

ED Legal Letter

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Procedures for handling diagnostic errors will keep you out of court

By **Jonathan D. Lawrence, MD, JD, FACEP, FAAEM**, Emergency Physician, St. Mary Medical Center, Long Beach, CA.

Editor's note: The practice of emergency medicine is plagued with potential medicolegal pitfalls. The risk of litigation looms even after the emergency physician (EP) or nurse believes he or she has survived yet another shift. No one likes to hear the dreaded question, "Remember that patient you saw last night?" This issue of ED Legal Letter will address the patient problems that the EP may never hear about — the patient with the missed x-ray whom your partner calls to return for splinting and/or referral; the patient with the missed electrocardiogram (ECG) finding who returns for further evaluation; or the febrile patient with a missed positive blood culture. Dealing with these issues will ensure positive patient outcomes and significantly reduce malpractice liability. The risk-management strategies detailed in this month's issue should be developed in every emergency department (ED). Failure to adopt procedures to deal with these problems can have devastating consequences.

Introduction

Interpretation of x-rays and ECGs is an integral part of the everyday practice of emergency medicine. Basic training for these skills starts in medical school and continues throughout residency. Additional practice through on-the-job training adds to the EP's ability to interpret x-rays and ECGs. Our skill at performing these tasks is acknowledged by the payers of our services. We are permitted to collect professional fees for the interpretation of x-rays and ECGs. More often than not, decisions regarding patient management depend on our ability to interpret these studies promptly and accurately. Even in practice situations where the radiologists immediately read the x-rays and give "wet readings," the EP most often is left to interpret the films at night when the radiologist is safely tucked in bed. Even with the advent of teleradiology, readings still may not be available in the time frame required by emergency practice. Nevertheless, EPs are neither radiologists nor cardiologists. Occasions do arise in which there is a discrepancy between the radiologist's or cardiologist's interpretation and that of the EP. Although these are not

frequent, nor do they often lead to a change of patient care, sometimes the difference in the reading is such that a patient and his or her attorney interprets the discrepancy as the reason for a poor outcome.

This article explores the duties of the EP, radiologist, cardiologist, and hospital in making sure the discrepancies are picked up in a timely manner so that patient care will be minimally affected.

Also, in a closely related topic, cultures and laboratory tests often are ordered in the ED. The results of all cultures and selected laboratory tests will not be complete by the time the patient leaves the department. This article further explores the duties of the EP, ED, and laboratory to follow up on positive bacteriologic cultures and laboratory tests.

Sources of the Duty

The duties of the EP, ED, hospital, radiologist, cardiologist, and laboratory initially arise from the standard

of practice that has developed over time. That is to say, all the above-named professionals and organizations must conduct themselves in a reasonable way. Or put another way, what would a reasonable physician, hospital, etc., do under same or similar circumstances? Most would agree that it is reasonable for radiologists and cardiologists to act upon discrepancies they pick up between their interpretations and those of the EP. Likewise, it would be reasonably prudent for someone to take appropriate action, such as contacting the patient, informing him or her of the discrepancy, and arranging follow-up if necessary. Physicians and organizations that don't act in this reasonable way, and cause harm to the patient as a result, face the possibility of negligence liability. These "standards of care" occasionally are written, but more often are not. It takes an expert in the field to inform the judge and jury of what the standard of care is.

Another source of the duty is the Oakbrook Terrace, IL-based Joint Commission on Accreditation of Healthcare Organizations (JCAHO). Although JCAHO standards are rarely specific, broad interpretations of certain JCAHO guidelines make it clear that hospitals are expected to follow up on patient care in the ED. Specifically, JCAHO standard CC.3.1 states: "The hospital provides for coordination of care and services among health professionals and settings." The intent of the standard is explained further: "Communication and transfer of information between and among the care professionals and settings is essential to a seamless, safe, and effective process."¹ The communication of discrepancies from one practitioner to another falls squarely within this standard. JCAHO surveyors clearly want to see how the problem of discrepancies is handled.

State regulations also may play a role. In California, for example, Title 22 is interpreted by hospital surveyors as calling for the maintenance of a log of cultures taken and x-ray discrepancies detected, plus the action taken as a result.²

Finally, a body of case law has arisen as a result of litigation. This case law provides some guidance as to what juries believe the standard ought to be. While specific cases rely on specific fact patterns, case law gives attorneys and physicians alike an idea of what the courts and the public expect as the standard of care. This may not necessarily be the same as what the experts in the field believe.

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Of the three areas under discussion, x-ray discrepancies are the most common, lead to the most litigation, and have been studied more extensively than either ECG discrepancies or following up on cultures. The most common discrepancies are missed fractures, missed foreign bodies, missed infiltrates on chest films, and missed incidental findings, such as lung masses. In more practice settings, EPs are the first physicians to interpret computed tomographies (CT) and selected ultrasounds. As this practice becomes more widespread, it can be expected that discrepancies in interpretation in these two areas will become more prominent as well.

Simple long-bone fractures rarely are missed. The most commonly missed fractures (in descending order) are fractures of the lumbar spine, knee, thoracic spine, and facial bones, the latter owing to the complexity of the bony structures of the face and the considerable overlap of other bony and soft tissue shadows.³ Likewise, fractures of abnormal bones, such as in patients with osteopenia, arthritis, prior surgery with or without the presence of hardware, and those with other deformities can cause fractures to be missed. Pediatric bones also present potential problems because of the complexity posed by the epiphyses. It should be no surprise that radiologists, too, may have difficulty interpreting the radiographs in these patients. Therefore, many radiologists will want additional bone imaging techniques such as CT or nuclear scanning before they will commit to an interpretation. The missed fracture with the highest potential for monetary damages is the missed cervical spine fracture. A lifetime of care for a quadriplegic is very expensive. The question of how many views and under what circumstances they should be taken before one can “clear the C-spine” has been commented on extensively, and most recently, definitively by the NEXUS study.⁴ The presence of SCIWORA (Spinal Cord Injury Without Radiographic Abnormality) only complicates the picture if the EP reads the x-ray as normal and yet the patient develops cord symptoms.

Most EPs will not miss a retained metallic foreign body. More problematic are less radiopaque foreign bodies, such as glass, plastic, or wood. Clinical correlation is paramount when looking for foreign bodies on radiographs. It is not uncommon for the radiologist to be concerned about a foreign body noted on the x-ray,

while the clinician, knowing the site of the injury, knows the foreign body must be old, as its location is far from the current wound. Marking the site of the injury with a paper clip or other radiopaque item helps both the EP and the radiologist.

Both in litigated cases and in general, the public most often believes that radiologists are the final arbiters of radio-graphic findings. This may not be so. Many studies have investigated the accuracy of and comparisons between the x-ray interpretations of EPs and radiologists. Most studies find a high level of concordance between the interpretations of the two specialties, similar in fact to the rate of agreement between radiologists.⁵ This may not be due to the excellent training of EPs but rather that EPs interpret radiographs knowing the clinical picture, while radiologists often do not. It has been demonstrated that radiologists also improve their accuracy when provided with clinical information. A recurrent problem in many of these studies has been to define the “gold standard.” Since there often is disagreement among radiologists (approximately 9% of the time), it would not be surprising if differences of opinion arose between EPs and radiologists. Who really is right? One of the best studies on the subject found discordance between the EP and radiologist in 1% of 12,099 x-rays obtained in an ED. Of these 121 cases, the EP over-reads the film in seven cases, and under-reads the film in 57. Of the 121 cases, 76 cases were felt to require follow-up, and 20 were brought back for further studies. (Two patients were admitted without further studies.) Of the 20 with further studies, the radiologists were found to have over-read the original study in 11. After adjusting for these additional numbers, it was calculated that the EP misinterpreted the film 0.91% of the time and follow-up was required 0.38% of the time.

What can the EP do to pick up the discrepancy as quickly as possible, and how can the EP minimize the consequences of a possible miss?

With regard to possible missed fractures, the most important thing an EP can do is to immobilize an injured extremity to prevent its use prior to the “official reading” by the radiologist. This probably is intuitive, and necessary in most cases, as the patient rarely will want to cause him or herself pain or further injury. Later, if a fracture is discovered, or the radiologist requests more views, no further damage will have occurred unless the patient removes the immobilization and proceeds to be noncompliant with physician orders. Secondly, a conversation with

the patient regarding the procedure by which the x-ray is reviewed by a radiologist should take place, along with how the patient will be contacted if a discrepancy is detected. Most EDs have a description of this procedure preprinted on the standard aftercare instruction sheet. Without further injury attributable to the EP, the patient will have a difficult time convincing a jury that the missed fracture led to damages, an essential element of a negligence lawsuit.

Any system to pick up discrepancies must be composed of the following parts:

- The EP's interpretation must be made available to the radiologist.
- The radiologist's interpretation, if varying significantly from the EP's, must be relayed to the ED.
- The EP must be made aware of the discrepancy.
- The EP must have the emergency treatment chart available to correlate the discrepancy with the clinical course.
- The EP or a designee must contact or attempt to contact the patient to determine whether follow-up is necessary.
- The discrepancy and follow-up measures must be logged.
- Each of the above steps must be accomplished in a timely fashion, so that any harm to the patient is minimized.

Though obviously the method and manner by which these points are carried out will vary by institution, the following, though not an exhaustive list of the possibilities, are suggestions that have been known to be effective:

• **Making the EP's reading available to the radiologist.**

There are a variety of high-tech and low-tech solutions to this phase:

- A. The EP can write an abbreviated notation of the important findings on the x-ray requisition that accompanies the film.
- B. The same notation can be written on the x-ray jacket in which most departments keep the films.
- C. The radiology department can keep a log in the ED of all films taken. The x-ray tech has the responsibility to log the patient's name and views taken. The EP makes a notation of the reading in the log next to the patient's name and view taken. The appropriate pages of the log are taken to the radiologists for review with the films.
- D. An electronic log similar to (c) is kept on the hospital computer system. The radiologist can

access the log to see the EP's impression.

- E. The EP makes a notation of the reading on the regular chart. A clerk makes a copy of the chart to go with the films to the radiologist.
- F. If the chart is kept in electronic format, the radiologist can access the chart to find the EP's interpretation.

All of these methods must have a "fail-safe" mechanism by which the EP reading can be tracked down if no interpretation appears by whatever means selected. Someone in the radiology department must pursue the chart from the ED.

• **Relaying the discrepancy to the ED.**

If a discrepancy is found between the radiologist's and EP's interpretations, a mechanism must exist for the ED to become aware of it. The best method by far is for the radiologist to make personal contact with an EP on duty, understanding that, most often, the EP on duty is not the one who read the film. It is the most efficient way for the two departments to resolve their differences. The radiologist can show the EP the area of concern, while the EP can simultaneously pull the chart and readily determine if the difference is clinically significant and requires follow-up.

Second best is for the radiologist or someone from the radiology department to notify a charge nurse in the ED with a list of discrepancies. Adding another person between the radiologist and EP only multiplies the possibility that a discrepancy will fall through the cracks. A third way is for the same list of discrepancies to be brought to a clerk, or other nonlicensed person. For reasons stated above, this is not recommended. In addition a nonlicensed person lacks the training to recognize the significance of any discrepancy found.

• **Relaying the discrepancy to the EP.**

As already stated, the best way for the EP to be made aware of a discrepancy is for the radiologist to contact him or her directly. If a nurse or clerk is given a list, he or she must, in turn, notify the EP. This may not be as easy as it sounds in a busy ED. The main priority for any EP is the patients currently in the ED. The busier the ED, the less likely a nurse or clerk will attempt to "bother" the harried EP. Nonetheless, the temptation to delay dealing with these x-rays must be avoided, even if they're dealt with one at a time between other duties. There simply shouldn't be so many films of this sort to pose a big problem. Remembering that only about 1% of films, on average, have any discrepancy, one can calculate the average number of films, based on the census of the ED and the number

of patients receiving x-rays. If a department is seeing more than a 5% discrepancy rate, a further study of the interpretative skills of the individual physicians is in order.

- **The EP must have the chart available.**

Once the EP is aware of the x-ray discrepancy, it is imperative that the chart be reviewed in light of the new findings. Therefore, the chart must be readily available for this and other purposes for at least three days following the ED visit. Electronic chart retrieval is the ideal method, posing no limitation on the time charts are kept in the ED. The EP may find, once the chart is reviewed, that 1) the discrepancy has no clinical importance; 2) the patient has been admitted to the hospital and subsequent treaters may or may not be aware of the reading; 3) the patient has been transferred to another facility with the physicians at the other facility either aware or unaware of the findings; 4) the patient has been appropriately treated as though the EP were aware of the so-called discrepancy; 5) the finding clearly was missed; or 6) follow-up studies are necessary for equivocal findings.

Some of these discoveries require follow-up phone calls to other physicians, other hospitals, or to the patient. Some require no follow-up at all.

- **Follow-up contact with the patient.**

Clearly, if a finding was missed (such as a fracture or retained foreign body), or if follow-up studies may be required, contact must be made with the patient or the patient's representative. This is why it is so important to have a good phone number at the time of the initial visit. It is common ED lore that patients often give false information at registration for a variety of perceived reasons usually revolving around avoidance of payment or detection by authorities. Studies have shown this occurs only rarely. Most "bad" information is a result of sloppy registration.⁶⁻⁸ As a fail-safe mechanism, ED physicians and/or the discharging nurse should confirm a way of contacting the patient for follow up in all patients who have received x-rays, ECGs, cultures, or pending laboratory tests. This should be by asking for confirmation of a "best phone number," address (in case a letter or telegram is sent), or a third-party contact with an explanation of why follow-up might be necessary.

Follow-up contact with the patient can be done by the EP or by a nurse whose job description includes such calls. Obviously, an introduction is followed by an honest and straightforward explanation of the purpose of the call. With the chart in hand, the examiner

can ask some simple questions that can determine if, when, or where a follow-up visit is required. For example, a fairly common scenario is the febrile young child with a questionable infiltrate on a chest x-ray interpreted by the radiologist as positive for pneumonia, but not interpreted as such by the EP. The follow-up contact may reveal the child is no longer febrile and doing well without treatment. In such a case, no return to the ED would be necessary. The same child who still is ill will require a revisit, to the pediatrician, a clinic, or back to the ED if further questioning reveals a likely delay in follow-up care.

Editor's note: If, after questioning the parents, the EP feels comfortable doing so, an antibiotic can be prescribed over the phone. Obviously, this should be done only if the parents represent no material deterioration in the patient's condition. There always is a risk when calling in antibiotics over the phone, and EPs should err on the side of having the patient return for a re-check.

Likewise, the questionable fracture in a patient now having minimal pain and no disability requires no revisit. The discovery of a foreign body at a location remote from the present injury (presuming no missile caused the injury) also requires inquiry into prior injuries as the explanation but not necessarily a return to the ED. If the chart reveals the patient has a follow-up visit arranged with his or her own physician, and the finding is not critical, it would be acceptable to contact the private physician instead of the patient.

- **Logging the discrepancies.**

A log of all x-ray discrepancies must be kept in the ED. At a minimum, it must include the patient name, medical record number, date of visit, EP reading the film, EP or nurse doing the follow-up contact, the nature of the discrepancy, and action taken. This log is very useful for quality control. It is a powerful tool to determine if some physicians in the group miss significantly more than others when interpreting x-rays. It may identify those for whom refresher courses may prove useful. In most states, if the log is used regularly for peer review purposes, it is not discoverable in litigation.⁹ This means a plaintiff's attorney cannot obtain the log to see a particular doctor's "track record."

Since some of these cases may end up in litigation, it is also a good idea to write or dictate an addendum to the chart with a full description of the discrepancy and the action taken. As always, addenda must be clearly identified as such with proper date and time

and signature of the author. *Never* be tempted to alter the original chart. It is far easier to defend a missed x-ray finding than an accusation of fraud.

- **Timeliness.**

The entire process described above must occur within a time frame to minimize potential harm to the patient. During regular weekday working hours when a radiologist is usually present, the radiologist should be reading the films while the patient is in the ED or shortly thereafter. Discrepancies should be brought to the attention of the EP prior to the radiologist leaving for the day in those institutions where the EP interprets x-rays at all hours. X-rays that accumulate during the night or on weekends should be the first order of business for the radiologist upon his or her arrival. Institutions utilizing teleradiology with a remote group of radiologists have an obligation to be sure readings are done in a timely manner, with periodic audits to insure compliance. Large teaching hospitals with radiology residents 24 hours a day need to have additional quality control measures to be sure discrepancies between attendings and residents get to the clinicians in a timely fashion. Finally, hospital policies and procedures should be realistic. Unrealistic demands (for example, that a copy of the x-ray report will be on the chart within 12 hours) will come back to haunt the hospital if a failure to comply with its own policies and procedures leads to patient harm.

Editor's note: The following cases are developed from the personal files of the author:

Case 1: *Brauff v. Jacobs*

A 35-year-old man fell onto his left knee while jumping over a rope stretched between two posts being used to block a path in an amusement park. He was taken to the nearest hospital by ambulance and examined immediately by the EP. The documented knee exam revealed mild swelling, but minimum pain. There were no deformities. Examination of ligaments and tendons revealed no laxity or pain. Distal pulses and sensation were normal. The patient was sent for x-rays of the left knee. The EP interpreted the films as normal. A knee immobilizer was placed and the patient was put on crutches. As he was from out of state and was flying home the next day, he was instructed to not bear weight until he was seen by his own physician.

The next day the radiologist read the films. He noted

that one view showed a “probable nutrient artery,” but he couldn’t be certain there wasn’t a linear femur fracture present. This finding was not relayed to the ED or EP. Meanwhile, the patient flew home. On arrival, before he could see his own physician, the patient attempted to walk down the stairs of his home without crutches or assistance. He fell, was taken to his local ED, and a mid-shaft femur fracture was identified. He eventually recovered after a number of surgeries.

The patient sued the radiologist, the EP, and the hospital for the misdiagnosis. Even knowing the final outcome, experts could not decide whether the “nutrient artery” seen originally was actually the distal end of a femur fracture. One of the plaintiff’s contentions was that if he were informed of the possible fracture noted by the radiologist in a timely manner, he never would have attempted to walk down the stairs unassisted. He claimed the fall converted a nondisplaced fracture into a complex one that caused his prolonged recovery and continuing pain. The defendants’ position was that fracture or no, all the harm suffered by the patient was a result of his two falls. Since he was instructed not to bear weight, any additional injury was the result of his own contributory negligence.

The EP was dismissed from the suit prior to a settlement with the other defendants. Clearly, what saved the EP from having to contribute to the settlement was his decision to immobilize the knee and documentation of his instructions for the patient not to bear weight until seen by his own physician. This hospital had a breakdown of communication between the radiology department and the ED. If the possibility of fracture had been relayed to the EP by the radiologist, the EP would have had the opportunity to call the patient and advise immediate re-evaluation at a local ED or by a primary care physician prior to the second fall.

Case 2: *Anderson v. Ruloff*

A 58-year-old male executive presented to the ED complaining of one half-hour of achiness in his chest after playing racquetball. A workup for acute coronary syndrome ensued and was negative. A stress test was done the same day, which also was negative, and the patient was discharged home for outpatient follow-up with his own physician. The EP interpreted a chest x-ray taken during the workup as normal. The radiologist’s report dictated the next day noted a “suggestion of a 2-cm nodular mass in the right upper lobe. Follow-up CT scanning is recommended.” There was no

record of either the ED, EP, or patient's private physician being notified of this finding, though the official radiologist's report was attached to the ED record when transcribed two days later.

Six months later, at the patient's normal yearly check-up, an x-ray was ordered. The mass then was noted to be 4 cm in size. A workup revealed it to be a tumor with metastases. After two years of treatment with surgery and chemotherapy, the patient died. His family sued the hospital, the EP, the radiologist, and the patient's private physician for wrongful death. Plaintiffs contended that had the cancer been caught at an earlier stage, treatment more likely than not would have been curative and the patient would still be alive and working, supporting his family. Thus, damages were not only general damages (loss of the companionship of a family member), but also lost earnings. In this case, since the plaintiff was an executive with a substantial income, the lost earnings amounted to several million dollars.

The EP's defense relied on an emergency expert stating that the mass on the original x-ray interpreted by the EP was so subtle that a majority of EPs most likely would not have seen it. Put in legal terms, it was not below the standard of care for the EP to miss the mass. After depositions were taken, it became clear that the focus of plaintiff's action was against the radiologist and the hospital. Therefore, plaintiff settled with the EP for \$50,000 prior to trial where his family was awarded a multimillion-dollar judgment.

Not withstanding the fortunate outcome for the EP, an obvious breakdown in the surveillance mechanism for discrepancies occurred. Had the ED been notified of the mass within days of its discovery by the radiologist, a prompt follow-up CT would likely have been ordered, the mass better defined, a diagnosis made, and treatment started. It is highly unlikely a complaint would have been filed.

Case 3: *Ms. B v. X Medical Center*

Editor's note: *The names of the parties to this case have been changed because the case still is in litigation.*

A 58-year-old woman with a long history of debilitating arthritis, hypertension, and a prior cerebrovascular accident that left her weak on the left side presented to the ED around midnight on Saturday of a holiday weekend. She stated that she was in her motorized wheelchair when she collided with a

post, striking her left foot. She complained of pain isolated to the left foot. An examination of the foot by the EP revealed prior surgical scars, minimal swelling, no discoloration, and moderate pain.

An x-ray was taken of the foot and interpreted by the EP as showing osteopenia and surgical screws, but no fracture. The EP did not note his interpretation on the x-ray requisition, as was department policy. The patient was told there was no fracture. Her ankle and foot were immobilized with a splint, and she was discharged home with instructions not to bear weight on the foot and to see her own physician on the following Tuesday.

The radiologist came in on Sunday morning to review the films taken the previous day. He made a written notation on the x-ray film jacket of "possible fractures to the distal second and third metatarsals." He then dictated a report, which was transcribed that afternoon.

On Monday morning, while attempting to reach a box of cereal on a shelf, the patient put weight on her left foot. She testified that she felt no immediate pain, but on attempting to turn, felt such severe pain in her foot that she fell onto her outstretched left hand. She returned to the ED, where a Colles fracture was identified and treated with immobilization. She related to the orthopedist that her injuries began with the foot injury. The orthopedist called the radiologist and received the report of the "possible fractures." No other x-rays were taken of the foot, and the patient refused casting, preferring a boot immobilizer. She apparently recovered from the wrist and foot injuries without sequelae.

Meanwhile, the dictated radiologist's report made its way onto the patient's ED record seven days later. Hospital policy stated "x-ray reports shall be on patient charts within 24 hours." The ED only became aware that there was a discrepancy between the EP's and radiologist's interpretations when the patient called to complain that she was misdiagnosed. The patient sued the hospital and the two physicians, claiming that had hospital policy been followed, and had she been notified that her foot was broken, she never would have tried to bear weight on the foot, and therefore, she wouldn't have fallen and broken her wrist. The defendant's emergency medicine expert reviewed the x-rays and felt the presence of fractures was not definite, and if present, could be missed by a reasonable EP practicing within the standard of care in the community. Even the radiologist hedged, by

stating the fractures were “possible.”

This case still was in litigation at the time *ED Legal Letter* went to press. The outcome is, therefore, as yet unknown. Nevertheless, a seemingly trivial case (with minimal damages, since the patient apparently has recovered) has been made more difficult for the defense because of the breakdown of the system. First, the EP didn’t write his impression on the x-ray jacket as required by the system in place at this hospital. Second, the radiologist didn’t pull the ED record when he saw no impression written on the jacket. Third, the hospital’s own policy wasn’t met, as the report didn’t make its way onto the ED chart for seven days. It is unclear whether, if the report were on the chart, anything would have changed. If no physician reviewed the report to realize there was a discrepancy, getting the report on the chart in an hour would not have changed the result. Just knowing the hospital violated its own policy may have great influence on a jury.

On the positive side, the EP immobilized the affected extremity and instructed the patient not to bear weight if painful. The patient seems to have violated this instruction. Also, it still is not clear if the metatarsal heads truly were broken or merely severely osteopenic. Patients certainly can have pain without fractures. What actually caused the patient to fall? The jury will balance these factors.

ECG Discrepancy Monitoring

JCAHO surveyors mandate a cardiologist or other “qualified physician” review all ECGs taken in the hospital and interpreted by physicians of other specialties such as EPs. Although the process of interpretation by EPs and quality control via review by cardiologists is similar in many ways to the interpretation of x-rays, ECGs have unique properties that make discrepancy monitoring of them more difficult than with radiographs.

Although comparison of new x-rays with old is important in many instances for the radiologist, it is imperative for proper ECG interpretation in all but the absolutely normal tracings. Subtle changes in axis, bundle branch blocks, ST-segments, and T-waves may have important clinical significance. Subtle differences in x-rays rarely have such importance. If no ECGs exist in the hospital’s database, attempts should be made to obtain one from another institution or the patient’s own physician. Modern technology makes it possible to receive a faxed copy of an

ECG from anywhere in the world in a matter of minutes. In fact, the most time-consuming part will be to get the consent for release of medical information to the sending institution. If a patient is released from the ED, a copy of the ECG may be faxed, sent by mail, or hand-delivered to the patient’s physician or clinic.

Fortunately, the digital age has made recovery of older ECG tracings easier than ever. EPs need to inquire about prior tracings on all patients for whom ECGs are ordered. Computers also have led to the most obvious difference between interpreting x-rays and ECGs. A software program installed in the ECG machine interprets virtually all ECGs taken in this country. The quality of the interpretation depends on the quality of the program.¹⁰ The program interpretation is only as reliable as the instruction set downloaded by it. No physician, EP, or cardiologist should rely on the computer interpretation. It should be seen as a starting point, rather than the final word. These programs seem to have the most difficulty recognizing various paced rhythms and slow atrial fibrillation. Also, depending on the program, ischemia often is over-read in the presence of long-standing ST-segment and T-wave abnormalities.

The same principles for good communication between the emergency and radiology departments apply to cardiology as well. It may be even easier for the EP to relay his or her interpretation of the ECG to the cardiologist. Since the tracing taken in the ED with the computer interpretation physically is taken to the cardiologist, what could be easier than for the EP simply to write, “agree with computer interpretation” if that is the case? Otherwise, a short notation of the ways in which the interpretation differs is all that is required.

A significant problem for the cardiologist is to establish a comfortable threshold for deciding when a discrepancy is important enough to warrant contacting the EP. Most EPs would agree that they are contacted far more often by radiologists than by cardiologists regarding discrepancies. This is not because EPs are so much better at interpreting ECGs than radiographs; in fact, the opposite probably is true.^{11,12} It is more a question of deciding when a change is significant and requires intervention. The same studies that show EPs interpret ECGs less accurately than radiographs also show that the lack of accuracy only rarely has clinical significance.^{13,14} If and when the cardiologist contacts the EP regarding a discrepancy, the same process of

reviewing the chart, contacting the patient, and logging the incident should occur as it does with x-rays.

Case 4: *Adamian v. Glendale Memorial Hospital*

In a California case, a 70-year-old male presented to the ED on March 24, 1995, after suffering 12 hours of pleuritic left chest pain. He reported he had no significant past medical history. A physical examination performed by the EP revealed no significant findings. Cardiac enzymes were negative. An ECG taken in the ED was interpreted by the EP as showing “no acute changes.” No comparison was made with an ECG taken in the ED on Feb. 11, 1995, when the patient presented for near syncope. It couldn’t be ascertained whether the EP called for or saw the old records and ECG. The patient was discharged home with a diagnosis of pleurisy and told to see his own physician within two days. A copy of the ECG was neither sent to the patient’s physician, nor was a copy given to the patient.

The next day the patient saw his own physician and reported he was told the ECG was “normal” by the EP. Also, the next day, the cardiologist over-read the ECG. He noted some differences between the February and March tracings and in his report noted that these changes may be due to “ischemia.” No attempts were made to contact the ED, the patient, or the patient’s physician.

Three days later, the patient was admitted to the hospital with an acute inferior myocardial infarction. He died from a gastrointestinal (GI) hemorrhage and multisystem failure felt to have been caused by anticoagulation therapy. The family sued the hospital, the EP, the cardiologist, and the patient’s private doctor for wrongful death.

In his deposition, the EP explained his notation “no acute changes” was his specific reference to acute ST-segment or T-wave changes commonly associated with ischemia or acute myocardial infarction. It was not meant to imply he was comparing the February and March tracings. The expert for the defense testified the changes noted by the cardiologist were subtle at best, and that most EPs would not diagnose ischemia based on the March ECG. He had to admit, though, that a search of the hospital’s medical records for old ECGs and their comparison was required by the standard of practice.

The cardiologist, in defending his decision not to contact anyone about the changes from February to

March, stated that he, too, did not think the changes were of an acute nature.

The patient’s private physician was questioned as to why he accepted the patient’s report of a “normal ECG” without taking a look at the tracing himself.

With the potential of co-defendants pointing the finger at each other, the parties settled before trial for a nominal sum. The value of the case was diminished by the speculative nature of what could be done for this gentleman had his physicians been able to intervene at an earlier time. Since his death was from a GI bleed, it would have been problematic to further anticoagulate him. Under California law, the maximum recoverable would have been \$250,000 for general damages.

There are two lessons for the EP here: 1) Always try to compare new ECGs to old ones if there is any abnormality on the new tracing. If no old ECGs are available, state it in the record. Make reasonable attempts to get old ECGs from other institutions; and 2) Always make sure the physician following up with the patient has a copy of the ED ECG. Fax it or send it by mail.

The cardiologist had the additional burden of deciding when an abnormal ECG requires follow-up action. These criteria have never been developed fully. For, example, how much of a change in axis from one tracing to the next is significant enough to be important? What about changes in voltages? How much of a change in ST-segment depression is important?

Both cardiologists and EPs owe it to themselves to develop a mechanism to identify patients requiring follow-up contact. Cooperation between the specialties can hammer out the mechanics of the process. How does the all-important clinical information get to the cardiologist so as to make the interpretation more accurate and useful? How does the cardiologist, in turn, contact the EP and any other physicians involved in the patient’s care to arrange for follow-up?

Lab Tests and Culture Follow-Up

Certain laboratory tests are known, when drawn, to take longer to run than the expected stay of the patient in the ED. Most notably, these include endocrine studies, such as thyroid tests, cortisol levels, and hemoglobin A_{1c}, among others. These are ordered as a courtesy to other physicians, but the results often are returned to the EP.

By far, though, cultures and sensitivities from specimens of body fluids obtained in the ED are the most

common laboratory tests with delayed results. Some cultures, such as for viruses, are “send outs” with very long turnaround time, sometimes weeks. More often, though, cultures are obtained for aerobic and anaerobic bacteria. Cultures most often obtained in the ED that need follow-up are for sexually transmitted diseases (STDs); throat cultures looking for strep; blood, cerebrospinal fluid, and urine cultures on infants with fevers of unknown source; and from wounds. Most of these patients are discharged. Much has been written on the lack of necessity of many of these cultures, since the most efficient way to treat some of these infections is often empiric. Nonetheless, a positive culture demands follow-up. Cultures taken on obviously ill patients most often are reviewed by the physicians who admit them.

Culture follow-up is the simplest of the areas to handle because there is less to interpret. However, the reviewer still must be someone trained in discerning the difference between a true positive and a contaminant. For example, obtaining more than four organisms in a urine culture almost certainly indicates a contaminated specimen. Likewise, *Staphylococcus epidermidis* in a blood culture should make one suspicious for contamination. Also, only a trained individual will be knowledgeable as to what antibiotic, if any, would be most appropriate for a given culture result.

The mechanism for review is fairly straightforward. The laboratory notifies the ED of a positive culture. A nurse or physician pulls and reviews the chart to see whether the patient was put on an appropriate antibiotic. If not, the patient is contacted and a follow-up prescription or appointment is arranged, if necessary. A nice touch, if a change in prescription is necessary, is for the EP to call a pharmacy convenient to the patient with the new prescription. A frequent occurrence finds the EP calling a patient who spontaneously has improved. This especially is true for infants who receive a “septic workup” for fever of unknown source. This should not be surprising, since studies have shown a large percentage of well-appearing infants improve spontaneously with or without antibiotics.¹⁵ Indeed, 80% of cases of otitis media, the most commonly diagnosed pediatric infection treated with antibiotics, will resolve without them.^{16,17}

It is reassuring, then, for the EP to make the call and find out a child is doing well.

Breakdowns can occur anywhere in the communication chain. The laboratory may not contact the ED.

An appropriate person may not review the chart, or the patient may not be contacted for follow-up. A failure to contact the patient may have serious legal ramifications if the infection goes on to become more serious. As with all patients, be sure a good phone number for follow-up contact is obtained.

As with x-rays and ECGs, a log (often referred to as a “bug book”) must be kept on all positive cultures and the actions taken. Likewise, a notation in the chart of the follow-up call and the result of the culture is indicated.

From time to time, patients may call on their own (or be encouraged to call by ED personnel) to get culture results. While there may be little harm in this practice with regard to parents calling on behalf of their children, resist the temptation with adults. No one in the ED has any assurance that the person on the other end of the telephone is the patient. It would be inappropriate to release medical information to anyone other than the patient. This could prove to be extremely embarrassing, with potential legal liability if the subject of the culture is an STD. One way around this problem is to give the patient a unique identifying code upon discharge. This could be the patient’s medical record number, for example. Later, the ED personnel can ask the caller for the code to be reasonably assured the caller is the patient and deserves the test result. Whatever method is used, the staff must be reasonably assured the person to whom they are speaking is an appropriate recipient of the information.

In many states, the reporting to the patient of HIV test results is strictly controlled and only may be done by the physician ordering the test.¹⁸ This obviously is problematic for EPs because of their irregular schedules. Release of the result outside the limits of the law can expose the physician to disciplinary action and fines.¹⁹ For this reason, HIV testing is discouraged in the ED, unless the patient is being admitted to the hospital and the physician ordering the test will be the one to follow up with the patient in-house. Other exceptions for testing in the ED exist for the protection of police, emergency medical service, and other health care workers.²⁰

In other instances, the reporting of certain communicable diseases to the local health authorities is mandatory, regardless of the wishes of the patient. This includes most STDs, tuberculosis, and certain enteropathogens, among others. In these cases, there is liability if the physician or someone acting on his

or her behalf does *not* report the positive culture. Almost all hospitals have a nurse epidemiologist who usually assumes this function. Dealing with patients with positive cultures for STDs can be tricky at times, as the following case demonstrates.

Case 5: *Jenkins v. Chin*

A 35-year-old woman presented to the ED complaining of vaginal discharge and mild lower abdominal pain for three days. The EP performed a full exam and obtained cervical cultures for gonorrhea and chlamydia. The patient was treated with appropriate doses of ceftriaxone and doxycycline for “mild PID [pelvic inflammatory disease].”

Two days later, a man, identifying himself as the patient’s husband, called the ED requesting the results of the cultures. A clerk looked up the results and informed him that the cultures were positive for gonorrhea. As per the local reporting statute, these results also were forwarded to the local health department by the nurse epidemiologist.

One year later, the hospital and EP received a summons and complaint from the patient for invasion of privacy and emotional distress. The complaint stated that the hospital violated the patient’s privacy rights by releasing the results of the culture to her husband, thereby causing him to accuse her of infidelity, resulting in the termination of their marriage.

The hospital and EP prevailed on a motion for summary judgment. The court reasoned that although the hospital should not have released the information to the husband absent the patient’s consent, he inevitably would have found out since the health department routinely follows up on positive cultures with a survey of the source patient’s contacts. Therefore, he would have been informed of his exposure to gonorrhea and the source of that exposure. The court went on to say that the emotional distress and divorce were inevitable even absent the ED’s blunder. Thus, there was a failure to meet the standard of care, but that failure did not cause the patient’s damages.

Even though the hospital and ED dodged the bullet in this case, the lessons are clear.

The release of sensitive culture results never should have occurred as it did. First, a clerk should not be in the position to release such information. Second, no mechanism for ascertaining the identity of the caller was in place.

Summary

Every ED needs policies in place that assure that test results are reviewed so that follow-up care can be arranged if indicated. All significant x-ray and ECG discrepancies, as well as positive cultures and other laboratory tests, must be brought to the attention of the EP on duty in a timely manner. The EP then can correlate the findings with the patient record to see whether follow-up is necessary, and make the indicated arrangements with the patient and/or the patient’s physician. Failure to perform these important functions may lead to accreditation difficulties with JCAHO and subject the hospital and physicians to legal liability.

Endnotes

1. *2002 Hospital Accreditation Standards*, Joint Commission on Accreditation of Healthcare Organizations, p. 157.
2. *California Code of Regulations*, Title 22.
3. Barber F, Marx JA. Accuracy of emergency radiograph interpretation by emergency physicians. *J Emerg Med* 1984; 1(6):483.
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6. Isaacman DJ, et al. A simple intervention for improving telephone contact of patients discharged from the emergency department. *Ped Emerg Care* 1997; 13(4):256.
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11. Todd KH, et al. Effect of cardiologist ECG review on emergency department practice. *Ann Emerg Med* 1996; 27(1):16.
12. Kuhn K, et al. Quality assurance in the emergency department: Evaluation of the ECG review process. *Ann Emerg Med* 1992; 21(1):10.
13. *Id. Supra* note 11.
14. *Id. Supra* note 12.
15. Baker MD, et al. Outpatient management without antibiotics of fever in selected infants. *N Engl J Med* 1993; 329(20):1438.

CE/CME Objectives

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16. Rosenfeld RM. What to expect from medical treatment of otitis media. *Ped Infect Dis J* 1995; 14(9):731.
17. Takata GS, et al. Evidence assessment of management of acute otitis media: 1. The role of antibiotics in treatment of uncomplicated acute otitis media. *Pediatrics* 2001; 108(2):239.
18. *California Health and Safety Code*, Section 121015(b).
19. *California Health and Safety Code*, Section 120980.
20. *California Health and Safety Code*, Section 121135.

CE/CME QUESTIONS

13. Studies have shown that EPs and radiologists disagree on the interpretation of x-rays approximately:
 - A. 1% of the time.
 - B. 15% of the time.
 - C. 20% of the time.
 - D. 25% of the time.
 - E. 30% of the time.
14. Which of the following is *not* an essential component of an x-ray discrepancy surveillance mechanism?
 - A. Notation of the EP's interpretation of an x-ray is made available to the radiologist.
 - B. The ED chart is made available to the EP when notified of a discrepancy by the radiologist.
 - C. The radiologist dictates a report of the

discrepancy.

- D. ED personnel contact the patient for clinically significant discrepancies.
 - E. The discrepancy is logged.
15. What is the recommended means of getting the ED ECG to a patient's private physician?
 - A. Transmit the ECG to the private physician via facsimile.
 - B. Mail the ECG to the physician.
 - C. Hand-deliver the ECG to the physician.
 - D. All of the above
 16. Culture and sensitivity results may be released to persons calling by telephone if:
 - A. The caller requests it.
 - B. The caller provides reasonable proof of identity as the patient.
 - C. The caller identifies him or herself as a close family member.
 - D. The culture is negative.
 - E. The culture does not deal with a sexually transmitted disease.

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The final version of the recently proposed changes to the Emergency Treatment and Labor Act (EMTALA) is expected to become effective on Oct. 1.

To keep you on track, American Health Consultants offers the EMTALA: Complying with the Final Regulations audio conference, Tuesday, Nov. 12, 2002, 2:30-3:30 p.m. ET. The conference will be presented by **Charlotte S. Yeh, MD, FACEP**, and **Nancy J. Brent, RN, MS, JD**. Yeh is medical director for Medicare policy at National Heritage Insurance Co., Hingham, MA. Brent is a Chicago-based attorney, with extensive experience as a speaker on EMTALA and related health care issues.

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