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Error in Medicine

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A NINETY-YEAR-OLD MAN who had been healthy and active was awakened in the middle of the night by the urge to urinate. When he did so, he was frightened to discover the toilet bowl turn red with blood and clots. He telephoned his doctor and was admitted to the urology service of a modern medical center. The initial tests and X-rays revealed an unusual form of cancer of the bladder.

In the morning, the man's physician helped him choose a specialist. Because the case was unusual and interesting, he suggested that the attending surgeon be a man much favored by the residents of the service, for then the case would provide maximum teaching benefits and the patient receive good care.

Pre-operative evaluation revealed the man to be in relatively good health except for mild hypertension and varicose veins. It was suggested that he receive small doses of heparin during and after surgery to prevent pulmonary emboli, a complication common in post-operative bedridden patients of his age. Such therapy was new at the time and viewed by the surgeons who had had no experience with it as exposing the patient to a risk of bleeding, despite the published evidence to the contrary.

The operation (partial removal of the bladder) went extremely well and offered promise that cancer would not soon recur or be the cause of death.

The first post-operative day was uneventful except that the

patient had considerable pain. On the second day, morphine was given because of the severe pain, and that evening the patient was found by the internist to be stuporous and breathing poorly. He wrote a note on the chart suggesting that morphine be discontinued because of its depressant effect and told the nurse not to give the next dose until the resident had seen the note and stopped the morphine. On the next day, still receiving morphine, the patient was neither alert nor breathing well. The internist discontinued the morphine, and the discussion with the surgical resident that followed was sharp and angry on both sides. The following day was Sunday and the internist did not see the patient. That night he was notified that the patient had been transferred to the intensive care unit.

A review of the chart revealed that the morphine had been restarted in a smaller dose and that the patient had gone into respiratory arrest and shock. The resident (the same one who restarted the morphine) had worked long and vigorously to reestablish effective respiration and blood pressure and correct the associated metabolic abnormalities. Blood chemistries revealed that the patient's kidneys were not functioning well, but the report of similar tests done when he was first admitted could not be found for comparison.

The attending surgeon could not be reached (and had not responded to earlier calls). His attraction for the house staff, it turned out, was not only his competence but also the fact that he often turned his cases over to them and then stayed out of the way.

In the intensive care unit, the patient was appropriately monitored and his respiratory problem effectively managed. The physician in charge of the unit decided to start peritoneal dialysis to take over the function of the patient's kidneys, despite the fact that the degree of kidney failure was not severe nor endangering him.

Although the patient was able to leave the intensive care unit, his renal function worsened and did not return. Numerous consultants saw the patient and the case was discussed frankly with the family, and, to the degree possible, with the patient. Repeated peritoneal dialyses were required which, although ultimately seen as pointless, were also seen as difficult to discontinue. He de-

veloped massive swelling of the lower extremities, interpreted as thrombosis of the inferior vena cava. Ultimately the peritoneum became infected and he finally died of pulmonary emboli and pneumonia. Autopsy confirmed the thrombosis of the inferior vena cava, peritonitis, pneumonia, and pulmonary emboli.

The case is illustrative of the many facets of medical error. It was marked by mistakes throughout, except for late in the illness. It is an example of what may be a medical maxim. In a difficult case, when errors start, each will give rise to more. Were a malpractice suit to be brought (that did not happen because the family was grateful for the attentive care), the jury would undoubtedly have found for the plaintiff. The suit could have been based on more than one technical error, easily proven, and virtually impossible to defend.

The small dose heparin regimen should have been employed to prevent thrombosis. Since that opinion had been entered on the chart by the medical consultant, when the surgeons decided against the heparin, their opinion and the reasons for it should have been entered on the chart. The morphine should have been discontinued and certainly should not have been restarted. The events leading to the respiratory arrest should have been documented in the doctor's notes. The absence of initial laboratory results entered on the chart would have attested to inadequate pre-operative evaluation of the function of the remaining kidney. There were undoubtedly other errors which I have forgotten. As many technical errors as there were, there were also errors of judgment. They ranged from the initial choice of operation, to the decision to start peritoneal dialysis. In those instances, perhaps no technical mistakes were committed, but clearly a reasoned analysis of the case and the arguments for or against alternative actions were lacking at each step.

Although fortunately the example does not represent a common occurrence, it is typical enough to provide the basis for a closer look at the whole phenomenon of error in medicine.

To start with, we can dismiss some excuses. The case was not so difficult or unusual that it presented new technical problems. Although it ultimately became extremely complicated, that occurred as a result of the errors and was not their cause. Carelessness did not cause the mistakes except perhaps for the

missing pre-operative laboratory report. Technical competence, training, and experience were more than adequate to the challenge, as were the technological resources of the institution. Indeed, there are reasons for believing that if the patient had not been in a teaching hospital that was so superbly equipped, the matter might have ended better.

Of much greater importance to an understanding of error in medicine is a look at what would have been the best basis for a malpractice action. Clearly, the continued administration of morphine to this patient, after it was apparent that it greatly impaired his consciousness and respiratory function, was wrong and indefensible. But when the case was over and the family had won their suit, what would the physicians have learned from the trial? Not to give morphine in such circumstances? Any second-year medical student learns that when he or one of his friends in the pharmacology laboratory kills a cat with too much morphine. Although the morphine was the agent of the mistake, the error originated in the conflict between the surgical resident and the internist and the subsequent failure of both of them to protect the patient from their dispute. That dispute would not show up in court unless it was used by the plaintiff's attorney to get one of them to testify against the other.

The function of malpractice law is not to teach physicians what not to do but rather to compensate patients injured by wrong action. However, it is inevitable that something as influential as malpractice law should start to become the teacher rather than the student of an understanding of medicine and medical errors.

One of the things it has taught is that the primary concern of malpractice is with technical mistakes. While certain ethical errors, such as the abandonment of a patient, are grounds for suit, the overwhelming attention is paid to technical errors. There may be good, even inevitable, reasons for that single-mindedness, but an understanding of error that dwells on the technical is simply inadequate.

Errors in medicine are not only technical, but also arise from the moral sphere, social or interpersonal interaction, and from problems of thought. It is in the nature of so complex an activity as medicine that these all interact, but in this case, as an example, each can be seen for its separate effect.

The failure of the internist to come to the hospital on the crucial Sunday was a moral error. So, too, was the failure of the surgeon to remain closely associated with the case after the operation. Similarly, when the resident did not call the internist after the respiratory arrest, he was in error because he was both acting beyond his ability and failing to act in a way that would have been an acknowledgment of his technical error. As noted earlier, errors in social interaction between attending physician and house officer are probably what started the case on its fatal course. Later there were conflicts between house officers of different specialties, common enough, but damaging nonetheless. There were also errors in thought and reasoning. The choice of operation in the first place may have been dubious, and the decision to start peritoneal dialysis certainly was. It may be argued that those were technical errors, but I think not—certainly not by malpractice standards. Medical decision-making is based primarily on the estimation of alternative probabilities. Doctors become very good at that sort of thing. Recently, writers on decision-making in medicine, however, have pointed out that doctors' intuitive methods may lead them far astray, particularly where small probability statistics are involved.[1]

All these kinds of error were probably as crucial in this case as the actual morphine administration. Yet, one might argue that their recitation merely shows that medicine is a human activity and is thus subject to human weakness. That being the instance, such a recital is hardly more illuminating that the opposite single-mindedness of malpractice law.

I believe I can show that these human foibles do not occur at random, and can be systematically understood if we are able to see a "case" in medicine as much larger than a case of, for example, carcinoma of the bladder. That is not merely to say that a patient is a person, but rather to try and find, at least in terms of medical error, what can be seen as an individual entity in medicine. Something individual in the same sense that a person is an individual—discrete and comprehensible in himself, even though subject to outside influence. An individual in the same way that Gorovitz and MacIntyre apply the term to a salt marsh or a hurricane.

Before going further, it is necessary to define better what

usually seems to be meant by error in discussions of error in medicine. Here I mean not to give clarity to the word in the sense of a dictionary definition, but rather to show the special meaning that it seems to have acquired in relation to the behavior of physicians. It does not seem to me that error usually means simply inadvertent action based on ignorance, false beliefs, or notions—inadvertence that applies equally to an action committed or uncommitted. Error in that sense is not something the physician does so much as something that happens to the physician—and through him as agent, something that happens to the patient. That sense of error is morally neutral, and I believe that is not what we commonly mean when we speak of physicians' errors. For one thing, such neutral errors are generally not known to us as mistakes at the time they occur or even soon after. They are revealed by the evolution of knowledge. For example, in years past, keeping patients in bed for long periods after surgery was an error that led to a high incidence of thrombophlebitis and pulmonary emboli. When such an embolus occurred, it was not called error, it was called chance. Generally speaking, that class of mistakes which seem morally neutral—which are conceived as happening to rather than being done to the patients—are perceived as chance events even though they may be causally related to the action of the physician. If, years later, the doctor becomes aware that his action caused the mistake, he may believe that he, as well as the patient, suffered at the hands of fate.

Nor is it usually considered error when, in therapeutic research, patients are randomly assigned to treatment groups and some, therefore, suffer or do less well than others. To preserve that sense of freedom from error, the physician must feel sure that chance alone is operating in the assignment of patients to the treatment groups. In these situations, the physician relinquishes his more comfortable role as the agent of choice, giving over to chance that agency. Should it turn out, as is usually the case, that one group of patients does less well, the doctor may feel badly for the less fortunate patients, but he will not feel that he erred.

I believe that what is commonly meant when people speak of doctors making errors has three requirements. First, the physician is held to be responsible for his choice of action by himself, his patient, or the group. Next, to consider that an error has been

committed, the physician, patient, or group must believe that a causal relationship exists between the doctor's action and the injury. Finally, there must be an injury or the awareness of near injury. If something good happens as a result of a mistake, it would generally not be called an error, but, rather, serendipity.

Thus, error, in its peculiarly medical expression, requires a sense of responsibility, an awareness of causal relationship, and injury. What is interesting about each of these terms is that they have both an objective and subjective expression. Most discussions of error in medicine, particularly those centering around malpractice, implicitly or explicitly accept these requirements for error, but deal only with the objective aspects. There seems not to be an awareness that the objective nature of responsibility, causality, and injury (at least in their relationship to medical error) are the societal expression of individual subjective senses of responsibility, causality, and injury. For that reason, these factors in their objective expression are relative to the value structure of the group in which they occur. They are also relative to the group's understanding of the nature and cure of illness and of the function of physicians.

It may be argued that there is nothing relative about the injury suffered by the patient presented here. He was given morphine which led to respiratory arrest and ultimately to his death. But if the highest call on the physician was the relief of pain—indeed in certain terminal illnesses that is believed to be true—then the injury would not have come about through error, but rather as an unavoidable consequence of mercy. So much of what happened to this patient represented not the ineluctable operation of nature, but was the consequence of more or less informed current beliefs about causality in disease, infection, thrombosis, and so forth. The very fact of operating on a ninety-year-old man represents a change from a generation ago in beliefs of what is appropriate to the aged.

The subjective nature of the word *injury* is pointed up by the behavior of modern patients who act as though anything but a perfect outcome from the treatment of curable disease represents injury. If, after a fractured leg has healed, the patient does not walk perfectly, he may well feel and act toward his physician as though he has been injured—not by fate, but by the physician!

Here, as in other areas of medicine, one finds a pervasive and perhaps increasing belief that fate can be controlled or denied. Such a belief is manifested in proposals to create systems of compensation for adverse medical outcome resulting from medical treatment, whether or not caused by negligence. Such proposals suggest that, since the function of modern medical care is to return the patient to health, when that does not happen, despite reasonable expectations based on the existing state of knowledge, then the patient has been injured and compensation is justified.

Quite apart from whether such suggestions are good or bad or will help alleviate the problems of malpractice insurance, they point to something interesting. It might have been suggested earlier that I was wrong in asserting that definitions of responsibility, causality, and injury were relative to the value structure of the group; rather than that, it could be asserted that they are simply relative to our state of knowledge. What was not an injury previously, now becomes an injury, causally related to the action of a responsible physician, because knowledge has advanced to reveal the proper action. While the result of the advance of knowledge is undeniably true, the newer "no fault" malpractice proposals suggest that, in addition to advance in knowledge, there has also been a change in the group's belief—one should be compensated for injury arising *not only* from the negligence of physicians, but also from the action of fate. I am not necessarily opposed to such a belief, but I think the belief and its ramifications are awe-inspiring.

Thus, thinking about injury has changed, and so, too, has thinking about causality—the changes are related. As always, everything is seen to have a cause, but now cause is conceived to be within the control of man. Chance and fate are ruled out as legitimate causes. Injury implies injury *by someone*. And, curiously, when society compensates an individual for the action of fate, that too is an attempt to deny fate. When I buy fire insurance for my house, I do so in recognition that things happen, and that causal chains are not always controllable. But when society begins to compensate its members for injuries arising from chance, the net effect is to deny the power of chance. The next case shows how chance itself is removed from the causal chain.

During an operation to remove an intervertebral disc that was pressing on a lumbar nerve root, the instrument that was being used by the surgeon broke, and a piece dropped into the wound and could not be recovered. The operation was concluded with the instrument fragment still in the disc space. In time, it migrated spontaneously to a more accessible location, and a second operation was done to recover the broken piece. The patient recovered completely. In the trial of the malpractice suit that followed, the history of that instrument from its manufacture to the time of operation was exhaustively reviewed. No responsible party could be shown, and the jury found for the defendants (the surgeon, hospital, and instrument maker). On appeal to a higher court, the case was returned for retrial. Since it was clear that the instrument should not have broken, the jury must find the responsible party(s) and apportion damages. Such a finding by the higher court naturally causes apprehension among physicians and their insurers. In newer proposed systems of malpractice compensation, such cases would fall under the rubric of medical accident—to be compensated on a no-fault basis. It seems equally reasonable, however, to compensate the patient for getting the disc disease in the first place. That, too, was an accident of fate. Or to compensate any patient for any illness. Indeed, in the amendment to the Social Security Law, which extends Medicare benefits to patients with end stage renal disease regardless of their age, we have seen the extension of just that thought.

Another facet of the problem of error in medicine was revealed in the recent series of articles in the *New York Times* on poor practice in American medicine. In discussions of unnecessary surgery and unnecessary prescriptions—both of which are clearly quite common—there seems to be an unspoken basis for the presentation. It is assumed apparently that patients get sick from diseases from which they can be cured. If they are not cured, or if they are given treatments, medical or surgical, which are unnecessary or do them harm, then error has been committed. Such error, the assumption seems to be, is technical in nature and thus always knowable. Therefore, it must always arise from venality or ignorance on the part of physicians. There is no question that there are venal physicians who do wrong acts solely for monetary or other non-medical reasons. There is also no

question that there are ignorant, uninformed, or stupid physicians who do wrong things simply because they do not know better when they should know better.

It is my contention that those two sources of error—venality and ignorance—are the least important both numerically and conceptually. There are and always have been venal physicians, and they should be revealed. There are and there always have been physicians who should be retrained. However, I believe the greatest source of error lies in the inherent belief and value structure of medicine, equally shared, as must be the case, by both physicians and patients. Where the belief exists that fate in its expression as illness can be denied or overcome, and where cure is the expectation, there exists a force to act. Medicine is based on a belief in the efficacy of intervention. The focus of the force to intervene is the disease. It is difficult but necessary to point out the difference between disease as entity and disease as symbol. It is clear that the symbolic utility of disease as the cause of human ills is dependent on its concrete utility in individual cases. That is to say that the surgical (or medical) removal of disease must succeed often enough in removing that state of dysfunction called illness to maintain the symbolic importance of disease.

But then, what is meant by disease as a symbol? Diseases such as fibroids of the uterus or tumors of the thyroid gland may be the cause of considerable illness and disability. But not all fibroids of the uterus or tumors of the thyroid cause illness, and it is difficult sometimes to distinguish between those that are or will be the cause of disability and those that will not. For example, tumors of the thyroid are quite common and physicians go to great lengths to try and decide which are at risk of becoming malignant and thus should be removed. Many physicians believe that perhaps all solid tumors of the thyroid should be operated upon. However, oddly, death from cancer of the thyroid is really quite rare. The disparity between the commonness of thyroid tumors and their surgical removal and the rarity of death from thyroid cancer requires some thought. The solid tumor becomes not only the thing itself, but a symbol for the threat of cancer. We strike at the enemy by striking at its symbolic representation. One might argue that all I have shown is that it is difficult to decide which thyroid nodule will become cancerous and calling it

a symbol is just fanciness. I think not. Why do we not reason backwards from the very small frequency of thyroid cancer rather than forwards from the large number of thyroid nodules. I think because each thyroid tumor is symbolic of the threat of cancer. The actual fact of cancer, very low in frequency, is not the prime mover, but rather the threat of cancer.

In simple terms, the object of removing disease is to make or keep someone healthy. When we see disease consistently removed or treated with apparently little, or at least obscure relation, to ultimate health (despite good intentions), we may suspect that the real has been replaced by symbol.

Symbols attain their importance as representatives of reality by conferring meaning on reality even when that reality may not be the best concrete expression of the symbol. The symbol remains constant and dependable when reality is not all that constant and dependable. We live in a surgical age in medicine, based on a belief in efficacy of the extirpation of disease. It is essential to remember that for the symbol to retain its force, both patient and doctor must believe in it. It is from this symbolic meaning of disease and surgery that most error in medicine derives. Patients who have unnecessary hysterectomies are not usually dragged kicking and screaming to the operating room. Both they and their surgeons believe in the importance of the operation. The surgeon believes the organ is diseased, and the patient believes that when the diseased piece is removed, she will feel better. But more, it is the surgeon's definition of disease that may confer reality on her feelings. A force exists for the presence of the operation. To eliminate that source of unnecessary surgery, it is almost necessary to eliminate surgery. Put another way, the proven efficacy of surgery has as its inevitable accompaniment unnecessary surgery. Some years ago, it was believed that polyps of the colon should be removed because of the risk of malignant transformation. Such polypectomies often necessitated major abdominal surgery. Evidence was then presented that showed malignant change in such polyps to be quite rare. After considerable debate in the literature, many physicians ultimately agreed and abdominal surgery for such polyps stopped being correct practice. Recently, new instrumentation (the flexible fiber-optic colonoscope) has made it possible to remove those polyps without abdominal surgery and

with small risk or discomfort to the patient. Not non-existent risk, but small risk. Now polypectomy has again become common. It is very difficult for physicians and patients to leave tumors alone. It is this relationship of disease as entity to disease as symbol that becomes very difficult to define. Yet, in examining poor practice, the symbolic meaning of disease and the related force to act are forgotten, and each individual operation or combined statistics are treated as only the disease they represent.

Our beliefs in medicine as an attempt to control nature and deny fate, and our confusion of disease as entity with disease as symbol, confound attempts to understand error in medicine. These problems also underlie the persistence with which we view error in medicine primarily as technical. Understanding this or even accepting it does not, however, point to any useful alternative. It is necessary, now, to show why an individual instance of a disease is not a large enough whole in itself to be the basis for an adequate examination of error in medicine.

Appendicitis is a disease whose simplicity makes it a useful example. It is common, usually easy to diagnose and operate upon, and involves inflammation of a vestigial appendix which was thought (probably incorrectly) to be of no use to anyone except surgeons. When a patient fails to recover from appendicitis, it would be common for many, including some physicians, to equate the failure with error. Equating failure with error here, and in so many other instances, implies that we know enough of the nature of disease so that the failure to cure the patient does not tell us about appendicitis but about doctors. In this view, appendicitis becomes the constant against which to measure the performance of physicians. What makes appendicitis the constant in this equation is not the thing represented by the word *appendicitis*, but rather our knowledge of it. We act as though our knowledge truly contains the thing and contains it so completely that it can act as a benchmark for the performance. Indeed, mechanisms are currently being developed to measure quality of medical care that depend precisely on that assumption. In these programs, the actions of medical personnel, as shown by hospital or office records, in regard to certain specified diseases such as heart attacks, kidney infections, and others, will be assessed to see if certain standards have been met. These mea-

surements of quality have a certain galenical cast and may well have a galenical outcome—strictly specified "correct" treatments initially used as measures that ultimately become rules for treatment.

However, any experienced clinician is aware that both the diagnosis and treatment of appendicitis can be difficult. In the aged, the pregnant, or otherwise sick, or when underlying the case there is an uncommon microbe, parasite, or other unusual situation, things may go very badly. Indeed, on close examination, our knowledge of appendicitis is imperfect. What most of us call appendicitis—abdominal pain, tenderness, certain laboratory findings, and so forth—is not appendicitis at all. It is a symptom complex most often associated with inflammation of the appendix and useful in its diagnosis. We have no idea how often the appendix becomes inflamed and then subsides without treatment, presenting none of the features known as appendicitis. For all we know, that is a common occurrence, just as it turned out that poliomyelitis infection occurred ninety-nine times more commonly than paralytic polio. In this country, chronic appendicitis is neither an honorable nor acceptable diagnosis, whereas in Britain it is. We do not even know why appendicitis has become as uncommon as it has in a decade or two. So our knowledge of this banal little disease is very far from complete.

To act in regard to this disease, or perhaps any disease, as though our knowledge contained the thing itself is hubris. What our knowledge does contain is enough information to allow the usually successful diagnosis and sometimes successful treatment. So we must add these peculiarities of disease knowledge to the other deficiencies that arise from trying to equate categorizations of disease with true natural categories or even true, free-standing individual entities. Disease definitions, as undeniably useful as they are and have been, are essentially artificial. They represent man's inevitable drive to bring order to his perceptions by forming those perceptions into categories.

We have thus seen many things that compound our attempts to understand error in medicine. The first is the very way we have come to use the word error in a morally charged manner. We often equate error with failure, inadvertent ignorance, mistaken beliefs, wrong perceptions arising from our view of the world of

disease and the sick. We make equal these morally neutral phenomena with those where the physician is held responsible for an action causally connected to an injury, real or supposed, suffered by a patient. Earlier, I pointed out that when a patient suffers at the hands of chance, the physician, on discovering this, may feel badly for the patient or even for himself if he was the agent through which chance operated. In other words, the physician stands in subjective relationship to his patient such that, even though mistakes beyond his control have occurred, he may feel shame, guilt, sadness, or anger. While the rest of us may comfort him by pointing out that he is not to blame, his feelings are not inexplicable to us. It is in the nature of the relationship of the physician to his sick patient that for the brief period of their bond, the fate of the patient is part of the fate of the physician. Worse for the one, perhaps, but part, nonetheless, of the other. Is it any wonder, then, that physicians and patients (and thus, all of us) should in so many ways support the illusion that fate is within our control? But it is just those illusions that make it so difficult to understand error. There is yet another problem that prevents a more complete understanding of medical error in its moral, social, and thinking spheres. That problem comes from choosing this or that individual instance of disease as the conventional framework of reference from which to examine error in medicine. Such a limited frame of reference is inadequate. For one thing, diseases as we know them could conceivably be seen as entities, but they are not individuals in the Gorovitz-MacIntyre sense that salt marshes are, free standing and unique. Individuals in the sense of salt marshes or hurricanes are acted on by outside forces and act on their surroundings, but they are understandable as wholes in themselves. Comprehensible as wholes, that is, with the addition of one more element with which science deals poorly—time. The relationships within and around individuals are only understood as occurring through time.

Now if we return to our original case, what dimensions of it will stand up to definition as an individual? Not merely the man himself, because by himself, we do not know why he is in the hospital. Not as "a case of cancer of the bladder," for that does not tell us who he is, his age and the other conditions he had, such as the eccentricity to morphine, that helped set the stage for

error. It is not until we have added to those the hospital and the set of physicians and the time in which the case occurred that we have the individual entity—free standing and unique.

To put it more simply, one cannot comprehend medicine by looking at disease entities alone. Each case, whether error is present or not, is like a stage play. A setting, an audience, a disease whose story is told, and a set of actors. Only by examining that piece of theatre—medicine's individual—can one gain understanding of error—or even of cure or care.

NOTE

1. William B. Schwartz, et al., "Decision Analysis and Clinical Judgment," *American Journal of Medicine*, 55 (October 1973), pp. 459-72.