

Ethical Dilemmas in Today's Nuclear Medicine and Radiology Practice*

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Throughout history, societies have developed their own codes of ethics, including those pertaining to the practice of medicine. In the United States, physicians have adopted a set of ethics based on religious values and historical teachings. We, as physicians, have been presented several codes of ethics, including the American Medical Association Code of Ethics and the American College of Radiology Code of Ethics. Over time, we have learned to appropriately apply these codes to our daily practice. With the advent of new technologies in imaging, we may lose sight as to the transfer of these principles to reflect current conditions. Recent history has shown a trend of new technology leading to potential misuse of this technology and further leading to stricter governmental regulations. It is the purpose of this review to give guidelines for dealing with new technologies, such as PET imaging, and we describe a radiologist's ethical responsibility in a doctor–patient relationship. A historical review of medical ethics will lead to discussions about various issues affecting radiologists and nuclear physicians. To be sure, not all ethical situations are black and white, and therefore there are many gray areas. The opinions expressed in this article are those of the authors and are based on extension of already established rules of ethical conduct.

Key Words: medical ethics; PET; nuclear medicine; radiology

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May the love of my art motivate me at all times, may neither avarice or miserliness, nor thirst for glory or a great reputation engage my mind; for enemies of truth and philanthropy could easily deceive me, and make me forget my lofty aim of doing good. . . . Endow me with strength of heart and mind, to serve the rich and poor, the good and the wicked, friend and foe and that I may never see in the patient anything else but a fellow in pain. . . .

Maimonides 12th Century

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The disciplines of nuclear medicine and radiology are experiencing the most rapid evolution of change. These changes, including the rapid technologic developments, new molecular models for disease processes, and new opportunities and constraints in the economic practice of imaging, have given the radiologic community numerous areas in which the basic principles of medical ethics are being tested and challenged. Antenatal imaging has given us the opportunity to selectively perform fetal therapy. The introduction of stem cell technology has given us new opportunities to treat disease and potentially select the characteristics of our progeny. New adaptations of Stark legislation and the concept of block leasing and other ingenious means to circumvent anti-kickback laws have thrown some of the radiologic community into a different light. The numerous codes of medical ethics have not changed much, but our adherence to them appears to be waning. The practice of nuclear medicine and radiology includes imaging, patient management, therapy, and research.

In each of these areas, there are ethical issues guiding our performance and decision making. The purpose of this review is to demonstrate several scenarios in which ethical decision making plays a vital part. To understand the individual scenarios, one must be acquainted with the history of medical ethics and the basic principles underlying the various codes of ethics.

Understanding these principles will enable us to derive ethics-based solutions to common problems in the nuclear medicine or radiology practice.

HISTORY OF MEDICAL ETHICS

The first references for the admonition of physicians to heal their patients can be found in the Bible. In approximately 400 B.C., Hippocrates, the Father of Medicine, developed the Oath of Medical Ethics for physicians to follow. Among the key elements of this oath, physicians are told to honor their instructors in the medical arts, practice for healthy benefit, give no deadly medicines, abstain from mischief and corruption, and maintain confidentiality with their patients. The Jewish Talmud has numerous references

to proper behavior of physicians and the need to do whatever is within one's means to treat their patients. One would think that this oath alone should suffice in giving physicians a road map toward ethical behavior. However, as physicians began to stray from these moral codes, other more tightly ethical codes developed. Maimonides, a Jewish scholar and physician to the Sultan of Egypt, developed the Oath of Maimonides. This oath places this physician as God's emissary to heal mankind. One of the pertinent statements is cited at the beginning of this review. Other cultures and religions espoused various elements of medical ethics. For example, Buddhism, born in India over 2,540 y ago, emphasizes that the root cause of suffering lies within one's mind. To obtain freedom from suffering, one must develop the right view and practice the right action. The Sanskrit word "Shila," or ethics, means the right way of living (1). The Buddhist aim of eliminating suffering in a compassionate way coincides with the objectives of medicine, and Buddhist clergy have been involved in care of the sick for over 2,000 y (2). Buddhism's holistic beliefs parallel other branches of Indian medicine such as Ayurvedic medicine. The Muslim religion has also developed its own set of ethics based on the teachings of the Qur'an. There appears to be a division of opinion with one group, educated and more modern, accepting tenets that serve science and humanity. An opposing faction is more scholarly and knowledgeable about Islam, but less so of medical sciences. One major concept in the Qur'an is, "It is not fitting for believer, man or woman, when a matter has been decided by God and His Prophet, to have any option about the decision" (3). Islam fundamentally does not believe in prolonging life, as everyone has a predetermined life span. Whereas heroic efforts for the terminally ill are discouraged, heroic measures at the beginning of life, such as for premature babies, are encouraged (4). There is a separate Oath of a Muslim Physician that was put in place in 1977. This has several similarities to the Oath of Maimonides and mandates caring for rich or poor and people of their faith and those not. One other culture, the Chinese, has a very long history of medical ethics based on the principles of Confucianism. The core of this principle is loving people. Believers felt that practicing medicine was a means to save people by love. A physician of the Tang Dynasty, Simaio Sun, emphasized "People's lives worth more than gold." In medicine, benevolence means causing no harm to people and Confucianism required doctors to be cautious in the course of diagnosis and treatment to avoid mistakes or harm. The Canon of Medicine also forbids the medical profession from taking benefit of temptations like sex and money (5).

Although the various codes of ethics in China, India, and the Middle East have been around for quite some time, it took physicians in America a longer time to develop ethical standards.

Sir Thomas Percival published a code in the 18th century. This code of medical ethics was adopted by many American

physicians and eventually developed into the first code of ethics adopted by the American Medical Association.

The Code of Ethics was established in 1846. Particular items that pertain to the practice of nuclear medicine and radiology include: honesty, competency, duty to report fraud or deception, continued education, and consultation with other physicians. The heinous crimes against mankind perpetrated during the Holocaust resulted in the Nuremberg Code being introduced in 1947. To effectively prosecute those involved in the atrocities, a code of normal, moral behavior had to be established to be used as a benchmark. It was against this code that Nazi doctors' actions were compared. The major thrust of this code was participation in research and what proper research should consist of. Basic principles of research, such as informed consent, necessity of benefit for society, protection from injury, and qualification of investigators, were established as part of this code. The Declaration of Geneva in 1948 adopted by the World Medical Association empowered physicians to practice in accordance with the laws of humanity and to respect human life from conception. A newer version of this code was presented in 1964 as the Declaration of Helsinki. It was later revised in 2000, and key to this version was the statement that "the well-being of the human subject takes precedence of those interests of science and society." In this version, ethics committees are urged to monitor clinical research trials, and conflicts of interest are addressed. The Belmont Report was presented in 1976. This provided ethical principles and guidelines for the protection of human subjects of research. Basic ethical principles were applied to the conduct of medical research. The basic ethical principles discussed in this report were:

1. Respect for persons: This provides 2 moral requirements: the requirement to acknowledge autonomy and the requirement to protect those with diminished autonomy.
2. Beneficence: People are treated in an ethical manner by respecting their decisions, protecting them from harm, and making efforts to secure their well-being.
3. Justice: This mandates scrutiny of the selection process to ensure that there is a fair distribution over all classes and to prevent some classes, such as minorities, from being systematically selected.

Application of these principles led to the consideration of informed consent, risk-benefit assessment, and the selection of subjects for research.

The practical aspects of medical ethics should not be learned on the fly after initiating one's practice of nuclear medicine and radiology. For a host of reasons, the teaching of ethics should begin long before. Some medical schools have developed excellent programs to teach ethics. The process of learning to be ethical does not involve a list of things that one should or should not do. It is an evolution of

experiences and practical solutions that make teaching of medical ethics effective. Richard Gunderman, in his article about teaching ethics as part of the radiology residency curriculum, mentions 7 reasons for doing so (6). There is a concern that the fractionation occurring in the field of radiology will diminish common denominators between the imaging modalities. Medical ethics is one way to unify concerns of a multimodality department. The 7 major reasons are:

1. Prevention of misconduct. Nuclear physicians or radiologists are not immune to ethical pitfalls, including tampering with medical records, fraudulent billing, financial misconduct, substance abuse, and incompetence. Programs should avoid equating ethic with legal issues.
2. Explicit ethical issues such as informed consent, patient confidentiality, and informing patients directly about their imaging results.
3. Teaching ethics can help protect and promote the stature of nuclear medicine and radiology.
4. Ethics foster achievement of professional excellence.
5. Promotes sense of professional aspiration.
6. A good teacher can help trainees recognize and seek those career aspects of their careers.
7. Ethics is vital to enable trainees to situate their professional lives into their personal ones.

A. Everette James Jr. discussed several aspects of the impact of technology on the medical practice (7). The rapid advance of imaging devices has caused legislators to put restrictions on technology use. This was accomplished by the requirement for certificates of need, the introduction of diagnosis-related groups (DRGs), the physician's role as gatekeeper, and other programs to restructure the practice of medicine. Practice guidelines and outcomes evaluations were other methods designed to slow down the use of technology. As always, government agencies have reduced reimbursement for imaging procedures and most recently have slashed reimbursement for outpatient imaging procedures (7). As the level of technology increased, the need for training or retraining in the new modalities has put a strain on both teaching programs and practicing nuclear physicians and radiologists. With the new constraints placed on physicians, becoming "functionally literate" in the new areas has become difficult. In addition, at the same time, lawyers have increased their awareness of these developments and have increased their litigation resulting from errors and pitfalls of these new methods.

The American College of Radiology (ACR) has published a set of ethical guidelines for those who practice radiology specialties. For the purposes of this article, the term "radiologist" should also extend to include the nuclear medicine physician or the radiation oncologist.

CODE OF ETHICS

The 2001–2002 ACR Code of Ethics contains principles of ethics, rules of ethics, and disciplinary procedures. The following is a summary of the principles of ethics.

Principles of Ethics

The Principles of Ethics summarized below form the first part of the Code of Ethics of the ACR. Diverse ethical systems have 5 ethical categories in common: the morally imperative, the morally commendable, the morally neutral, the morally odious, and the morally proscribed (8). The principles described below serve as goals for exemplary professional conduct, hopefully placing physicians in the first 2 categories above.

1. Render service with full respect for human dignity.
2. Continual improvement in medical knowledge.
3. Be aware of limitations and seek appropriate consultations.
4. Safeguard against those physicians deficient in moral character.
5. Radiologists' responsibilities extend to society in general.
6. Radiologists may not reveal confidences entrusted to them or deficiencies in character unless to protect welfare of the individual or the community.
7. Decision to render a service by a radiologist is a matter of the individual physician and patient choice.
8. Bond between radiologists and radiation oncologists should not be used for personal advantage.

Rules of Ethics

The Rules of Ethics summarized below are the second part of the ACR Code of Ethics. These standards are required of everyone and are a directive of specific minimal standards of professional conduct.

1. Consultative opinion on radiographs or scans regardless of origin.
2. It is proper for a radiation oncologist to provide consultative opinion regarding cancer or other disorders.
3. Radiologist should be accepted as a member of the staff.
4. Referral to site of self-interest is not in the patient's best interest. Improper influence on professional judgment should make effort to restructure the ownership of the facility.
5. Mutual respect of other members of the health care team. No harassment or discrimination.
6. Whatever lawful contractual arrangements with the health care system are deemed desirable and necessary, ensure that the system of health care delivery in which they practice does not unduly influence the selection and performance of appropriate available imaging studies or therapeutic procedures.
7. No agreement that prohibits medically necessary

care or requires care at substandard levels. Radiologists should advocate cost-effective studies.

8. Should speedily respond to patients' inquiries regarding fees or financial incentive. No division of radiology fees directly or by subterfuge (block leasing).
9. Nonpartisan, scientifically correct expert testimony; no compensation dependent on outcome.
10. Research reported with integrity.
11. Should not claim as intellectual property that which is not theirs.
12. No untruthful or misleading advertising.

Disciplinary Procedures

By virtue of the adopted rules and principles, the Board of Chancellors may censure, suspend, or expel for due cause. Disciplinary process is established and defined.

John Armstrong discussed ethical conflicts in the context of the humanity versus technology conflict (9). When a patient becomes ill, he or she suffers a loss of humanity and becomes very exploitable. The duty of physicians is to honor the patient's humanity and develop a beneficent physician-patient relationship.

New technologies have taken a central role in patient care. The radiologist is an integral member of the patient's care team. The patient develops a relationship with the radiologist. The range of the relationship is from a patient who respects the radiologist, and may even remember his name, to one in which the patient is merely an abstract entity. The author presents a spectrum of 7 levels of separation between the patient and the radiologist on which we all can be found (9).

The advent of teleradiology has presented new ethical dilemmas, and new HIPA (Health Insurance Portability and Accountability Act) regulations have been developed to protect the patient's confidentiality. Ashcroft and Goddard discuss several ethical issues regarding teleradiology (10). Among these are confidentiality, security, access to a control of information, competence, the patient-physician relationship, interprofessional relationships, and clinicoradiologic meetings. Mutual commitments need to be made by both parties involved, the agency transmitting the images, and the radiologists who are interpreting them (10). Many radiologists are now performing "nighthawking" services from abroad—for example, Australia, France, or Israel. A new set of rules will probably be established to regulate such practices.

PRINCIPLES OF MEDICAL ETHICS

There are several basic principles inherent in almost every code of ethics written. The principles revolve around the patient's rights with regard to their body during illness and even during healthy times. The principles include autonomy, dignity, integrity, and vulnerability. The principles help to create a solid foundation for protection of human beings. Rendtorff states that the principles of autonomy and

integrity are seen in the framework of human rights law. The principles manifest the concern for protection of human rights in biomedicine (11).

Autonomy

By definition, the term "autonomy" means self-governing and is associated with the freedom of the individual and also wishes for his or her future life. Autonomy also implies other basic characteristics, such as rationality, individuality, independence, and moral responsibility. The term also implies the capacity for individuals to make their own decisions about his or her own life, and thus the concept of informed consent is a very vital one. Quoting the authors, "An autonomous action means 1) freedom, 2) authenticity, 3) deliberation, and 4) moral reflection." One area of conflict occurs when dealing with before-birth and after-death issues, such as organ donation. In these cases, the concept of autonomy does not apply. Similarly, incompetent patients and minors do not have autonomy in the general sense.

Human Dignity

"The principle of human dignity signifies that the human beings have a special position that places them over the natural and biological position in nature. Human beings are assigned a dignity that determines their value and position in the world." The concepts of human dignity have been key issues in both Judaism and Christianity. This devout concept of human life poses difficulties when discussing right-to-life issues. The French jurist Noëlle Lenoir stated that the aim of bioethics and biolaw is to protect what is human—that is, the human dignity in the technologic development (12).

Integrity

Integrity is closely connected with autonomy and dignity and concerns the integrity of the human person and personality. "The human body and its parts form a sphere of integrity that is supposed to be treated with special care and comprehension" (13). In this context, integrity implies the right to life and the right to decide about one's own death.

Vulnerability

This principle is considered an underlying concept in the ethical and legal debate about bioethical questions. It is a concept that is more difficult to comprehend. The French philosopher Emmanuel Levinas has described this concept as the "foundation for understanding human condition." The human being is vulnerable and must be protected when confronted with possible intervention by others (E. Kim, oral communication, June 2002).

When we think about the term "ethics" in medicine, many of us have different connotations. Recently, the significance of this term has been exemplified in articles published in weekly magazines. The thrusts of these articles concern current topics of interest—namely, human cloning and genetic research. When physicians involved in the imaging specialties are asked about ethics, many think about proper billing and behavior in the presence of a patient. Ethics in

the field of nuclear medicine extend way beyond the simpler ideas we learned in medical school. It encompasses, for example, which study we do on a patient, how we modify a study, how we conduct clinical trials, the handling of confidential information, the marketing of services, referral patterns, billing patterns, and correlative recommendations. The purpose of this article is to provide a historical perspective of medical ethics in practice and research and to identify potential conflicts in our clinical or research nuclear medicine practices.

Ethics consultations are now available in 93% of hospitals in the United States (8). It is a service offered by an individual, group, or team of consultants to help patients, family members, surrogates, or health care providers understand and discuss “value-laden issues” between physicians and patients or surrogates, between patients and surrogates, and among medical professionals. This is a problem-solving activity and not something in abstract form and is part of ongoing relationships and services of those responsible for decision making. The objectives of these consultations are to facilitate communication, mediate and negotiate conflicts, identify ethical options, provide ethical justification, recommend strategies, confirm or challenge viewpoints, interpret institutional policy, provide education resources, and assist with emotional and spiritual support. Many patients needing to make serious decisions may want spiritual support and this consultation service can help facilitate this. The goals of this “ethical consult team” are to promote ethical resolution, establish comfortable and respectable communication, help those who may have ethical uncertainties, and help institutions to recognize certain patterns of ethical problems. Although this consult approach is more geared for serious therapeutic decisions, an occasional patient may question the need for diagnostic or therapeutic procedures, especially when one of these is part of an investigative protocol. In particular, cancer patients are more prone to question the need for certain procedures and the timing of follow-up diagnostic imaging.

To reinforce integration of ethical principles into everyday practice, we present several scenarios to establish some potential issues that may arise in a nuclear medicine practice:

ETHICAL CASES

Scenario 1

You are approached by a drug company that has an investigational drug to treat osteoporosis. It is a drug that is injected daily for 1 mo. Volunteer patients with proven osteoporosis would be asked to withhold their osteoporosis medications for 6 mo during the trial. Bone mineral density (BMD) studies would be performed at various intervals. This seems like a simple trial. When we analyze this further, we see that we are asking a potential patient with a BMD 2.5 SDs below the peak bone mass, and currently improving on his or her medication, to stop taking the existing medica-

tions. By doing so, we expose the patient to the risk of the new medication, or even placebo, not working. Do we want to expose our patient to an increased risk for fracture?

Ethical Dilemma. This scenario violates the patient’s right to know the consequences and risks. It is very difficult to ask a patient to stop a medication that appears to be working. In this particular scenario, the physician hounded the patient to sign the consent. The patient was not told that discontinuing the medicine may be harmful or that he or she may receive a placebo. However, when the patient asked the doctor what his financial involvement was, he stopped bothering the patient.

Suggested Resolution. Many trials require the patient to stop taking existing medication, often before the trial begins. Studies involving emerging therapies often require no other chemotherapy to be given during the trial. For a cancer patient in whom chemotherapy was not working, the trial may be a viable option. Patients have a right to know the physician’s financial interest in a trial and, more importantly, the potential consequences of medication stoppage or placebo. Some trials simply cannot be run with concurrent medications. In these cases, an educated participant can make a decision based on his or her perception of risk versus benefit.

Scenario 2

A patient with newly diagnosed colon cancer calls your office and wants to get a PET scan before surgery. You advise her to ask her colorectal surgeon to request the study. The patient informs you that the doctor refused to order the test. Your curiosity gets to you and you call the surgeon to ask him why he didn’t want to order the scan. After getting vague comments, you ask him point blank. He admits that he is afraid to order the study because it may cause a delay in the patient’s surgery. This translates into “I may lose the case if we find extensive disease.” You have your answer. Now what do you do?

Ethical Dilemma. Unfortunately, this scenario has become increasingly more common. A patient in our medical center was denied a preoperative PET scan by the colorectal surgeon and widespread disease was noted at surgery. A postsurgical PET scan revealed numerous unresected lymph nodes. The patient is in a bind. He or she has done homework on the Internet and knows that PET is clearly useful. Another patient was denied a brain PET scan to evaluate for active tumor versus radiation changes. The neurosurgeon did not want to send the patient to a competing hospital that ran the PET scanner. During a complicated neurosurgical procedure, it was determined that there was only scar tissue. What should have been done was to call the physicians and reinforce the utility of doing PET both presurgically and during follow-up.

Suggested Resolution. When the issue of “lost surgeries” comes up, we often discuss increased confidence of the patient, significant potential cost savings, and even other possible surgical procedures, such as radiofrequency abla-

tion. We have not won this battle, and continued patient diligence will be needed. Most patients are reluctant to make a suggestion to someone held in such high esteem as their surgeon. However, the Internet has made many patients PET savvy.

Scenario 3

You have just installed your state-of-the-art PET scanner. You remember an interesting case you had seen involving an 18 y old with fever of unknown origin (FUO). A gallium scan was not contributory. A recent journal article talked about using ^{18}F -FDG PET to look for infections. You are excited. Do you call the referring physician and offer to perform a PET scan?

Ethical Dilemma. Several articles have shown the utility of PET scanning in patients with FUO. However, under the present allowable indications, this use may be considered as clinical research. The other issue is lack of reimbursement. Although the use of oncologic PET imaging has been stretched to include unusual tumors, the nuclear medicine community has not yet sanctioned ^{18}F -FDG PET for routine clinical evaluation of FUO.

Suggested Resolution. Under the physician practice-of-medicine concept, a nuclear physician would be allowed, on an individual basis, to use an approved radiotracer for a nonapproved indication. Under the guise of consultation, physicians frequently will call the referring physician to ask about changing the type of study. For example, if a diabetic with a foot ulcer were referred for a bone scan, we often would call the referring physician and ask permission to switch to a tagged white blood cell study. Similarly, one may ask the referring physician to switch from a gallium scan to an ^{18}F -FDG scan in a patient with lymphoma. Many times these decisions are based on reimbursement or lack of thereof. The patient needs to know about the potential economic consequences of insurance coverage denial if performing an out-of-indication examination.

Scenario 4

Mrs. C had a bone scan performed in your department. She had a biopsy positive for breast cancer and was sent for a bone scan. Before she leaves, Mrs. C would like a report from the radiologist. She is not due to see her doctor for 2 more weeks. What do you do?

Ethical Dilemma. This scenario is a common occurrence. As a resident, one of us was faced with a similar situation. The patient had a history of treated breast cancer and the follow-up bone scan demonstrated a solitary lesion in her lumbar spine. She demanded a report before she left the department. My attending told her she had a bone lesion that could be a metastasis and that he would call the doctor to tell him of their conversation. On the way out of the hospital, the patient dropped dead from a heart attack. The autopsy findings demonstrated Paget's disease of the spine without metastatic disease. Though this case may be the extreme, patients process result data differently than their physicians. Schreiber (14) reviewed patient preferences in

regard to disclosure of findings directly to patients. Ninety-one percent of their patients surveyed wished to have the results presented to them by the radiologist, if the results were normal. Eighty-seven percent would like the radiologist to tell them of abnormal results. Similar patient attitudes were described by Levitsky et al. (15), by Vallely and Manton Mills (16), and by Song et al. (17), who reported that radiologists are generally reluctant to convey information to patients regardless of results. One half of the radiologists surveyed believed that the patient should be referred to his or her physician to discuss the results.

Suggested Resolution. The ethical considerations are obvious. Discussing results alone with the patient does not portray the possibility of other diagnoses. The patient's physician can put the results in perspective. Giving a patient an interpretation before they leave your department can often spur the radiologist into making a hasty, erroneous reading. This should be avoided at all costs. One could tell the patient that it takes awhile to adequately review the images and correlative images. There has been at least 1 episode of a radiologist being sued for failure to divulge results to a patient. In this case, the patient had an abnormal chest radiograph as a preemployment screen in perspective with the patient's clinical findings and history. The court ruled that by not informing the patient, the radiologist caused a delay in diagnosis (18). In our institutions, physicians do not give reports directly to the patient. The patient is told that a report will be conveyed to or discussed with the referring physician and when that report can be expected. All too often, physician's offices give the patient a copy of his or her report without any discussion. This should also be avoided.

Scenario 5

You are reviewing a PET scan on a patient with colon cancer. The patient has a large intensely hot lesion in the liver, consistent with metastasis. However, the patient also had an MRI scan of the liver that was interpreted as "classic for hemangioma" according to your colleague. Most hemangiomas, in our experience, have no increased FDG metabolism. This patient had been followed with serial CT and MRI scans and the lesion was getting bigger. Several hemangiomas in other parts of the liver had no FDG uptake. How do you discuss this situation with your associate?

Ethical Dilemma. With the increased specificity of PET imaging in cancer, scenarios like this are becoming more common. Many "CT misses" are due to the technology differences between the 2 modalities or to CT "blind spots." However, PET has shown that things often thought to be normal on CT can harbor metabolically active disease. Some of our referring physicians have been disappointed with the CT scan interpretations and have started ordering the PET scan first so that directed CT scanning can be performed. Getting back to our situation, the evidence pointed toward metastasis, although occasionally hemangiomas do take up FDG. Metastasis was confirmed. It is

imperative that the discrepancy be brought to the radiologist's attention. The nuances of PET imaging are changing the way we define findings on a CT scan. If the radiologist is made aware of how PET can distinguish various abnormalities, he or she is less likely to make the same mistake again. It is important not to point a finger at a particular radiologist. It is not uncommon for PET to demonstrate focal uptake for no apparent reason.

Suggested Resolution. When notified in a polite, dignified way, the radiologist will become aware of this discrepancy and hopefully will affect future interpretations. Whether or not the radiologist amends the report has also caused some concern. One radiologist said that by doing so, he would lose the confidence of his referring physician. On the contrary, referring physicians may be impressed with surveillance and correlation of reports. It is also not uncommon for the radiologist to call to let us know that what was seen on the PET scan was a more benign process, such as atherosclerosis of a vessel. Although we routinely have the CT or MRI scans available at the time of dictation, good communication with the radiologist is imperative. We also relate confirmed findings to the radiologist as positive feedback.

Scenario 6

One occurrence that is a nuclear medicine physician's nightmare is a misadministration. For example, a patient referred for a bone scan inadvertently is injected with ^{99m}Tc -diethylenetriamine pentaacetic acid. What do you tell the patient? The doctor?

Ethical Dilemma. For some misadministrations, mandatory reporting to a state or federal agency and the referring physician is necessary. The question of whether or not to tell the patient is a difficult one. Some state laws say that if the patient's condition would be worsened by knowing of a misadministration, such disclosure may not be necessary. We have found honesty is the best policy.

Suggested Resolution. According to the book *To Err Is Human: Building a Safer Health System* (19), there are between 44,000 and 98,000 deaths per year in U.S. hospitals attributed to medical errors. Many errors, including misadministration and therapeutic errors, can be prevented by designing systems that make it hard for people to do the wrong thing and easy for people to do the right thing. For example, a workable checklist system for identifying the patient and preparing and labeling a dose would help to prevent misadministration errors. An error is defined as failure of a planned action to be completed as intended or the wrong use of a plan to achieve an aim. The goal is to reduce errors classified as preventable adverse events, those injuries by medical management rather than the disease itself.

In our case, in the very least, the patient's referring physician needs to be made aware of the misadministration. Notation should be made of any such conversation. In addition, solutions to prevent a reoccurrence should be put in place.

Scenario 7

A major equipment manufacturer wants to take you and your associates out to dinner at the next Radiological Society of North America meeting. It just so happens that your hospital is looking at the picture archiving and communication system package. Do you agree to be picked up in a limousine and be wined and dined?

Ethical Dilemma. This is a very difficult issue to tackle. Although such events occur in almost every industry, the medical profession is excessively scrutinized for conflicts of interest or other issues that may give the impression of impropriety. These issues need to be addressed on an individual basis. When a detail person delivers some samples and a pen, he is hoping you will prescribe his pharmaceutical product. Obviously, you are under no obligation to do so. In the medical imaging business, imaging equipment manufacturers will do almost anything to get their equipment into your department. Once an affirmative decision is made, that company can usually be assured of a longer-term relationship.

Suggested Resolution. Several highly visible radiologists and nuclear medicine physicians have gotten labels based on their relationships with these companies. For example, Dr. X is known as a General Electric person or Dr. Y is a Philips person. We believe that dealings with equipment companies should be at arm's length and one should avoid any perception of more than a business relationship. Attention should be paid to the individual institution's conflict of interest policies. Some have a "no gifts" policy and employees made be dismissed for violating it. There appear to be more controls in government agencies, such as state- and county-run hospitals. In addition, "consulting fees" paid to various employees make dealing at arm's distance impossible. This is especially concerning when that person has decision-making powers related to contracts and equipment purchases.

Scenario 8

You have opened your PET imaging center and have built up a nice practice. One day, a major referring physician lets you know he is no longer going to send you patients. He has signed a block lease arrangement with a new imaging center down the street.

Ethical Dilemma. Under this relationship, which is not specific to PET, a party such as an oncology group buys blocks of imaging time, usually 100 h per block. The time is paid for by a bank draft, whether or not a patient is imaged. In return, the oncology group buys the scan at wholesale and sells it back to the patient at near retail. Groups usually try to give the patient a slight discount to "legitimize" this type of arrangement. Although there is a very detailed legal structure for such entities, not all centers follow the guidelines. Ethically, this can be viewed as a glorified kickback scheme. However, under current laws related to PET imaging, these contracts are generally considered legal entities.

Suggested Resolution. The ACR Code of Ethics specifically forbids any relationship that rewards referral patterns. Those who have signed such block leasing arrangements typically do not refer Medicare patients under this arrangement. At this time, these arrangements are under scrutiny but do not seem to violate any laws. The concept was modeled after the mobile imaging services that sign contracts with hospitals. If one does enter such a relationship, it should be disclosed to the patient.

Scenario 9

You just got a call from a referring oncologist. You had read a PET scan on one of his patients. At the patient's request, he sent the scan to be read at a major academic center. You are flabbergasted when he reads you the report, which suggests that the oncologist should send all future patients to them because you aren't doing things right. Believe it or not, this actually happened. This type of self-aggrandizement should not be tolerated. Ethics does not stop when one dictates a report. The essence of medical ethics and business ethics should pervade all aspects of patient care.

Ethical Dilemma. The medical record or reports should not be used as a means of criticizing others. In this particular case, there was no error in the original dictation. A standardized uptake value of an abdominal lesion was not reported. The overreading physician used this as an opportunity to generate business for himself.

Suggested Resolution. If, indeed, there is an error in the original dictation, the physician should call the doctor reading the initial scan or the referring physician. The imaging report should not be used as a verbal battleground or marketing tool. Additional abnormalities discovered should be mentioned without stating that the other doctor erred. Remember, that whatever is written in a report, albeit an overreading, may come back to haunt you if there is any subsequent litigation.

Scenario 10

You have just purchased a new PET scanner. If you use a recommended 555-MBq (15 mCi) dose of ^{18}F -FDG, you can have your patient imaged in 45 min. However, after thinking about it, your business manager tells you that by increasing the dose to 740 MBq (20 mCi), you could cut out 2 min per bed stop or up to 15 min per patient. That would increase your throughput by at least 1 patient per day. What do you do?

Ethical Dilemma. Sadly, some centers are putting economic benefit ahead of patient safety. Although there is no doubt that a 740-MBq (20 mCi) dose is relatively safe, unnecessary radiation is being delivered to the patient. In Europe, where FDG supply is not as bountiful, scans are done with a lower dose. Some physicians forget that they are there for the benefit of the patient. Increasing dose to improve the bottom line should be viewed with disdain.

Suggested Resolution. Physicians should adhere to dose guidelines for all radiopharmaceuticals. There are vast dif-

ferences in types of PET scanners. Some, with sodium iodide crystals, require only 148-MBq (4 mCi) doses of ^{18}F -FDG. Scanners can acquire in either 2- or 3-dimensional mode, and there is much variation in the time it takes to perform a whole-body scan. PET/CT can provide the fastest throughput.

When purchasing a PET camera, one should take all of the factors into consideration. However, increasing dose to decrease scanning time is not generally acceptable.

Scenario 11

You have just purchased the latest and greatest PET/CT system. Your business manager wants to capture the costs of the CT in addition to the PET scan. You have some reservations. What do you do?

Ethical Dilemma. The advent of PET/CT had brought about several concerns. Though the technology uses state-of-the-art CT scanners, only 1 CT protocol is performed on each patient. One does not have the option of precontrast, postcontrast, or multiple-phase studies. Some centers do read and bill for a separate CT scan, when done as part of the PET scan. There have been some concerns as to whether nuclear medicine technologists can perform CT scans and vice versa. Some states have allowed cross-imaging with additional training.

Suggested Resolution. Many nuclear physicians are not certified to interpret CT scans. Therefore, a radiologist may need to be consulted to read the CT scan. Because of the incompleteness of the CT scan when compared with standard protocols, some are reluctant to bill for this study. This dilemma is in its evolutionary stage and there are no hard-and-fast rules. Perhaps, a surcharge for coregistration or CT will be developed to simplify the situation.

Conflicts of Interest

Conflicts of duty result when a physician is responsible to >1 party. For example, a radiologist has an obligation to the patient to do the right study and interpret it correctly. He or she has an obligation to the referring physician to interpret and correlate the study in a reasonable amount of time and with a high degree of accuracy. The radiologist also has a responsibility to the hospital or his partners to generate income with which to cover expenses. Generally, this "poly-loyalty" of the radiologist does not cause any problems. Problems may occur when an unethical physician is paid referral fees for sending patients to the radiologist or when the hospital does extra imaging or billing that may not be warranted. A more common example occurs when a radiologist or nuclear medicine physician is acting as an agent for a pharmaceutical company performing research involving imaging. The radiologist is beholden to the drug company to do the best imaging per protocol. He or she must also protect the patient by understanding the informed consent. Sometimes, this is difficult. For example, if we ethically related all concerns to the prospective research subject, very few would volunteer for such a protocol. We owe it to

the patient to properly inform him or her and we owe it to the drug company not to use excessive scare tactics.

CONCLUSION

Nuclear medicine physicians historically have been and are by-and-large highly ethical and patient oriented. The recent changes in technology have influenced some to “milk the system.” After many years of drought in the technology of nuclear medicine, our specialty has finally regained recognition. We have a great future, especially in regard to metabolic imaging and molecular imaging. We need to enter this new era with a set of principles that will not let us stray from the guidelines and codes of ethics described above. Hopefully, being made aware of the potential ethical breaches as described above will encourage us to make the right choices.

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