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Technical Factor Selection/Chart

Technique charts are guides for providing the exposure factors needed to produce an image that meets the given standards of a radiology department. They are formulated so that predetermined contrast and density ranges can be consistently produced by all operators on a given piece of radiographic equipment, to ensure the maintenance of good image quality.

The selection of a combination of technical factors to produce an optimal radiograph is a complex art. In 1940 Harold G. Petsing made the following statement, "One of the problems coincident with the art of radiography has been the search for satisfactory and practical methods of selecting and recording desirable techniques for different anatomical regions." This is still true today.

A technique chart that works is based on the presumption that the x-ray units are calibrated regularly and that automatic processors are maintained according to manufacturers' recommendations. The selection of technical factors and the screen film combinations used can influence the amount of radiation received by patient and operator. One must be aware of how to lower dosage and still produce a quality radiographic image. A technique chart is not intended to be used from x-ray room to x-ray room. Even with identical equipment, a variation in calibration may affect techniques.

IMPORTANT: Every radiographic unit must have its own technique chart.

While the type of technique chart to be used is based on the preference of the interpreter, the quality of the image can be influenced by technical factors under the control of the operator. There are several types of technique charts: There are fixed mAs, variable kVp charts; fixed kVp, variable mAs charts; Automatic exposure device charts; slide rule format; and computer software programs. When used properly each of these is a viable technique chart. Each has their own properties and depends on what type one wants to use for the consistency of the image quality.

Some operators are reluctant to measure the part under study and prefer a "favorite" or "rule of thumb" for the measurement. The categorizing of patients as to body size, shape, and tissue density can be difficult if a patient is seen covered with a sheet, lying down, with plaster or mechanical splints, etc. Technique charts cannot always be followed precisely. They should not be thought of as prescription or cure-all for technical problems. A standardized technique chart does not take into consideration the nature of patient's pathology or physical conditions. A patient may be muscular, obese, or pregnant or have a disease condition that changes the body

size, shape or tissue density. The tissue types, age and size of the patient must be considered when selecting the following technical factors:

- Milliamperage determines the quantity of the x-ray to be used for a specific technique and can be described as the current flowing through the x-ray tube. The mA stations must be constantly monitored for mA linearity.
- Exposure time is the length of the exposure and when combined with the milliampere value are the major controlling factors of radiographic density.
- Kilovoltage determines the quality of the x-ray beam and influences the amount of scatter generated. As the wavelength of the beam decreases, the penetration effect increases. Kilovoltage controls radiographic contrast.

Example of fixed mAs chart

Part and view	CM	mAs	kVp
Chest/ PA	22	10	100

Example of variable mAs chart: (changing the time)

Part and view	CM	mA	Time	kVp
Chest/ PA	22	300	1/30	100

Example of variable kV chart: (changing the kVp based on CM measurement)

Part and view	CM	mA	Time	kVp
Chest/PA	22	300	1/60	100
Chest/PA	24	300	1/60	108

Example of automatic exposure chart:

Part and view	Sensor	kVp
Chest/PA	2 lung area + middle sensor	Manufacturer recommendation

Example of dental intraoral chart:

Part	mA	kVp	Time
Adult Bitewing	7	70	20 impulses
Pediatric Bitewing	7	70	10 impulses

Example of dental extraoral chart:

Part	mA	kVp
Adult panoramic	10	90
Pediatric Panoramic	10	70

Example of digital chart:

Part	Manufacturer's number range
Chest /PA	SI 100-200 example