

# Indications for Office Radiographs

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*Radiology is an essential part of the family physician's office practice. Like most diagnostic tools, radiographs can provide valuable information, but they also have the potential to be abused. One of the first tasks in ensuring optimal use of any procedure is to establish criteria for proper patient selection. This article is a review of general and specific indications for office radiographs on both symptomatic and asymptomatic patients based on published expert consensus and studies that have examined indications for radiographs using clinical criteria. For symptomatic patients, indications are discussed for the following radiographs: extremities (traumatic and nontraumatic), skull, abdomen, chest, orbits, sinuses, facial bones, and spine. Indications for asymptomatic patients are discussed with specific attention to lumbosacral spine and chest radiographs. When appropriate indications are followed, the physician can avoid the problem of overuse and its consequent radiation and economic burdens, as well as the problem of underuse with its risk of incomplete evaluation.*  
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**R**adiology is an integral part of the family physician's office practice. In a previous study<sup>1</sup> one of the authors (J.G.H.) found that 87% of family physicians have x-ray equipment in their offices, and that they use it to obtain 28 different types of radiographs. Approximately 90% of these x-ray studies are of the extremities (42.3%), chest (39.6%), spine (7.5%), and abdomen-pelvis (3.8%).<sup>2,3</sup> Most family physicians (73%) also believe that interpreting these radiographs is a fundamental clinical skill for the family physician, and that he or she should be capable of reading 90% of the office films without referral to a radiologist.<sup>1</sup> Furthermore, a study comparing the interpretations of family physicians with those of radiologists on the same set of office radiographs<sup>4</sup> found that family physicians were concordant with the radiologist 90% of the time, and that all of the radiographs with discordant readings were selected for referral.

A prospective study<sup>3</sup> was also done in an attempt to understand further the reasons that family physicians who read their own films refer some to a radiologist. The results showed that these physicians used a definite set of

discriminating criteria. These criteria included referral to confirm the family physician's own interpretation, to interpret equivocal findings, to provide medicolegal support, to enhance the family physician's interpretation skills, to help interpret complex films, to confirm the adequacy of treatment for a patient's problem, and to provide additional interpretation support because of the seriousness of the patient's condition.

In a descriptive study of the office practice<sup>2</sup> one of the authors (J.G.H.) found that radiographs are obtained on about 5% of all office visits. Furthermore, 90% of the office radiographs are obtained to evaluate five major ICD-9-CM diagnostic categories<sup>3</sup>: injury or poisoning (32.3%), respiratory system disease (13.3%), musculoskeletal or connective tissue disease (13.3%), infectious or parasitic disease (11.1%), and signs or symptoms and ill-defined conditions (7.0%).

Since radiographs are important diagnostic tools for many family physicians, it is appropriate to establish guidelines for their use so that they are neither overused nor underused. Overuse carries with it the hazards of excessive radiation exposure and an undue economic burden. Underuse involves the potential risk of incomplete diagnostic evaluation.

When family physicians were queried about their own reasons for obtaining radiographs in their offices,<sup>1,3</sup> their free responses clustered into five main chapters: (1) to confirm a clinical diagnosis (48.2%), (2) to establish a diagnosis that could not be made clinically (25.6%), (3) to

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screen for problems otherwise unsuspected (13.8%), (4) to follow-up on an established diagnosis (5.1%), and (5) to obtain medicolegal documentation (0.5%). These reasons are consistent with the reasons that Galen and Gambino<sup>5</sup> suggest motivate physicians to use laboratory examinations: (1) as an extension of physical diagnosis, amplifying the "physician's senses so that he can see, hear, or feel at the cellular, molecular, and atomic levels," and (2) to provide critical feedback information to the physician so that it is possible to control and correct performance.

This review examines the published literature regarding indications for those radiographs that are obtained in the office. When specific studies are available that focus on indications for radiographs based on clinical criteria, they are cited. When these data do not exist, published expert opinion is summarized. The ultimate goal of this review is to provide a set of guidelines for family physicians to use when they must make decisions about whether to obtain a radiograph to evaluate a patient's problem. The indications discussed are meant to be guidelines, not rigid protocols that must be followed. They are meant to help physicians with their daily care of patients, and they may need to be altered by the unique clinical context of certain patient encounters.

## GENERAL GUIDELINES

In their monograph *The Selection of Patients for X-ray Examinations*, Brown et al<sup>6</sup> point out that the optimal use of radiographs in patient care involves three specific activities: (1) patient selection—deciding to request a radiograph on a particular patient; (2) conduct of the examination—applying the optimal technique to obtain the requested x-ray examination; and (3) interpretation—analyzing the results of the radiographic examination. Brown and colleagues also suggest that the purposes for requesting an x-ray examination can be categorized as follows:

1. For the *symptomatic person*, radiographic information would be obtained for deciding future clinical management or evaluating previous clinical management, for legal, insurance, or employment reasons, and for satisfying the patient's (or family's) expectation of an x-ray examination or procedure.

2. For the *asymptomatic person*, radiographic information would be obtained for identifying persons suffering from a particular condition, for discovering epidemiological information, for legal, insurance, or employment purposes, and for providing a baseline for comparing future problems.

A limited number of utilization studies have analyzed the efficacy of obtaining specific radiographs for these categorical reasons. Regardless of the specific reason for obtaining the film, however, Brown et al<sup>6</sup> suggest that for the symptomatic patient two general utilization principles must undergird any decision to obtain an x-ray examination:

1. The examination must be capable of providing the information the physician desires regarding the patient's internal anatomy or physiology. In Galen and Gambino's words,<sup>5</sup> it must be the right test to "extend the senses" to the "cellular, molecular, and atomic levels."

2. The radiographic information that the physician seeks, even if negative or normal, must be expected to be useful in medically managing the patient.

These criteria are echoed by Kuhns et al<sup>7</sup> in their book *Decision Making in Imaging*. Before requesting an x-ray examination, they suggest that the physician ask two basic questions:

1. Is the examination going to affect my diagnostic certainty about the differential diagnosis I am considering, and if so, how much?

2. Will the information expected to be provided by the examination change my diagnostic thinking enough so that it will significantly affect my choice of treatment?

To these basic utilization criteria suggested by Brown et al<sup>6</sup> and Kuhns et al,<sup>7</sup> Galen and Gambino<sup>5</sup> would likely add a third: the radiographic information that the physician seeks, even if negative or normal, must provide critical feedback information that can be used to improve and enhance the physician's clinical skills. In this context, the less experienced physician will probably obtain more radiographs for evaluating clinical problems, with the frequency decreasing as his or her clinical skills mature.

In selecting asymptomatic patients for screening x-ray examinations, Brown et al<sup>6</sup> suggest that the physician consider three primary factors and five secondary factors. Primary factors include the incidence, severity, or contagiousness of the disease or condition; the detection reliability of the survey examination; and the usefulness of the information gained in controlling or treating the condition or disease. Secondary factors include time and monetary costs, characteristics of the disease in question, consequences if the condition goes undetected, radiation risk incurred from the screening, and an expected minimum yield.

These criteria for asymptomatic patients are similar to those that Frame and Carlson<sup>8-11</sup> used to evaluate the utility of any examination, including x-ray examinations, designed primarily for screening purposes useful for

health maintenance interventions. Frame and Carlson's criteria are as follows:

1. The condition must have a significant effect on the quality or duration of life.
2. Accepted methods of treatment must be available.
3. The condition must have an asymptomatic period during which detection and treatment significantly reduce morbidity or mortality.
4. Treatment in the asymptomatic phase must yield a therapeutic result superior to that obtained by delaying treatment until symptoms appear.
5. Tests that are acceptable to patients must be available at reasonable costs to detect the condition in the asymptomatic period.
6. The incidence of the condition must be sufficient to justify the cost of screening.

The American College of Radiology (ACR) in its publication *Medical Radiation: A Guide to Good Practice*<sup>12</sup> suggests that practically all radiographic examinations have the potential to provide some useful information. This belief has led some physicians to justify obtaining a radiographic examination on practically every patient. This practice, however, leads to an unconscionable ionizing radiation burden for patients as well as a huge economic burden for society. At present, therefore, the general medical consensus is that guidelines for optimal use of ionizing radiation are necessary.

In the discussion that follows, indications for specific office radiographic examinations are outlined for both symptomatic and asymptomatic patients. These indicators should not interfere with the individual physician's ability to evaluate any given patient. They are directed at improving overall utilization when they are applied by the physician in each case based on his or her best clinical judgment.

## INDICATIONS FOR RADIOGRAPHS ON SYMPTOMATIC PATIENTS

### Extremity Radiographs with Trauma

Using odds ratio analysis in a study of 864 patients, Brand and colleagues<sup>13</sup> developed a patient selection protocol for obtaining extremity radiographs following acute upper and lower extremity injury in an attempt to identify the best clinical predictors of bone injury. By combining statistical analysis with review by an expert panel, Brand et al developed a protocol that recommended x-ray examinations for any of the following indications (the first eight indications were derived from statistical analysis and the

remaining six were added by the expert panel): (1) bone deformity, (2) bone instability, (3) crepitation, (4) bone point tenderness, (5) severe swelling in an upper extremity, (6) ecchymosis in an upper extremity, (7) moderate to severe pain with weight bearing in a hip or thigh, (8) any positive knee finding, (9) abnormal examination for distal neurovascular or tendon function, (10) open wound associated with musculoskeletal injury, (11) palpable mass, (12) medical history suggesting increased risk of fracture (eg, cancer, chronic disease, Paget's disease), (13) impaired sensation (eg, from multiple sclerosis or diabetes mellitus), and (14) noncommunication (eg, unconsciousness or intoxication).

When this protocol was applied clinically to 848 patients during the protocol evaluation stage, the overall referral fraction (percentage of patients seen that were referred for an x-ray examination) was 77% (compared with 90% in the control phase), the sensitivity (percentage of positive cases identified) was 96%, and the positive yield (percentage of positives among the referral cases) was 41%. Most important, using the patient selection protocol did not result in any increased or prolonged morbidity. Strict adherence to the screening protocol would have resulted in an even further drop in referral fraction. The authors estimate that the total reduction in x-ray use for upper extremities would have dropped by 12% and for lower extremities by 19%. The financial impact of this reduction is significant. Based on 1982 costs, the authors estimated that the protocol could save between \$79 million and \$139 million annually for radiographic charges without compromising care.

### Extremity Radiographs Without Trauma

Radiographs of the extremities are also useful for evaluating a number of nontraumatic conditions. There are no published clinical criteria based on utilization research for nontraumatic extremity films. Therefore, a summation of published expert opinion<sup>14-26</sup> is relied upon to indicate that extremity radiographs can be useful in diagnosing or managing the following conditions: (1) disturbances in skeletal growth and maturation, (2) osseous dysplasia, (3) skeletal anomalies and syndromes, (4) metabolic and endocrine bone diseases (eg, osteogenesis imperfecta, Cushing's syndrome, malnutrition, osteomalacia, hyper- and hypophosphatemia, renal osteodystrophy, hyper- and hypoparathyroidism), (5) bone tumors and cysts, (6) bone metastases, (7) ischemic necrosis, (8) poisoning, (9) Paget's disease, (10) infections in bone, and (11) joint diseases (eg, the arthritides, periarticular disease, condromatous tumors, loose bodies).

## Chest Radiographs

Chest radiographs are obtained in a wide variety of clinical situations. No published studies have investigated the predictive value of either historical or physical examination data for positive findings on chest radiographs. In a prospective study of primary care office radiology that compared family physicians' interpretations with those of radiologists on the same films,<sup>4</sup> however, family physicians were asked to list the clinical findings that prompted their request for a radiographic examination on 100 consecutive office radiographs. Data from four of the participating clinics on 170 chest radiographs obtained during the study period recorded 35 clinical indications, alone or in combination, for requesting the film. These indications are summarized in Table 1 in order of predominance. Table 1 also shows the number of times a positive finding was noted on the film for each criterion that was listed as a reason for obtaining the film. As is noted, the presence of cough or positive findings on physical examination prompted almost one half of the radiographs. Further prospective study is necessary to evaluate the sensitivity, specificity, and predictive value of these clinical indicators, alone and in combination, before this preliminary list of clinical indications becomes established as a protocol to guide the radiographic examination of the chest.

In the absence of other published utilization research that attempts to identify and evaluate specific clinical findings as indications for chest radiographs, clinicians must rely on expert opinion for guidance. Freedman, discussing the role of imaging in clinical practice,<sup>18</sup> suggests that chest radiographs are best for the initial evaluation for four possible conditions: (1) pneumonia, (2) cancer, (3) metastases, and (4) congestive heart failure. He also indicates that chest radiographs can detect moderate to severe chronic obstructive lung disease, although pulmonary function tests are more sensitive and specific.

A systematic review of other published expert opinion<sup>14-23,27-34</sup> suggests that a wide range of pulmonary, cardiovascular, pleural, mediastinal, and diaphragmatic problems can be identified by the chest radiograph. This published information, however, does not indicate which clinical criteria are associated with positive radiographic findings or whether the chest radiograph is the best test for initial evaluation.

## Abdominal Radiographs

Although they provide no objective data to support their recommendations, Paul and Juhl<sup>27</sup> suggest that the plain film of the abdomen is useful if any of the following problems are considered in the differential diagnosis after clinical evaluation: (1) abnormal accumulation of gas within the gastrointestinal tract; (2) calculi or other abnor-

mal intraabdominal calcification; (3) change in size, shape, or position of the liver, spleen, and kidney; (4) free gas within the peritoneal cavity; (5) ascites; (6) intraabdominal abscess; (7) abnormal intraperitoneal masses; and (8) radiopaque foreign bodies in the gastrointestinal tract or within the peritoneal cavity.

In the *Manual of Radiographic Interpretation for General Practitioners* of the World Health Organization<sup>34</sup> it is suggested that the abdominal radiograph is seldom helpful in diagnosing chronic abdominal pain; nor will such a radiograph help to confirm a ruptured ectopic pregnancy or exclude acute appendicitis. According to the WHO manual, abdominal radiographs should be reserved for patients whose clinical presentation strongly suggests one of the following problems: (1) obstruction of the bowel, (2) a perforated gastric or duodenal ulcer, (3) renal or biliary pain, with typical colic, (4) foreign body, whether swallowed or following injury, (5) misplaced intrauterine device, and (6) in newborn infants, failure to pass meconium or persistent vomiting.

In the previously cited study of office radiographic practice by family physicians that focused on their interpretation skill,<sup>4</sup> abdominal pain was recorded most frequently as a reason for obtaining the abdominal radiograph (62%). Other listed clinical indications included chronic constipation (and encopresis) (14%), vomiting (10%), abdominal distension (10%), and fever (4%).

Two views of the abdomen are useful when trying to decide whether the bowel gas pattern is abnormal in amount or distribution. In addition to the supine film, some type of upright view must be obtained to evaluate for possible free air. If the physician is surveying for other listed problems, such as calcification, masses, questionable renal or gallbladder colic, or organomegaly, then a plain film supine view by itself is adequate in most instances.

## Skull Radiographs in Trauma

In an attempt to decrease the use of skull radiographs following trauma, after several years of study Phillips<sup>35</sup> developed an emergency skull radiograph policy consisting of 11 criteria for use in a teaching hospital's emergency department. If any of the criteria were present, a skull radiograph was requested. If none were present, consultation with a neurology resident, neurosurgery resident, or emergency department faculty physician was required before the x-ray examination could be obtained. Phillips's criteria are based on (1) history: an established history of unconsciousness, gunshot wound, or skull penetration and previous craniotomy with shunting tube in place; and (2) physical examination: skull depression palpable or identified by probe in scalp laceration, discharge from the ear, cerebral spinal fluid discharge from the nose, blood in

TABLE 1. CLINICAL INDICATIONS LISTED FOR 170 CHEST RADIOGRAPHS

Clinical Indications	Frequency Listed	Percent of All Indications	Frequency of Positive Findings	Percent of Positive Findings
Cough	82	33	26	32
Positive examination finding				
Wheeze	13			
Rales	10			
Rhonchi	6			
PPD positive	3			
Hyperpnea	2			
Heart murmur	2			
Retractions	1			
Loss of breath sounds	1			
Total	38	15	14	37
Follow-up known disease				
Pneumonia	9			
Mass	3			
Effusion	2			
Tuberculosis	2			
Chronic obstructive lung disease	2			
Cancer	2			
Interstitial change	1			
Pneumothorax	1			
Total	22	9	16	73
Sputum change	18	7	6	33
Chest pain	17	7	3	18
Fever with other symptoms	14	6	10	71
Dyspnea	13	5	7	54
Smoking with other lung symptoms	12	5	2	17
Congestive heart failure	10	4	5	50
Rule out pneumonia	8	3	2	25
Sweats, chills	5	2	2	40
Administrative request				
Peace Corps examination	2			
Preoperative routine	2			
Nursing home admission	1			
Total	5	2	0	0
Other				
Asthma	2			
Hemoptysis	2			
Cancer fear	1			
Back pain	1			
Fatigue	1			
Persistent upper respiratory tract infection	1			
Total	8	3	0	0

TABLE 2. MANAGEMENT STRATEGY FOR RADIOGRAPHIC IMAGING IN HEAD TRAUMA

Risk Category	Signs and Symptoms	Management
Low-risk group	Asymptomatic Headache Dizziness Scalp hematoma Scalp laceration Scalp contusion or abrasion	Observation alone, watching for signs of high- or moderate-risk group. Discharge to reliable environment with written instructions
Moderate-risk group	History of change of consciousness at time of injury or subsequently History of progressive headache Alcohol or drug ingestion Unreliable or inadequate history of injury Suspected physical child abuse Age <2 years unless injury very trivial Multiple trauma Serious facial injury Possible skull penetration or depression Signs of basilar fracture Vomiting Posttraumatic amnesia Posttraumatic seizure	Extended close observation watching for signs of high-risk group. May require neurosurgery consultation. Candidate for plain skull radiography or CT examination
High-risk group	Depressed level of consciousness not clearly due to alcohol, drugs, or other cause after exclusion of metabolic and seizure disorders Focal neurologic signs Decreasing level of consciousness Penetrating skull injury or palpable depression	Neurosurgery consultation. Candidate for CT examination

the middle ear cavity, Battle's sign, racoon's eyes, presence of coma or stupor (not related to alcohol ingestion), or focal neurologic signs.

During the 3-year study that evaluated this protocol, the use of skull radiographs from the emergency department dropped by 40%. Phillips estimated that if the criteria had been rigidly followed, the rate would have dropped even further, to 25% of the prestudy rate, with an examination yield approximating 10%.

In the office setting, very few patients will present with any of Phillips's criteria. Most of the time the plain skull film examination (unless there is significant associated facial injury) has a very low yield. In practically every case for which a skull radiograph would be considered in the moderate or high-risk group, a computerized tomography (CT) scan or a magnetic resonance imaging (MRI) study will be needed for a definitive evaluation. For significant head injury, a plain film lateral view of the cranio-cervical area and facial bones is indicated, but skull films are of limited usefulness.

The ACR's *Guide to Good Practice*<sup>12</sup> suggests the man-

agement strategy for radiographic imaging in head trauma that is summarized in Table 2. According to this protocol, unless the patient falls into a moderate- or high-risk group, there is no indication for plain skull films. Even then, the decisions regarding treatment will almost always be based on clinical findings in conjunction with CT evaluation. The skull film will seldom, if ever, stand alone in the decision algorithm for managing head trauma.

### Skull Radiographs without Trauma

A careful clinical examination is necessary before skull radiographs are obtained. The findings from the examination will help the physician to obtain the correct views and to establish the proper correlation between clinical and radiographic findings. The skull is very difficult to interpret radiographically. Radiographs can help to evaluate problems but cannot supplant clinical judgment. The non-traumatic indications for a skull x-ray examination are relatively few.<sup>34</sup> If a local bulge (or dent) is found in the skull, radiographs may help in the diagnosis as long as the

bulge is clinically fixed rather than mobile. If the bulge is soft, a radiograph of that area will help to exclude an underlying skull defect caused by such problems as an infection or tumor. A skull radiograph may also help to evaluate a patient with persistent headache who has positive clinical signs, such as a neurological abnormality, elevated intracranial pressure (on funduscopic examination), or blindness. A lateral view of the skull may help to establish the diagnosis in patients with metastases or generalized bone diseases such as Paget's disease.

Although there are a number of conditions for which radiographs of the skull may be helpful in defining the nature and extent of the condition, the findings on the plain skull films for these conditions are mostly of incidental academic interest and do not add significantly to definitive diagnosis or treatment. Those conditions that might display plain film findings include abnormal intracranial calcifications related to such problems as unrecognized subdural or intracerebral hematoma, parasitic lesions, vascular lesions (eg, calcified arteriosclerotic plaques, aneurysms, arteriovenous malformations, capillary and venous angiomas), tuberous sclerosis, inflammatory lesions (eg, toxoplasmosis, tuberculoma, cytomegalic inclusion disease), degenerative lesions, and calcifications in neoplasms; and intracranial tumors.

In evaluating the nontraumatized but still symptomatic patient (eg, certain visual complaints or findings, neurologic findings, endocrine changes), a plain skull study may give some direction. Here again, however, the workup most often requires additional imaging (CT, MRI, angiography) for the definitive answer.

### Orbit and Eye

Radiographic examination of the orbit and eyes is indicated for the following purposes<sup>19,23,27,34</sup>: (1) detecting or localizing foreign bodies, (2) detecting the presence of a tumor in the orbit, (3) determining the effect of any tumor on the bony orbital wall, (4) determining a tumor or a disease of the optic nerve, and (5) evaluating orbital trauma.

The last indication is likely the most useful application for plain films of the orbit and eye in the office setting. Most of the other indications will require study by special imaging techniques such as CT, MRI, or special tomography when that technology is available to the family physician.

### Sinus Radiographs

Radiographs of the sinuses may help to evaluate inflammatory diseases (acute and chronic), cysts and tumors, and fractures. Usually just a Water's view of the sinuses

and a lateral projection are sufficient for office assessment. The major clinical indications for obtaining radiographs of the sinuses include local pain, swelling, trauma, and foul nasal discharge.<sup>34</sup>

In the previously cited study of office practice that focused on the family physician's interpretation skill,<sup>4</sup> the most common reasons given by these physicians for obtaining a sinus film were typical facial pain (57%), purulent nasal discharge (19%), headache (14%), and nasal congestion (10%).

### Facial Bones

Radiographic examination of the facial bones is mainly useful for evaluating the following problems<sup>19,23,27,34</sup>: fractures in patients with head and facial trauma, inflammatory diseases, and tumor; its major usefulness is limited to the first indication.

Usually, if there is sufficient head or facial trauma to warrant radiographs (except for simple nasal fractures), the patient will most often bypass the office and be evaluated in a hospital imaging center with plain films, tomograms (Panorex views), CT, or MRI.

### Spine

Based on a review of published expert opinion, in the absence of specific utilization studies,<sup>14-20, 24-26,27,36</sup> radiographs of the spine in the symptomatic patient may be helpful in evaluating such problems as spinal injuries, disc herniation, degenerative diseases, and congenital anomalies.

## INDICATIONS FOR RADIOGRAPHS ON ASYMPTOMATIC PATIENTS

### Lumbosacral Spine

Screening lumbosacral spine examinations prior to employment in jobs requiring heavy labor or strenuous activity have been performed in the past for three main reasons: (1) to provide a baseline against which later indications of lumbar disability could be compared, (2) to identify factors that could be used to predict the risk of subsequent lumbar disability, and (3) to identify persons with existing back abnormalities.

A number of studies have been done to evaluate the efficacy of these indications. To date most evidence indicates that finding a developmental lumbar abnormality is not useful in predicting an increased incidence of low back injury or disability. In 1979, as the result of these studies, the American Occupational Medical Association<sup>37</sup> recom-

mended that "lumbar spine x-ray examination should not be used as a routine screening procedure for back problems, but rather as a special diagnostic procedure available to the physician on appropriate indications for study." The ACR takes a similar stance in its policy statement regarding low back x-ray examinations in the *Guide to Good Practice*.<sup>12</sup>

### Chest Radiographs

The chest radiograph as a screening tool has primarily been used to screen for tuberculosis and carcinoma. In most areas of the United States the prevalence of tuberculosis is so low that chest x-ray screening programs are unproductive. Likewise, the chest radiograph as a screening tool for lung cancer has not decreased the morbidity and mortality from that disease. Chest radiographs are therefore not recommended for screening asymptomatic persons.<sup>38-42</sup>

This trend away from, or the outright recommendation against, obtaining routine chest radiographs also applies to prenatal care, hospital admissions, preemployment examinations, job exposure surveillance, follow-up of tuberculin reactors, and follow-up of patients after tuberculosis therapy is completed.<sup>12</sup> There are many considerations, however, that immediately move the patient from the routine category into specific indications. These considerations include diagnostic suspicion of any of the problem categories involving the lung, mediastinum, or thorax that were listed above for symptomatic patients.

There are also broad categories for which it seems prudent to obtain at least one baseline or initial chest film in populations with a higher incidence of chest diseases, such as Southeast Asian immigrants, for example. The same may also become true in the future for patients with acquired immune deficiency syndrome.

### Other Screening Radiographs

In Frame's updated "Critical Review of Adult Health Maintenance,"<sup>38-41</sup> no radiographs are recommended as screening tools in the medical evaluation of the asymptomatic individual. The *Guide to Clinical Preventive Services* of the U.S. Preventive Services Task Force<sup>42</sup> likewise does not recommend any x-ray examination for screening those who are asymptomatic.

### SUMMARY

Radiography is an important diagnostic tool for evaluating patient problems in the family physician's office. Like most tools, however, it can be misused by applying it too

often, not enough, or for the wrong indications. Before selecting a radiograph to evaluate a clinical problem, the physician should ask three basic questions: (1) Is this the right (best) diagnostic test (procedure) to give me the information I need? (2) How will I use the information I obtain from this radiograph clinically to manage the patient? (3) How will the information I obtain from this radiograph give me feedback on my diagnostic ability and improve my clinical skills? If these three questions can be answered positively, then the x-ray examination has value, and the radiation and financial risk are likely justified. This review provides information to family physicians that will help them answer these questions. In spite of this help, however, clinical situations are bound to arise when the answers may be difficult or unknown. In such cases, consultation with a radiologist is advised to determine whether an imaging study is useful for clinical diagnosis or management, and which study is most valuable.

For many radiographs, however, these guidelines cannot be considered absolute. During the process of this review, the author was surprised to find that for many types of radiographs (eg, chest, abdomen, spine), good utilization studies on symptomatic patients have not been done, and one must rely on the collective wisdom of putative experts for assistance with appropriate indications for radiograph application. Testing the wisdom of the experts and studying the predictive value of clinical findings (history and physical examination) as indicators for common office radiographs are fertile fields for primary care research that is both clinically and economically timely.

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