine's claim to be a science plays an important part in the moral education of the physician. In clinical education the ideal of science often stands in for the intellectual and moral ideals of medicine. Qualities and habits that are necessary clinical virtues are attributed to science, even though they belong equally to medicine as a practice. Commitment to objectivity and rigorous clinical method is a more persuasive example.

In clinical education the claim that medicine is a science, rather than being an accurate description of clinical work, is instead a behavioral and intellectual norm that expresses medicine's commitment to act on behalf of patients in a way that is as well reasoned and certain as humanly possible. "Medicine is a science" is a rhetorical claim that is meant to affect attitudes and habits. It is a moral appeal to do one's rational best for one's patients. The science ideal is meant to encourage objectivity, diligence, and sacrifice in the young, including those who come to medicine in their thirties, and to shore up the spirits of experienced physicians facing the death of a patient or the inevitable fallibility of their practice. Thus medicine thrives by advancing its moral and intellectual goals as "science" while covertly accomplishing them by interpretive, narrative, discursive means [Clifford Geertz, 1989].

Science and the self: certainty, detachment, safety. Beyond status and education, powerful advantages accrue to physicians from medicine's identification with science. It operates as a kind of ballast for practicing physicians as they rely on rational skill and personal virtue to meet their responsibility for another human being's continued health or survival. Science itself has an ethos, one that values rigor, openness, and

objectivity. Medicine's claim to be a science appropriates those values. In addition, medicine's identification with science also offers physicians an escape from emotion and the perils of subjectivity. No wonder they find sustenance, even comfort, in its aura and values.

First, there is emotional support in the intellectual assurance science offers. Second, science provides physicians an easily described and defended ethical stance. Last, for many physicians the principal benefit of the belief in medicine as a science is the boost it gives to clinical detachment, the professional façade maintained in the face of illness, pain, and human disasters of every sort, especially a patient's untimely death. Physicians practice in circumstances that (as every patient knows) are the focus of human emotions. Fear and the possibility of death, even if they are not everyday occurrences, are always at hand. After all, how to be attentive to another human being without losing oneself is a problem every human being struggles with in one way or another [Charles, 1989].

Physicians, new and old, need a safe way of being in contact with other human beings and their own feelings. Jodi Halpern has argued that detachment impairs decision-making, while what she calls "emotional rationality" promotes better patient care. Besides, the detachment supplied by the ideal of science does not deliver on its promise of protection from emotional pain—not without a cost to the physician's ability to feel. Far from providing a safe way to be in contact with patients, medicine's science claim is a frail defense against uncertainty, death, and human emotion. The belief that medicine is or should be such a science exacts a toll on the personal development of medical student and residents, the lives and psyches of physicians, the aid and comfort of patients, and the role of medicine in society.

Giving up the science claim would also entail a new look at medical education and a consideration of both the personal qualities it fosters, including the qualities essential to the care of the self and the care of the patient that it currently disvalues and neglects.

Two things—besides their professional knowledge and skill—set physicians apart from the rest of us, two things that shape them as people: a familiarity with death and an odd relationship to science. The two are not unconnected.

Death is always present but is seldom discussed in medical education. In the first year, students dissect human bodies with knives, scissors, saws, fingers. Then, after a two-year barrage of lectures, they begin to learn the practice of medicine in tertiary-care hospitals where, especially since the late 1980s, almost every patient is seriously. Young physicians have their budding clinical skills and the profession's goal of exercising a cool, rigorous, scientifically informed rationality for the good of the patient.

They have acquired crucial intellectual and behavioral skills and a rational clinical method. They have absorbed a commitment to objectivity: close observation, the suspension of judgment until information is gathered, skepticism about information they have not acquired or witnessed themselves, and, when results don't make sense, skepticism about their own procedures. They have learned a careful, rational method that enables them to sort through what once was bewildering signs and symptoms and now make medical sense of them. As they gain a capacity for clinical reasoning, they can begin to diagnose and treat an array of diseases with a fair degree of reliability

Clinical reasoning produces what certainty is possible in the uncertain undertaking of clinical medicine. It enables physicians to ignore torn and distorted bodies, awful sights, nauseating smells, the patient's misery and pain, and the promise of worse to come in order to do what must be done to ameliorate—often repair or cure—such conditions. By this circuitous route, the claim that medicine is a science comes to sustain physicians in the face of uncertainty, helplessness, and death. So entwined are ethics and practice that it is not surprising that they seem to be one and the same. The values of clinical practice include attention to the patient, reliance on one's own perceptions, awareness of one's skills and their

limits, careful observation, thoroughness, and accurate representation of what has been seen and done. Even in medical ethics courses, as elsewhere in the curriculum, they are basic assumptions. And while clinical medicine shares some of its values with science, the overlap between the two is far from constituting an identity.

For indirect evidence that the moral is buried in the clinical, there is the casual narrative formula that often introduces an informal case presentation.

The physician's responsibility is to figure out what the matter is and what will be best to do for the patient. The patient must be greeted, the history taken, a physical examination performed, and at least a tentative diagnosis given. And while clinical medicine shares some of its values with science, the overlap between the two is far from constituting an identity.

For indirect evidence that the moral is buried in the clinical, there is the casual narrative formula that often introduces an informal case presentation. As the audience, we are taken back to that moment of clinical beginning when nothing is known and almost anything can happen. "This elderly man walks in . . ." and with the physician narrator we are once more on the spot, curious and a little wary: What is going on here? The moment is central to the ethos of medicine, to its identity as a profession. The physician's responsibility is to figure out what the matter is and what will be best to do for the patient. The patient must be greeted, the history taken, a physical examination performed, and at least a tentative diagnosis given. Tests may be ordered.

The moral claim at the heart of the medical encounter. This inseparability of the moral from the diagnostic and therapeutic in clinical medicine is the germ of the clinical imperative, the demand physicians make of themselves to identify, treat, and (if at all possible) cure each patient's malady. Not that individual physicians—or whole segments of the profession—at times do not fail in their duty. But such failures are always shocking. Professional ideals merge readily with the ritual markers of those ideals. If I wax a bit eloquent about medicine's ethos, it is because I believe

that when all goes well, the doctor-patient relationship is one of the triumphs of human society. In every culture, medical practice is an ameliorating activity designed to salve some of the common and most grievous ills of the human condition. Its failure is not the inability to achieve a cure but the failure to attend to the plight of the sick or injured person, and it is a painful violation of trust. It takes its place on a scale with a parent's desertion or a teacher's seduction

“Osmosis” is a term that is often used for clinical medicine's educational process: the diffusion of a solvent into a solution through a semi-permeable membrane. The metaphor is a good one. The solution undergoes slow change molecule by molecule, and there's no going back. Despite all those science classes, the quintessential lessons in how to practice medicine are learned by immersion, absorption.

Such individually embedded cultural automatism is, in fact, just what clinical education aims for: an ingrained capacity for assessing the best information at hand and acting as others educated in the same culture or profession would—or at least in ways those others would recognize and accept. His concept of *habitus* is practical reasoning or phronesis understood in its cultural context; it is a kind of knowing or embedded tact that some might label intuition. Like Sherlock Holmes's “deductions,” it is often astonishing to outside observers, but within its culture, such knowledge seems “natural” and “automatic.” Like clinical judgment, *habitus* erases itself and becomes invisible. Those who possess it take it for granted.

So it is in medicine. What counts clinically is the ability to sort through incomplete and potentially imprecise information to determine what is going on. Dialogue is internal and the proverbs are uttered silently. Common sense, *habitus*, phronesis, clinical judgment: there are distinctions among these concepts, especially in the degree to which they are regarded as conscious and open to alteration or refinement.

Our cultural beliefs and the assumptions we make about medicine authorize their clinical practice and the rituals of medical education,

including its worst, mind-numbing, spirit-deflating aspects. The self-altering changes a medical student undergoes in becoming a physician are minor tremors compared to the tectonic shifts required to alter that process of acculturation. Bourdieu's habitus and Geertz's common sense are useful concepts because. Medical students have committed themselves to a self-altering course of study. An education in clinical practice is, necessarily, a moral education. It focuses on the development of good clinical judgment that will lead to the habitual good choices: the selection of the best possible action to take in uncertain circumstances. Because clinical education is an initiation into a practice, it involves the whole person: attitudes, values, behavior, habits, emotions, and ideas. Such a thoroughgoing process is necessary because the clinical practice for which students and residents are being prepared concerns above all how physicians act on behalf of ill people. Theirs are not abstract decisions. Novice physicians must learn how to conduct themselves and, especially, how to determine what action to take in situations of confusion, worry, crisis, disappointment, suffering, grief, deep human need, and occasional joy.

For medical students, becoming a physician involves the absorption of a culture and the shaping of the self. It is not the formation of the self, to be sure; the curmudgeons were surely right about mothers' knees. But medical education is concerned with manifestations of that self in and through the culture of clinical medicine. So compelling is this personal and psychological aspect of education that in discussions of the experiential learning that occurs in the third and fourth years of medical school and especially in residency, the word "training" is customarily used far more often than "education."

Medical students and undergraduates hoping to go to medical school seem never to be told that the education they are undertaking will have as much to do with their character, judgment, and behavior as with their intellect. Once in the hospital, clinical decisions and the acts they entail are regularly judged to be "appropriate" or "inappropriate," code words in an uncertain domain for "good" and "bad." Yet little explicit

attention is given to the character or the self of the person who is becoming a physician. Instead students are immersed in daily work that relies on conducting themselves responsibly, exercising good clinical judgment, and taking appropriate action on behalf of the patient. So important are objectivity and detachment believed to be for carrying out these duties that the self who is becoming a physician, almost on principle, seems to be ignored.

The neglect of the self in medicine is in part due to the honored place of self-sacrifice in the ethos of medicine. In the last quarter century, that heroic vision of medicine has moderated, and clinical education has to some degree changed, too. Residency programs have adopted a less military model. Night-float plans that reduce hours on call have slowly become standard throughout graduate medical education. It has been decades since residents were forbidden to marry; there is even a couples' residency matching program to accommodate the desire to find positions in the same city.

Whatever their specialty, residents are still immersed in a medical culture that puts patients' needs above the physician's. The hours spent taking care of patients, the lack of sleep, heroic expectations about the amount and the speed of work, multitasking, thinking on one's feet despite sleeplessness—all this is not simply hazing.

Science and the formation of the physicians claim for medicine to be a science play an important part in the moral education of the physician. George Engel described attention to the psychosocial aspects of illness as “the science of the art of medicine,” and Alvan Feinstein labeled clinical epidemiology medicine's “new basic science”—and neither for purely rhetorical reasons. Students and residents routinely hear about “the science of medicine” even as they learn a practice that is guided in ways that, though rational, are clearly not scientific. They do not seem to be disturbed by this. The role of case narrative, the use of proverbs and contradictory maxims, and ritual behavior that requires the self-assessment of one's ability is all ignored. There are too many vitally important things to be

done, and the practical, flexible reasoning they are acquiring is essential to performing those tasks well. Far from challenging the science claim, the educational focus on acquiring accurate information and exercising good judgment seems just what is meant by “the science of medicine”—even though that judgment is readily acknowledged to be exercised imprecisely under conditions of uncertainty.

Physicians’ commitment to objectivity and rigorous clinical method is a more persuasive example. Their careful, thorough, rational method may be shared with science, but an ideal of clear-eyed observation and careful reasoning is just as important to good practice in fields like history or anthropology that must explain unique circumstances and anomalous cases and contend with potential subjectivity.

Clinicians will scarcely utter an opinion without having examined the patient themselves, and they prefer that tests be performed in familiar laboratories. This is not snobbery or a quest for profit (although it can promote them) but a requirement of knowing in practice. Clinicians know their frailties and trust their strengths. Their drive for firsthand information is highly rational, especially in view of the experiential character of their knowledge; it is as likely to be shared with historians and literary critics, who have a similar need to immerse themselves in the record or the text, as with chemists or biologists. Finally, the often voiced expectation that every physician, young and old, in and out of academic medicine, will keep up with research seems to be proof that medicine is a science.

Physicians have a professional duty to maintain and improve their clinical judgment. Because the soundness of that judgment depends on the quality of the information they draw upon, in an ideal world it would be informed by the best available statistical evidence about every aspect of practice. This is precisely the role of evidence-based medicine strategies, which make stepwise and methodical.

Evidence-based medicine informs but does not replace clinical judgment. These characteristics—the commitment to thoroughness and rational method, attitudes of objectivity and rigor, the reporting and review

of clinical decisions, a demand for firsthand information, the injunction to keep up with research combined with the use of scientific knowledge and technology—are all aspects of clinical medicine, part of a good physician’s phronesiological duty. They are no more the defining characteristics of science than they are those of history or anthropology or art theory.

In clinical education the claim that medicine is a science, rather than being an accurate description of clinical work, is instead a behavioral and intellectual norm that expresses medicine’s commitment to act on behalf of patients in a way that is as well reasoned and certain as humanly possible. “Medicine is a science” is a rhetorical claim that is meant to affect attitudes and habits. It is a moral appeal to do one’s rational best for one’s patients. Still, the replicability and certainty of scientific knowledge remain medicine’s ideal (however unreachable), and attaining to the designation “scientist” has become part of the moral and intellectual education of physicians. This aspiration makes sense of the customary failure to distinguish between “scientific” as a description of much of medicine’s store of knowledge and the substantive “science,” which turns medical practice into something it is not. The science ideal is meant to encourage objectivity, diligence, and sacrifice in the young, including those who come to medicine in their thirties, and to shore up the spirits of experienced physicians facing the death of a patient or the inevitable fallibility of their practice. Thus medicine thrives by advancing its moral and intellectual goals as “science” while covertly accomplishing them by interpretive, narrative, discursive means.

CHAPTER ELEVEN: A MEDICINE OF NEIGHBORS

What would happen if medicine disavowed the claim to be a science and emphasized instead its character as a practice? The physician's moral duty to the patient would not change, nor would the intellectual obligation to determine the diagnosis, choose the best treatment, and provide a reliable prognosis. But the professional's social role might be altered.

Already weakened by patients' geographic mobility and the proliferation of subspecialties, the patient-physician relationship has been dealt a damaging blow by managed care. Increasingly, the profession that we appeal to in our direst need is becoming a medicine of strangers. Little wonder that contemporary physicians locate medicine's healing authority in science rather than in its best, most authentic source, the care of patients [Eric, 2003].

A medicine of friends. The right metaphor for the relationship between patient and physician is a question that has interested a number of thoughtful observers of medicine. I propose a medicine of neighbors. Far less alienating than a medicine of scientists or technicians, it is an alternative image that is more inclusive and, I believe, finally more rewarding than a medicine of friends. There have been many essays and surveys and classic works to do with patient-physician relationships that each offers its understanding, definitions and presentations for the case of the friendly physician, or the importance for the patient to see the physician as such. Just one example from many is "The secret to the care of the patient is to care for the patient." Such arguments suggest that friendship is an ethical goal of professional relationships. Whether motivated by nostalgia for an imagined past or by longing for a rarely attained unanimity, these writers encourage us to believe that good physicians should count patients as friends and that friendship between patient and physician is a goal of medical practice [Hubert, 2001].

Against friendship. The best indication that the ideal of friendship is not a true goal of medicine is the odd fact that it is expressed primarily by those who belong to the profession in question and not by the people they serve. For physicians, “a medicine of friends” is a critique of impersonal medical care. It directly conflicts with medicine’s ideal of openness to all in need, or if it does not, it is impractical: friendship with every patient would be emotionally exhausting, even perilous.

The doctor is not a friend. Or if she is, that is not who she is being when she is being my physician. While scraping my abraded palm with a small wire brush, tweezing out the fine grit that remains, or other treatments, this is not friendly! It is doctorly: she is intent on my hand, telling me what she’s going to do next, and if I can just hold still, I will be eternally grateful and we will go back to being friends [William, 1999]. During that time, the physician has distanced herself, narrowing her focus to an injured, almost entirely de-contextualized hand. This is a necessary distance, an essential objectification, and while it may be relatively easy to manage for a minor, accidental injury, it is far more difficult, if not impossible, for good, sustained care. Either friendship or the doctor-patient relationship must give way.

What do patients want? Friendship is not what patients want from their physicians. Certainly they are quick to condemn those who are discourteous and unfriendly. Even those few patients who seem to see their physicians as friends do not advocate friendship as a goal of their care. In his 1980 *New England Journal of Medicine* essay Norman Cousins tells of persuading his physician to release him from the hospital and treat him instead in a hotel where he can have round-the-clock access to film comedies that reduce his need for pain medication. It is the physician’s trust and willingness to experiment that Cousins values, not his friendship [Howard, 1983].

But friendship, if that is what it is, is an accidental reward and not a precondition or goal of the relationship. Patients do not want physicians to

feel their pain or to circumvent their usual stark procedures lest they be incapacitated, make mistakes, or miss important signs. A patient expresses the need not for the doctor to love him, but “I wish the doctor would just *brood* on my situation for perhaps five minutes, that he would give me his whole mind just once, be *bonded* with me for a brief space, survey my soul as well as my flesh, to get at my illness, for each man is ill in his own way.” Like the ideal of science, “a medicine of friends” works as counterweight to a necessary but somehow suspect attitude or practice. The ideal of friendship is an attempt to redress medicine’s necessary de-contextualization of the patient. Physicians long not only to exercise their skills but also to have a safe way to be in relationship with their patients. The problem lies with the paradox of intimacy and distance that is central to the patient-physician relationship. It exists for other professions, but the license physicians have to touch the body and their familiarity with matters of life and death make the balance of intimacy and safety both especially difficult and especially important [William, 1999].

Rx: A medicine of neighbors. What is needed is a different image to set against the growing specter of physicians as automatons at a conveyor belt performing technologized adjustments on a succession of disordered bodies. A medicine of neighbors offers this alternative. Neighbors are people in an accidental, almost gratuitous relationship, but one no less full of possibility for all that. Neighborliness is a duty, especially in time of need, but a limited duty that leaves considerable room for both self-preservation and performance above and beyond its call. The fulfillment of neighborly duty is judged by acts rather than by motives or emotions. Distinct from love and liking, being a neighbor requires only the fundamental respect involved in one human being’s recognition of another. Above all, in its randomness it is a relationship open to time, chance, difference, surprise.

As a model, a medicine of neighbors expresses much of what is valuable in the ethos of medicine, particularly its goal of disinterested service. Medicine is distinctive, even in a democracy, for its attention to all

comers –whether prisoners or criminals. The physician as neighbor is such a model. It neither requires a violation of the physician’s boundaries nor licenses a trespass of the patient’s. It guarantees these limits even as it enables proximity [Howard, 1961].

Neighborliness is a virtue that has much to recommend it as a metaphor for medicine in the twenty-first century now that both science and bioethics are widely accepted. A medicine of neighbors possesses homely qualities that friendship transcends and sometimes can ignore: chief among them are a clear regard and a fundamental respect for the other. Well realized, the patient-physician relationship may become something like friendship. Now and then, friendship is also the reward for having been a good neighbor. But neither the patient-physician relationship nor neighborliness necessarily includes it, nor begins there. Friendship is neither a precondition nor a goal of the patient-physician relationship [George, 1983].

Medicine already is or should be the care of neighbors. It is a norm that was available to medicine long before clinical practice incorporated science. We are challenged now to extend the benefits of medicine not only to those we live among, our literal neighbors, but more widely to figurative neighbors with whom we share the planet. We could do worse than to imagine the physician not as a scientist or a science-using technician but as a neighbor, and to evaluate both our beliefs about medicine and the public policy to which we consent by the degree of neighborliness they permit and encourage [Charles, 1987].

A medicine of neighbors. What would happen if medicine disavowed the claim to be a science and emphasized instead its character as a practice? Recognizing how physicians actually think and work would not reduce the importance and power of biomedical science and technological advance. The physician’s moral duty to the patient would not change, nor would the intellectual obligation to determine the diagnosis, choose the best treatment, and provide a reliable prognosis. But the professional’s social role—at least in the United States—might be altered. I caught a glimpse of

this possibility when I discovered the appeal that the image of a “medicine of friends” has for physicians beset by the current (dis)organization of health care [Charles, 1987].

The assumption that medicine is a science affects more than physicians’ sense of themselves. It also limits the idea of the profession’s role in society. On the positive side, the democratic openness and free access to information associated with science are qualities that support the ethical commitment to provide equitable care to all comers found in many of medicine’s oaths and professional codes. But on the negative side, medicine’s social role is limited by the value-free objectivity physicians (along with most of the rest of us) attribute to science. Issues of public health thus are seen as political rather than professional matters. So too are the economics and the organization of health care, even when, as in the United States, medicine has become a commodity and its egalitarian ethos weakened. Only as the clinical encounter has been turned into a brief, almost mechanical, ad hoc meeting of strangers—in other words, when the care of patients is threatened—have these issues become a concern. The lack of a stable panel of patients, exacerbated by managed care (which promised just the opposite), also means that clinical detachment is easy to maintain and so is a lack of interest in public health and even in psychosocial issue [James, 1972, 1983].

The advances of biomedical science and clinical medicine’s goals of increased precision and efficacy have not created this narrowed vision, nor has the belief that medicine is a science by itself led physicians to view their work mechanically or estrange them from their patients. But, with science the ideal, the failure of medicine as a caring profession becomes less important and its detachment from the health of the community less a betrayal of its goals. Scientific and technological successes can obscure (and may even seem a necessary trade-off for) the social failure to make those wonders available to those who cannot afford them. And the more objective and scientific medicine is believed to be, the more easily it can be commoditized, detached from a caring physician, and judged by its “product,” health [Mc Graw Hill, 1969].

CHAPTER TWELVE: UNCERTAINTY AND THE ETHICS OF PRACTICE

Almost a year after my daughter's diagnosis, a few months after her treatment ended, I caught a ride with a surgeon-writer from a conference. Because I admired the surgeon's account of his brother's death, I asked him about the perils of writing about illness in a family.

"It's never simple," he said. "But it's your story. Hers would be very different." Her illness, I told him, had immersed me in medicine's uncertainty. "Uncertainty in medicine is my soapbox!" "It's not all the physicians' doing," I ventured. "Patients and their families push them to be certain." Then abruptly, as I remember it, he said, "Do you mind my asking your daughter's diagnosis?" I told him everything up to the end of treatment, my unexpected anxiety at waiting for normal life, whatever that might be, to begin again [Nicholas, 1999].

For a moment he said nothing. Then he straightened, took a new grip on the steering wheel, and began to speak. He'd been a general surgeon, in a small town academic and community hospital. "People come back to us; we don't lose track of the patients we treat. I did breast surgery there for almost thirty years. In all those years, I lost only one patient who had Stage I disease."

All the terrifying counterarguments sprang to mind. I knew how partial his knowledge was. But, however valuable, his was the experience of just one person. What about the research! The experiments! He had given up surgery before they began doing DNA tests on tumors [Marcus, 2000].

The man who not 10 minutes before had been emphatic about medicine's uncertainty and the perils of ignoring it was now telling me that my daughter would not die—or not soon, not from breast cancer. The sources of his authority were his very local knowledge, a particular and specifically embodied objectivity, and long clinical experience that responded, I realize now, to a need he saw in me. His response—the pause,

the new grip on the steering wheel, his sitting up a little straighter—were all signs of his assuming a physician’s answerability. There was no intellectualizing distance between him and his experience, no self-reflective gap between his knowledge and the assurance he was implicitly offering. He stood for the belief that my daughter would live [Peter, 1998].

The need for certainty. Uncertainty, loss of control, and the damage to the sense of self are a part of illness, and, unscientific though these concerns are, we hope our physician will address them [Stephen, 1999].

Hope feeds on the assumption that medicine is a science, and that assumption is fed in return by need. We need medicine to be reliable and predictable and physicians to be agents of accumulated scientific knowhow. Physicians find it hard to resist, too, since they have been trained to expect of themselves a perfection of effort. People with chronic diseases know better. But the well and the newly ill (and their families with them) hold fast to a misunderstanding of physicians’ capacity. They’ll be able to fix it. In the face of such need, physicians understandably may not explain that medicine is not itself a science. Although wise physicians know their practice is often imprecise and always a matter of what will probably work best, they are reluctant to burden the patient with this. As patients we may not be interested. We want physicians to diagnose and treat with confidence, and the cultural belief that medicine is a science adds to physicians’ authority and assuages the patient’s fear. It may provide hope, perhaps promote healing. We want the certainty of science, its authority and protection, the promise of a better future, restored health. We want its reassurance. Instead, all too often, what we get is statistics [Sidney et. all, 1999].

The Numbers. Inside the hospital, “the numbers” means test results, yet numbers can be a snare and a delusion. Ian Lawson suggested 30 years ago that in medicine, an ill person’s uniqueness is expressed, oddly enough, in numbers rather than in words; the words evoked by disease and loss or recovery are startlingly common, while test results, even

for people with the same diagnosis, can vary wildly [Dewitt Stettin, 1981]. For prognosis, especially, the numbers are at best a quantified uncertainty. Sick people facing prolonged therapy need reassurance, especially when the treatment will be painful, life-threatening, or toxic in itself. Most reassuring would be the simple news that the illness is self-limiting: the sick person will soon be well and restored to normal life. But in the absence of that assurance, many patients and their families pin their hopes on science. Without control of our fate, we look for cognitive control.

Surely the numbers should answer the patient's burning life-or-death question. But they don't. Helpful though the facts may be for both decision-making and a sense of control, the limits of biomedical information are nowhere clearer or more painful than in the prognostic use and almost unavoidable abuse of statistics. In their need for certainty, patients ask for scientific answers. What they are given—or find on the internet—is probabilities. While most patients say they want more information, including statistics, the numbers are only a stand-in for the reassurance they need [Eric Cassell, 2000].

Though produced with something like certainty—these are the facts!—numbers alone cannot not offer the care and assurance patients need.

Medicine and the reign of science. As a moral, science-using practice whose goal is the benefit of the patient, medicine does not need the ideal of science to protect its practitioners either from subjectivity and emotionalism or from caring about their patients. The key to clinical success is within the words of Francis Peabody: “The secret of caring for the patient,” he wrote, “is to care for the patient.” Science alone is a limited source of knowledge and authority in the care of patients.

The performance of certainty. Medicine's own authority flows from the patient-physician relationship. The connection between the healer and a sick human being asking for help remains central to patient care. Yet,

while trust in the medical profession has declined, patients still commonly report that their own physician is different: competent, trustworthy, helpful, sometimes the source of inspiration and strength. Patients see the person who is the physician but respond to the archetype; they evoke physician-performance by the power of their need. Performance confirms performers in their roles, and physicians are no exception [Richard, 1985].

The ethics of practice. Medicine's ethics of practice calls first of all for the exercise of clinical judgment in response to a patient's need. It demands that physicians be thorough and careful observers. This is not because they are scientists, but because they are physicians caring for human beings who are ill. The ethics of practice calls for an examination of the currency and reliability of one's knowledge. It also values egalitarian openness; openness to all comers does not need scientific objectivity to justify it; it is part of medicine's identity as a profession. The ethics of practice also encourages a rigorous rationality and a commitment to continued learning, including an investigation of the reliability of current knowledge, not because medicine is a science but because its goal is good patient care [Claude Levi, 2000].

The ethics of practice also offers benefits that the ideal of science lacks. It provides comfort and protection for those caring for patients by acknowledging the human connection that is part of clinical work and not dooming them to think only of dissociated body parts. Above all, it encourages the acceptance of uncertainty and an appreciation of well-informed, well-exercised clinical judgment. These values, inherent in the everyday care of patients, have shaped the methods used to teach clinical reasoning. These include the virtues of honesty, attention, thoroughness, best effort, and skepticism are honed and rewarded [Edmund, 1993].

Medicine's ethics of practice includes not only the values of attentive care but also a commitment to the continued refinement of clinical judgment. This too is not science, but a pragmatism motivated by the duty to do one's best for the patient. In medicine, the ethics of practice is so strong that for

physicians to understand how they think and work is unlikely to alter, much less impair, their clinical habits. Patient care comes first.

Uncertainty and the ethics of practice. I had been writing about clinical judgment, the capacity for making practical decisions in uncertain circumstances. Until then I had seen the mismatch between the way medicine is taught and practiced and the claim that it is a science from a **very safe** distance. Her illness, I told him, had immersed me in medicine's uncertainty. "Uncertainty in medicine is my soapbox.

The need for certainty Few experiences feel as uncertain as illness. The assumption that life will go on is grounded in our bodily existence. Heel will follow toe, food will do us good, and eyes and hands and the rest of us will do our bidding. It all adds up to the everyday capacity for denial that eases most of us through most of life We want cures, of course, and very often we get them. But not always, and certainly not forever. It's not news that we are mortal. But surely, this time—in our case!—it will be different. Hope feeds on the assumption that medicine is a science, and that assumption is fed in return by need. When we are ill, the power imbalance between doctor and patient, much noted by critics of medicine, becomes a desirable difference, one we hope to enlist on our behalf [Edmund, 1993].

In the face of such need, physicians understandably may not explain (and may not remember themselves) that medicine, however scientific it may be, is not itself a science. There are at least two good reasons—besides lack of time—for this. First are habits of thought, both social and professional. The brilliant success of biomedicine and medical technology has come to be taken for granted in Western culture. Physicians know an immense amount about the body and have access to therapies that offer real help and often cure. All of us have come to expect an endless series of advances that have made diagnosis, treatment, and prognosis more and more reliable. At the same time, medicine is a deeply habitual practice that may rigorously review its methods and results but does not question the status of its knowledge. Its practitioners do not often think about its

radical uncertainty. They ignore the rational procedures they share with practical reasoners in other professions and the conditions their method shares with inquiry in the social sciences and the humanities [Pierre, 1990]. A second reason for silence is the clinical usefulness of the assumption that medicine is a science. Although wise physicians know their practice is often imprecise and always a matter of what will probably work best, they are reluctant to burden the patient with this. As patients we may not be interested. In fact, we may positively want not to know. We want physicians to diagnose and treat with confidence, and in a culture that understands the word “scientific” as a synonym for “rational,” the belief that medicine is a science adds to physicians’ authority and assuages the patient’s fear. It may provide hope, perhaps promote healing. So, while individual physicians may never actually declare that medicine is a science, few explain that it is not. Besides, if “science” has come to stand for “rationality,” medicine surely has earned the label. Physicians strive to be as rational as possible, and clinical epidemiology and evidence-based medicine have raised the bar substantially by calling to their attention the quality of information used in clinical thinking. We want the certainty of science, its authority and protection, the promise of a better future, restored health. We want its reassurance. Instead, all too often, what we get is statistics [Paul, 1994].

Inside the hospital, “the numbers” means test results. “Give me the numbers” is a request for laboratory values that nail down the facts. There the term seems ordinary, a guarantee of medicine’s scientific rationality. But, out on the street, “the numbers” has another life, one with a history: first a long use in illegal lotteries for the numinous objects of hope and desire; then a cleaned-up nightly presence on local television once the states took over the market in all-but-impossible dreams. In medicine, too, the numbers can be a snare and a delusion. In diagnosis and treatment, test results have something like symbolic weight [Pierre, 1990].

For prognosis, especially, the numbers are at best a quantified uncertainty. Like Tolstoy’s Ivan Ilych, patients want most to know whether

their case is serious or not. What part should numbers play in the answer to that question?

Nevertheless, scientific information is only part of what patients need. Data must be interpreted, evidence pieced together, and information sorted for its relevance to one particular patient. This is what physicians do—and why they are not likely to be replaced by computers. Just as most physicians have found a wide middle ground between lying and “truth-dumping” when they must give patients bad news, so it seems possible when discussing treatment to find a way between the stonewalling “trust me [Paul, 1994].

Patients and their families want more than information, something that science cannot provide. While most patients say they want more information than they presently receive, including statistics, the numbers are only a stand-in for the reassurance they need [Pierre, 1990].

For the rest of us, physician-patients included, numbers alone are not adequate. An educated grasp of statistics, no matter how balanced and thorough, only goes part way. Sidney trusted. Because the relationship between patient and physician entails attention, the exercise of clinical judgment, and fidelity, that relationship in and of itself can provide comfort and a sense of control to patients no matter how serious their disease.

There are barriers to providing such non-statistical reassurance. In the United States, the economics of medical care and its fragmented delivery constitute two of them. But a third, more personal barrier is well within an individual physician’s power to remove: the failure to acknowledge patients’ questions about their fate and the temptation to avoid such topics altogether. Because the science of medicine cannot provide anything like the certainty the patient so desperately seeks, physicians—particularly those who believe they are scientists—may feel that this is not their job [Edmund, 1993]. To provide the reassurance patients need, physicians must be willing to go beyond statistics, the numbers science provides. They have at their disposal not only biological and clinical facts but experience and clinical judgment, including hunches,

intuition, and an experienced ear. This is wisdom of a real-life, practical kind. Some patients will ask for scientific information; many more will want statistics; but all hunger for information about the world of illness they have entered. Whether patients and their families can give up the belief that medicine is a science is not clear. It may be as essential for us as for physicians: a kind of metaphoric goal forever unreachable but necessary to sustain us. We may need the belief in science in the same way we seem to need the surgeon's ritual reassurance

A loss of faith in physicians and the sense that medicine has abandoned them in an essential way makes it easy to believe that medicine has become a business after all

Medicine and the reign of science. What might the practice of medicine be like without its misidentification with science and scientific values? In the century since medicine added biology to its armamentarium, it has ceded its authority to science. As it has gained power from the technology that science underwrites, medicine's values have been increasingly misallocated in its outmoded ideal of scientific knowing. Medicine's identification with science is understandable. Besides improvements in diagnosis and treatment, there are its more subtle benefits: authority and emotional protection for its practitioners, an idealistic alternative to the neglect of public health and universal access, reassurance for patients. Although the idea of medicine as a science is not responsible for all the difficulties facing medicine, an examination of its effect on patients, society, and physicians themselves suggests some remedies. A richer, more complex understanding of clinical medicine and its characteristic rationality could readily replace the flawed ideal of medicine as a science.

We need to understand the practical importance the ideal of science has as a counterweight in clinical medicine's system of balances. Left unexamined, it endangers that balance. When the belief that medicine is a science dominates, upsetting the balance of information and experience in

clinical medicine, it undermines and corrupts medical practice. Science alone is a limited source of knowledge and authority in the care of patients.

The Performance of Certainty Medicine's own authority flows from the patient-physician relationship. Although the rituals and rules of that relationship have been refined over the last 50 years, the connection between the healer and a sick human being asking for help remains central to the care of the patient [Richard, 1985]. The performance of physicianhood is learned early, absorbed in medical school along with biological facts, clinical rules, and hospital routines. It is part of the acquisition of technique and the mastery of professional behavior and attitudes, and medical students are vividly aware of it. They put on white coats and the world responds to them differently.

The Epistemology of Practice The doubleness of performance suggests how the care of patients enables physicians to accommodate the claim that medicine is a science—even as the uncertainty of their practice requires much that escapes or defies the label “science.” Focusing on the patient reorients the physician's knowledge: the ethics of practice outweighs both the assumption that medicine is a science and everything the physician may understand about how clinical knowing actually works. The duty to respond to the patient, to act or to justify inaction, necessitates a sense that the information at their disposal is as solid as science. What physicians know about the uncertainty and imprecise applicability of their knowledge is one thing; the grounds upon which they respond to a patient are another. Thus the status of knowledge in clinical medicine may be uncertain, but knowledge in practice is firm.

Medicine's moral imperative to act on the patient's behalf, we must conclude, is so strong and so thoroughly embedded in clinical habit and predisposition as to override mere ideas about their knowledge [Peter, 1998].

Even those physician-educators who know well that clinical practice is characterized by uncertainty, urgency, and imprecision may believe that only medicine's aspirations to be a science can promote and

enforce sound rational procedures. Those who see clinical reasoning as inaccessibly unconscious can find the science claim a necessary counterweight to what cannot be described. And, as I have argued, experienced physicians may view the idealization of science as the best defense against emotion and subjectivity in medicine's intimate circumstances. All these arguments value clinical balance and the safety of patients, but they fail to appreciate the authority inherent in clinical medicine itself, an authority that is based in the acts of attention and care—including the very performance of certainty—in response to another human being's need.

A profession-wide attention to clinical thinking would not challenge the acculturated blindness inherent in practice—just as clinical decision-making and evidence-based medicine have not done so. Theories about thinking and methods of knowing do not conflict with the ethics of medicine as a practice. They cannot. The ethics of patient care prevails [Dewitl, 1981].

Conclusion

Montgomery's volume contributes very valuably indeed to an advancing understanding of the nature of effective medical practice in our times. Her volume makes an immediate, a significant and an important contribution to the medical literature and the reflective practitioner and the interested scientist will both gain much from a thorough reading of her text. If her volume had been written perhaps 20 years ago, Montgomery may have risked overstating her case in warning of the dangers of an over-reliance on science in clinical decision making and its potential to lead to a misnaming of medicine that would benefit neither doctor nor patient. But her monograph does not predate the inception of EBM, but has rather been written against a background of vigorous international debate on the nature of knowledge for practice and where the training of doctors in many countries is now heavily influenced by EBM-inspired curricula. Montgomery's text does not replace older volumes on medical thinking and clinical judgment, but in my view provides a particularly sharp insight into this field of study. Interested readers – if they have not already done so – would be well advised to read Montgomery's text in conjunction with a commendable earlier text and the most recent, perhaps least impressive one, simply in order to make comparisons and contrasts with these rather different works and to broaden their overall understanding of the field accordingly. Montgomery is to be congratulated on a fine achievement and I recommend her book most enthusiastically to all undergraduate medical students, to doctors in specialist training and to all those colleagues with a general or specific interest in clinical decision making. While Montgomery's text is entitled 'How doctors think', it could equally be entitled 'How doctors *should* think'. We need more books of the kind Montgomery has produced – and urgently.

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