

## What's NEXT?

The U.S. Food and Drug Administration Center for Devices and Radiological Health (CDRH) collaborates with the Conference of Radiation Control Program Directors (CRCPD) in a unique federal-state partnership to characterize the radiation doses patients receive and to document the state of the practice of diagnostic radiology. Each year the Nationwide Evaluation of X-ray Trends (NEXT) survey program selects a particular radiological examination for study and captures radiation exposure data from a nationally representative sample of U.S. clinical facilities. In 2001 a survey of facilities that perform **adult chest radiography** was conducted, capturing data on patient exposure, clinical technique factors, radiographic image quality, darkroom integrity, and the quality of film processing. An important survey design consideration was whether significant differences would be observed between the new digital-based imaging technologies and the established screen-film practice. Thereupon the 2001 survey included a significant number of responses from facilities using digital-based technologies.

Facilities are randomly selected, and the surveys are performed by personnel from the participating states' radiation control agencies. **Patient exposure data** is captured utilizing clinically validated phantoms representing a standard reference patient. This standard NEXT adult patient stands 172 cm (5 ft, 8 in) in height, and weighs 74.5 kg (164 lbs) with an approximately 23 cm chest and abdomen. Elements reported from a NEXT survey include radiographic equipment information, facility exam work load, film and screen data, radiographic technique factors, beam quality, entrance skin air kerma, darkroom fog levels, and the quality of film processing. Further information on NEXT surveys is available from the CRCPD ([www.crcpd.org](http://www.crcpd.org)) or from the Food and Drug Administration (301-796-5710).

*The information contained herein is for guidance. The implementation and use of the information and recommendations are at the discretion of the user. The mention of commercial products, their sources, or their use in connection with material reported is not to be construed as either an actual or implied endorsement by CRCPD or CDRH.*

## SURVEY RESULTS FOR YOUR FACILITY

The chart below and accompanying survey results of the 2001 NEXT survey can be used to compare your facility's practice with that of the US-representative survey sample for the **adult chest PA exam**. These survey results are NOT recommended performance levels, but rather are statistical indicators of the state of practice nationwide for this exam/projection at the time of survey. NOTE: Certain survey outcomes require the use of the NEXT adult chest phantom.

For a routine adult PA Chest exam:

	Your Result	Survey Median
Clinical kVp		110
Exposure Time (ms)		12
HVL @ Clinical kVp		4.2
Skin-entrance Air Kerma (mGy)		0.11
Image Quality:		
Phantom Film Background Optical Density		1.69
# Meshes Visible (spatial resolution indicator)		5
# Holes Visible (low contrast indicator)		5
Darkroom Fog (optical density)		0.04
Film Processing Speed*		101

\*Film processing quality was evaluated by the Sensitometric Technique for the Evaluation of Processing. Range of acceptable values for processing speed are:

Standard cycle: 80-120  
Extended cycle: 100-150

# Nationwide Evaluation of X-Ray Trends

## 2001 Adult Chest Radiography



Conference of Radiation  
Control Program Directors  
and

The Center for Devices and  
Radiological Health

U.S. DEPARTMENT OF HEALTH  
AND HUMAN SERVICES  
Public Health Service  
Food and Drug Administration

## Facility Practice, Technique Factors, and Patient Exposure

	Mean	25 <sup>th</sup>	Median	75 <sup>th</sup>
Entrance Skin Air Kerma (mGy) <sup>†</sup>	0.12	0.08	0.11	0.15
Air Kerma (mGy) <sup>†</sup>	All Random Facilities <sup>‡</sup>	0.12	0.11	0.15
	Screen-Film	0.12	0.08	0.11
	Digital (CR & DR)	0.16	0.09	0.13
Clinical Selected kVp	107	100	110	120
Exposure Time (ms)	23	7	12	28
Facility Weekly Patient Workload (Hosp/Priv Prac)	256/42	100/10	190/20	300/50
Phantom Film Optical Density	1.70	1.38	1.69	2.03
Number of Low Contrast Holes Visible	4.7	4	5	5
Number of High Contrast Meshes Visible	4.8	4	5	5

<sup>†</sup>To convert air kerma(mGy) to exposure(mR) DIVIDE air kerma by 0.00876 mGy/mR

<sup>‡</sup>Statistics for random facilities does not include contributions from facilities specifically identified for survey based on their use of digital-based x-ray equipment.

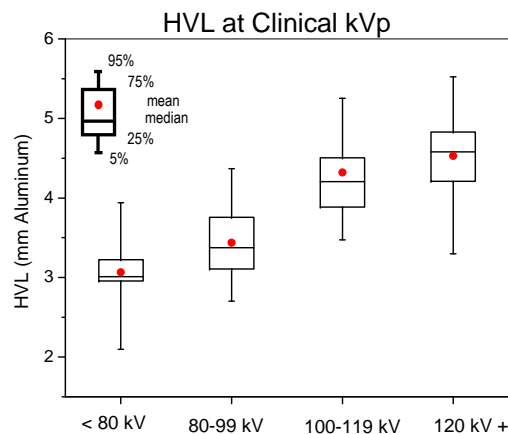
% of Facilities Using Grids	91.3
% of Facilities Using Automatic Exposure Technique	54.0
% of Facilities with Technique Chart Available	95.3

### Film Processing and Darkroom Fog

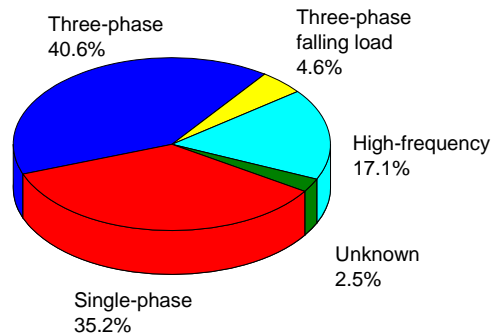
Processing Speed- STEP test (mean)	102
% Facilities Under-Processing (speed < 80)	7.0
% Facilities with: Darkroom Fog ≤ 0.05	58.5
Darkroom Fog ≤ 0.10	76.6

#### Notes

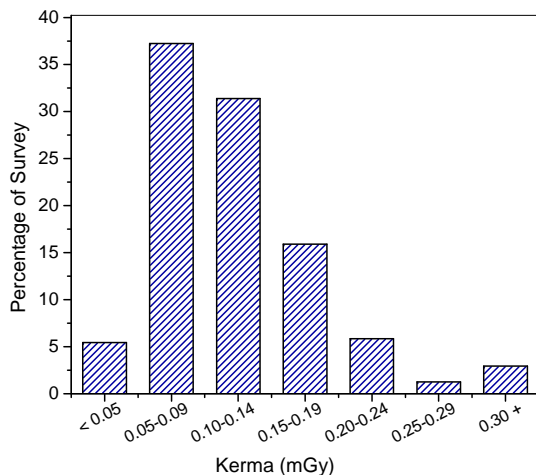
- Unless indicated otherwise, all tabulations and graphs are derived from the random sample population of surveyed sites.
- Phantom film optical density is background optical density from radiograph of the NEXT adult chest phantom.
- Mesh and hole image quality indicators require the use of the NEXT adult chest phantom and radiographic test tool.
- For valid comparison, film processing speed determination (STEP) should only be performed with equipment traceable to FDA references. For detailed description of the processor speed evaluation (STEP) refer to: *Suleiman OH, Rueter FG, Antonsen RG, Conway BJ, Slayton RJ. The Sensitometric Technique for the Evaluation of Processing (STEP). Radiation Protection Dosimetry Vol. 49, Nos 1/3, pp 105-106 (1993)*
- Darkroom fog is net optical density present after two-minute exposure.
- The complete 2001 NEXT survey protocol for adult chest radiography is available at the CRCPD website, [www.crcpd.org](http://www.crcpd.org).



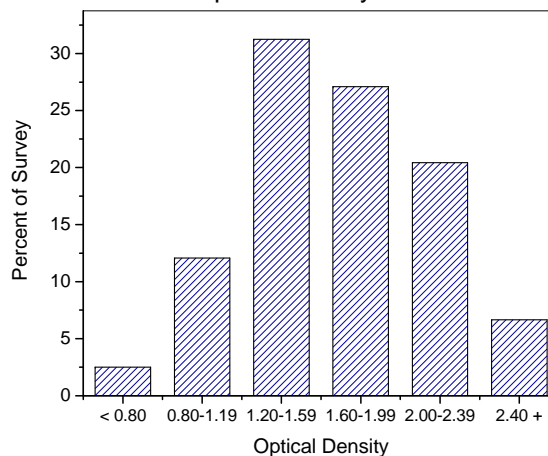
### Type of X-ray Equipment Surveyed



### Entrance Skin Air Kerma



### Phantom Film Background Optical Density



### Film Processor Speed

