

Q.A. Collectible

*Sponsored by CRCPD's Committee on Quality Assurance
in Diagnostic Radiology (H-7)*

Checklist Guide for Quality PA Chest Radiographs

CORRECT EXPOSURE & IMAGE RECORDING FACTORS

A. Controlled Film Densities:

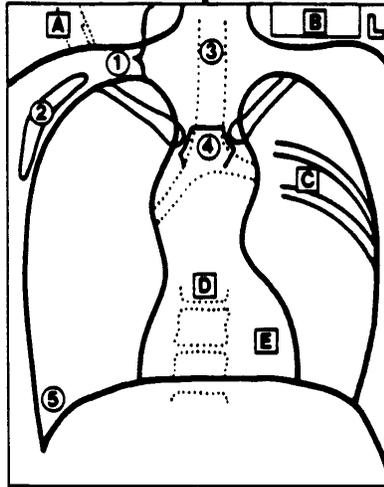
The radiograph should be properly exposed and fully developed. Here is a simple test. Place your finger between the film and the viewbox and in the area of the radiograph above the patient's shoulder. The x-rays directly hit this area and it should be completely black. If you can see your finger through the film:

- The exposure was too light, or more likely,
- The exposure was too high and the film was pulled from the developing tank too quickly to compensate for overexposure, or the processor is not adjusted to give optimal development.

B. Positive Patient Identification: A beautiful film is valueless without proper identification. This also includes correct markers. Don't depend on anatomical markings to verify true right and left side of the patient. Although rare, Visceral-inversa or Dextrocardia could cause the image to be read backwards (through the wrong side of the film).

C. Proper X-ray Imagery: A chest x-ray is intended to display hilar lung and bronchus markings and other tissue detail, but is not meant to show ribs or other boney details. Optimally the ribs will be projected to be almost transparent in appearance by the use of high kVp techniques.

D. Proper X-ray Penetration: An underpenetrated chest film would show a mediastinum that was clear and without information. A properly penetrated exposure is one that just faintly shows the intervertebral disk spaces right above the diaphragm.



E. Cardiac Shadow: Determining heart position, shape and size is one of the most important reasons for a PA chest x-ray. A fast exposure time (0.1 Sec) is used to avoid motion blur. The 72" focal distance is used so that heart-dimensions can be accurately measured without distortion. The heart should not appear as a silhouette but with varying density detected through the organ.

Note: The most common cause of repeat studies is exposure error and subsequent development failures. A

technique chart should be used to provide the proper selection of kVp and mAs for the patient, which will allow full development at the recommended time and temperature. The next most frequent problem is the absence of patient measurement or improper patient measurement. The rule is to measure the thickest portion of the patient's chest cavity.

CORRECT PATIENT POSITIONING

1. Film at Proper Height to Patient: If the cassette is routinely fixed under the patient's chin, often the lungs project to the top of the film, leaving much expanse under the diaphragm. On elderly patients, especially with kyphosis of the spine, the apex of the lungs may actually be off the top of the film. **Note:** Allow the top of the film to be about three fingers width higher than the patient's shoulders and don't be afraid to put the cassette top directly under the patient's nose.

2. Scapulas Out of Lung Fields: This is one of the best steps to assure proper projection of the lung field.

- Place the back of the patient's hands along side of the thighs, so that they are above the hips, but below the belt line.

- Have patient's thumbs rotate out pointing away from the body. This creates tension in the shoulders when the elbows are rolled forward.
 - Remind the patient not to hunch their shoulders when taking their "deep breath"-- this would only make the clavicals form a V, obscuring the hilar lung fields. (See diagram)
3. **Holding a Full Breath:** If two films were taken, one of full inflated and another with deflated lungs, these films would not appear to be the same patient! The diaphragm, with full inflation, should be fully descended to reveal all of the lungs with their subtle densities. Look for the gray region of air held in the trachea. On some films you may even detect the bronchial bifurcation. **Note:** A foreign body is more likely to be inhaled into the patient's lower right lobe.
4. **True PA Projection:** Patients are frequently left in a slightly turned position. Check to see if the sternoclavicular articulations are symmetrical on both sides of the spine. This is proof of a true PA. The best evidence is to watch where the patients place their feet. If they do not point straight toward the chest board, it is almost certain that the body is rotated to one side. Use the squares in floor tile or place colored tape on the floor to guide the feet and assure that the toes of each foot are an equal distance away from the chest board wall. It also helps to permit the patient to lean on the plate, which eliminates distortions and steadies the patient.
5. **Patient Centered to Film:** The width of most patients will fit in 14". Chest exams are always desirable in the upright position. Fluid levels would result in a detectable "blunting" of the costophrenic angles of the lower lung margins and the outer border of the diaphragm. This is of real clinical significance. A common occurrence is to have the patient positioned off to one side and one of the costophrenic corners is then off the edge of the film. When you encounter large patients, their diaphragms might be high enough to permit you to place the film cross-wise on the chest board and include all the lung fields. **Note:** Place the cassette so that the lead blocker for ID is up and only in the shoulder areas.

SUGGESTED METHOD OF PATIENT MEASUREMENT FOR PA CHEST X-RAY:

- Place back of caliper behind the patient and at the lowest level of the scapula.
- Slide in the movable bar to make contact with the patient's front rib cage approximately 1 1/2" below the nipple.
- Read the cm. thickness with the patient in full inspiration.

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