



## FORENSIC RADIOGRAPHY SURVEY

**A Survey Conducted by  
The American Society of Radiologic Technologists**

**November, 2008**

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## Executive Summary

On August 27, 2008, ASRT sent an invitation to participate in the ASRT Forensic Radiography Survey to all 720 National Association of Medical Examiners (NAME) members. As of September 25, 2008, a total of 77 responses had been received, yielding an 11% response rate. This rate resulted in an overall percentage confidence interval at the 95% level of about  $\pm 10\%$  for any response percentage to a question in the 40-60% range and  $\pm 6\%$  in the 70-90% range. With this response rate, one must take into consideration that there may be a response bias toward medical examiners that saw the survey invitation and responded because they were aware of the policies and equipment in their lab.

Detailed tables and charts of percentages and frequencies for each question, as well as cross-tabulations of various questions, are provided in the body of this report. The verbatim responses to questions appear in Appendix A.

### Basic Frequencies and Descriptive Statistics

- Almost three-fourths (71.4%) of the respondents indicated their job title as medical examiner, with the remaining quarter selecting the “other” option. After further analysis 11.7% of these respondents were coded as pathologist and 7.8% as coroners, leaving the remaining 9.1% as “others.”
- The majority (68.9%) of respondents also indicated that their primary workplace is located at an office of medical examiners with approximately 10% working out of a coroner’s office and a combined 19.3% of respondents working at a private office, university or hospital.
- NAME members were asked if radiographic equipment is used at their facility. An overwhelming majority (88.3%) of respondents indicated that images were produced at their facility. Of those who responded “no” (11.7%), 100% specified upon further questioning that radiographic equipment is available at an off-site location.
- Respondents were asked to indicate the type of radiographic equipment that is available for their use either at their facility or at an off-site location. Of the equipment presented a fixed radiographic room with film and wet processor was the most accessible. Of those with this type of equipment, 70.5% of the respondents stated that they have access at their facility, 6.6% at an off-site location and less than a quarter (23.0%) have no access to fixed radiographic equipment. Ultrasound equipment was the least accessible to respondents; only a combined 25.4% have access to this equipment at their facility or at an off-site location. Almost three-fourths (74.5%) indicated they do not have any access to ultrasound equipment.
- More than one-half (64%) of respondents indicated that less than 25% of their cases require imaging, and only 5.3% of respondents indicated that more than 75% of the cases require imaging. Using a semi-quantitative variable resulted in a mean percentage of 24.69% cases requiring imaging, a median of 19.53%.

- Homicides, suicides, decomposed bodies, infant deaths, penetrating traumas, burn victims and unidentified bodies were listed as cases that required imaging. Homicides and infant deaths were indicated by almost all respondents, at 93 % and 92% respectively.
- Respondents were asked to specify who was responsible for performing radiography at their facility and 44% indicated that a forensic assistant was responsible. About one-third (33.7%) said they are performed by a registered radiographer and 12.9% responded that the images are being produced by a forensic professional such as a medical examiner or coroner. As for training, the majority of respondents indicated performing radiography exams is done through on-the-job-training courses (50.7%), and only 5.6% indicated that no training is completed. When questioned further on who interprets these images 70.4% indicated that this was done by a forensic professional such as a medical examiner or coroner, with only one respondent relying solely on a radiologist.
- The hospital or university that houses the forensic department oversees regulation and inspection of radiographic equipment for 24.1% of respondents, a private organization performs these services for 22.2%. About 18% indicated that they were unsure or did not know how inspections of equipment were carried out.
- An overwhelming majority (88.8%) of respondents rated the images produced at their facility as good or excellent with only 2.8% stating that the quality of images produced at their facility were poor and required a comprehensive overhaul of their imaging program. When converted to a numeric scale of 0=poor to 3=excellent, the overall mean rating for quality was 2.16.

### **Cross-tabulations**

- All (100%) of the 14 private, hospital, and university-based facilities employ registered radiographers (university- and hospital-based facilities, exclusively), while only one-third (18 of 54) of medical examiners' offices (MEOs) and coroners' offices do so.
- Similarly, only about one-fifth of the 57 MEOs and coroners' offices require radiologic technologist certification, as compared to more than four-fifths of the 11 private, university-based, and hospital-based facilities. Further, all 4 of the facilities that have no training requirement were MEOs. This still represents only 8% of the 49 MEOs and the difference between MEOs and other facility types in this respect is not statistically significant.
- Private, hospital, and university-based facilities (PHUs) were significantly more likely (80%) to be required to be licensed than were MEOs and coroners' offices (33%). In addition, though only significant at the .05 level, PHU facilities were *less* likely (4 of 10) to post technique charts than were MEOs and coroners' offices (75%).
- Every respondent from a PHU facility who believed they knew who regulated and/or inspected the facility identified the hospital or university where the facility is housed. This was true of only 6 (16%) of the 37 similarly knowledgeable respondents from MEOs and coroners' offices. Among MEOs and coroners' offices, exactly one-third

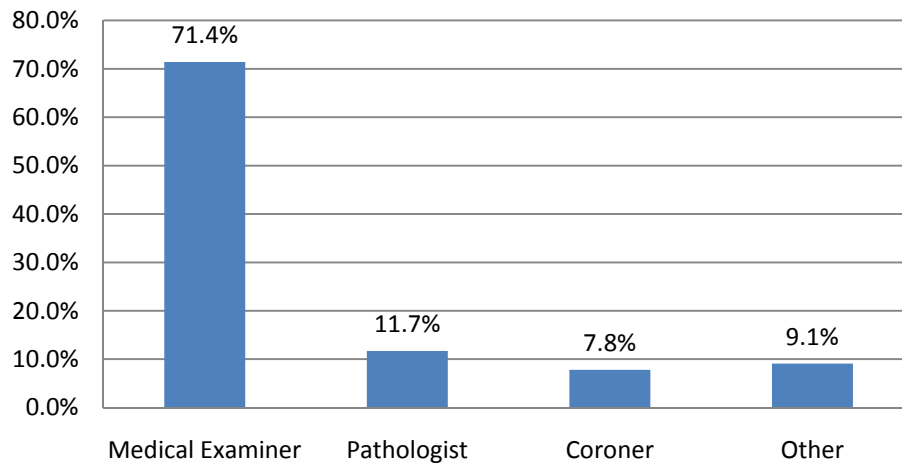
(15 of 45) report being inspected/regulated by a governmental agency (significantly higher at the .05 level than the 0% of PHU facilities who so report) and another 26.7% say that a vendor or company inspects/regulates them. (This percentage is not statistically significantly higher than the PHU facilities' 0%.)

- None of the differences with respect to perceived quality of the images produced among MEOs, coroners' offices and PHU facilities was statistically significant.
- More than three-fourths (79%) of MEOs and coroners' offices have their images interpreted by a forensic professional only, while this is true of only 38.5% of PHU facilities. Conversely, 17.5% of MEOs and coroners' offices and 61.5% of PHU facilities have their images interpreted by both forensic professionals and radiologists.

## Basic Frequencies and Descriptive Statistics

<b>1. Please indicate your job title</b>			
	Frequency	Percent	Valid Percent
Medical examiner	55	71.4%	71.4%
Pathologist	9	11.7%	11.7%
Coroner	6	7.8%	7.8%
Other	7	9.1%	9.1%
Total	77	100%	100%

### Job Title

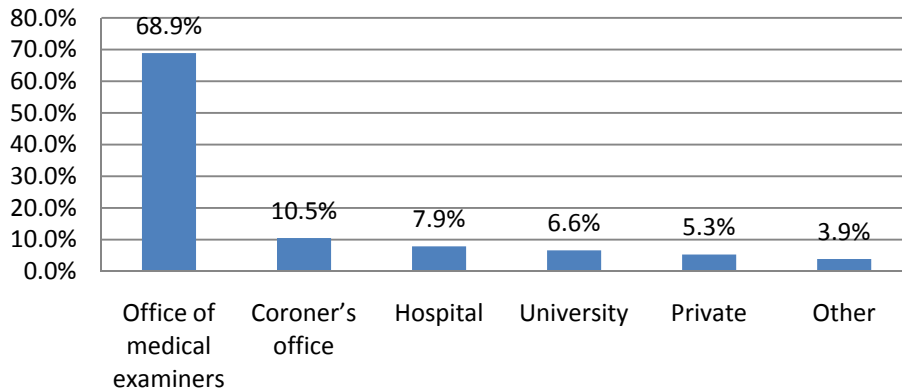


### 2. In what state is your institution located?

Please see the "Verbatim Responses" section for a list of states.

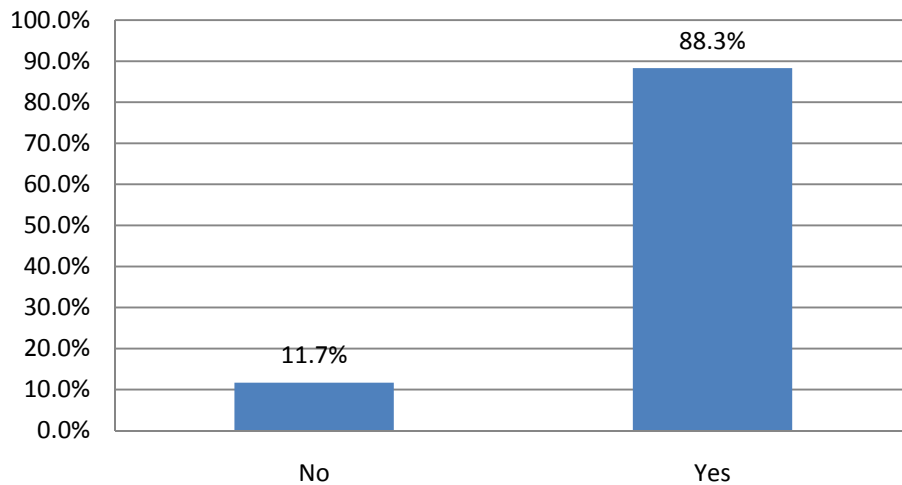
<b>3. In what type of facility are you employed?</b>			
	Frequency	Percent	Valid Percent
Office of medical examiners	51	68.0%	68.9%
Coroner's office	8	10.4%	10.5%
Hospital	6	7.8%	7.9%
University	5	6.5%	6.6%
Private	4	5.2%	5.3%
Other	3	3.9%	3.9%
Total	76	98.6%	100%
Missing	1	1.3%	
Total	77	100%	

## In what type of facility are you employed?



4. Is radiographic equipment used in your facility?			
	Frequency	Percent	Valid Percent
No	9	11.7%	11.7%
Yes	68	88.3%	88.3%
Total	77	100%	100%

## Is radiographic equipment used in your facility?



<b>5. If “no” (radiologic equipment is not used in your facility), is radiography performed at an off-site facility?</b>			
	Frequency	Percent	Valid Percent
Yes	9 <sup>a</sup>	13.0%	100%
Total <sup>b</sup>	9	13.0%	100%
Missing	60	87.0%	
Total	69	100%	

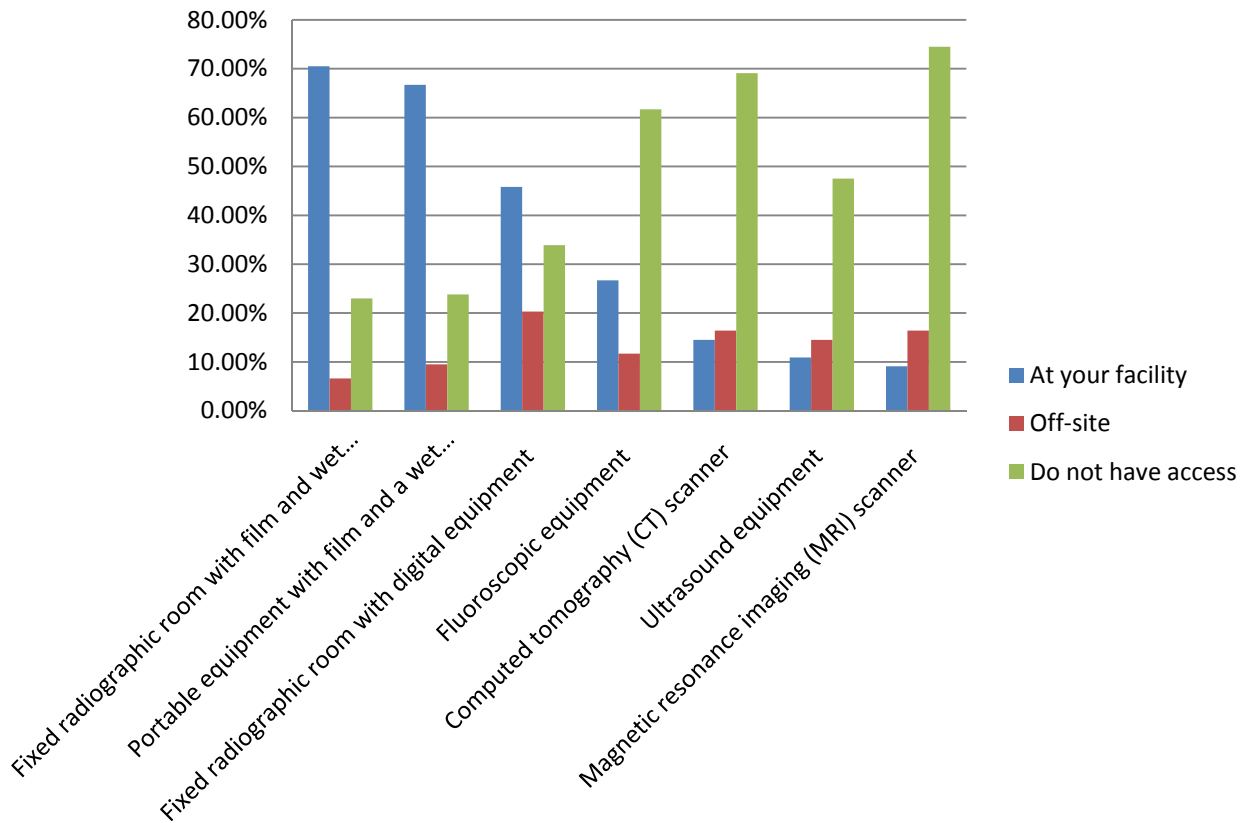
<sup>a</sup> Those who answered “Yes” were those respondents who matched the previous question and stated that radiographic equipment was *not used* in their facility.

<sup>b</sup> Eight respondents answered “No” to this question; however, upon further analysis, all of them indicated in the previous question that radiographic equipment *is used in their facility*; therefore, 100% of those who responded use radiographic equipment either at their facility or at an off-site location.

<b>6. Please indicate the primary location for the types of imaging equipment you have access to.</b>				
<b>Equipment</b>	<b>N</b>	<b>Valid Percent</b>		
		<b>At your facility</b>	<b>Off-site</b>	<b>Do not have access</b>
Fixed radiographic room with film and wet processor	61	70.5%	6.6%	23.0%
Portable equipment with film and a wet processor	63	66.7%	9.5%	23.8%
Fixed radiographic room with digital equipment	59	45.8%	20.3%	33.9%
Fluoroscopic equipment	60	26.7%	11.7%	61.7%
Computed tomography (CT) scanner	55	14.5%	16.4%	69.1%
Ultrasound equipment	53	10.9%	14.5%	47.5%
Magnetic resonance (MR) scanner	55	9.1%	16.4%	74.5%



## Primary location for the types of imaging equipment

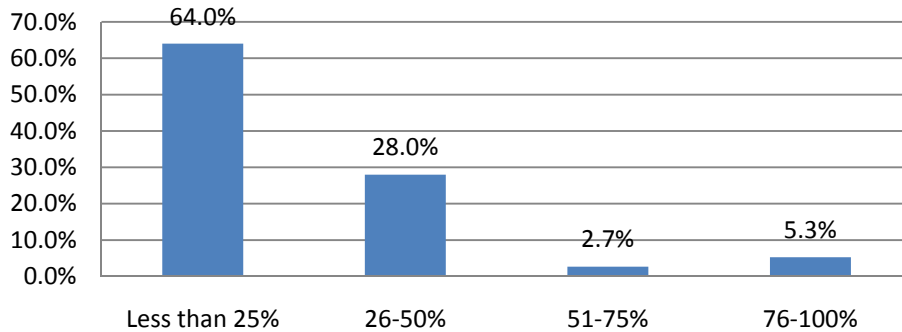


7. Approximately what percentage of your cases require imaging exams?			
	Frequency	Percent	Valid Percent
Less than 25%	48	62.3%	64.0%
26-50%	21	27.3%	28.0%
51-75%	2	2.6%	2.7%
76-100%	4	5.2%	5.3%
Total	75	97.4%	100%
Missing	2	2.6%	
Total	77	100%	
<b>Mean<sup>a</sup></b>	<b>24.69%</b>		
<b>Median<sup>b</sup></b>	<b>19.53%</b>		

<sup>a</sup> Translating "< 25%" as 12%, "26-50%" = 38%, "51-75%" = 63%, and "76-100%" = 88%.

<sup>b</sup> Calculated from grouped data; SPSS algorithm computed this as 22.17% because it cannot compute zero as a minimum possible value.

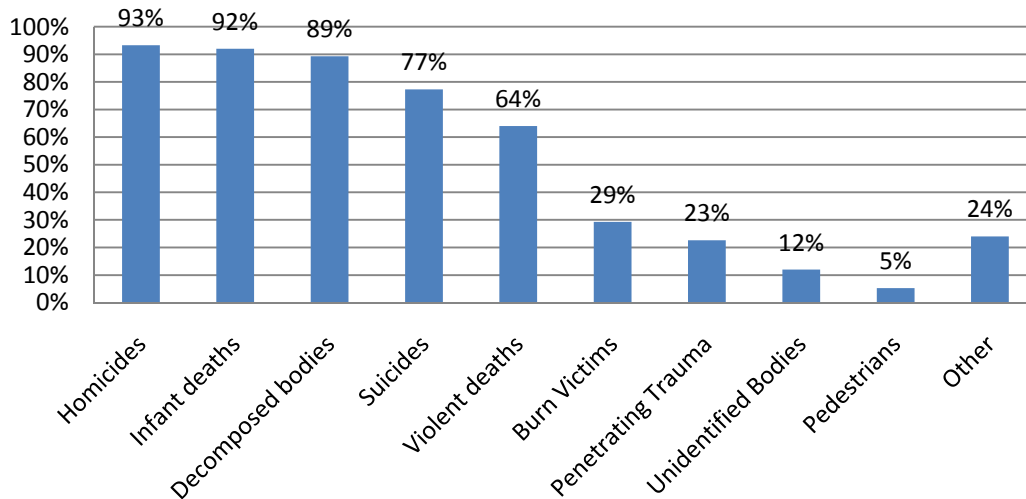
## Percentage of your cases require imaging exams



8. What types of cases require imaging exams? <sup>a</sup>			
	Frequency	Percent of Total	Percent of Cases
Homicides	70	18.32%	93.3%
Infant deaths	69	18.0%	92.0%
Decomposed bodies	67	17.5%	89.3%
Suicides	58	15.1%	77.3%
Violent deaths	48	12.5%	64.0%
Burn victims	22	5.7%	29.3%
Penetrating trauma	17	4.4%	22.6%
Unidentified bodies	9	2.3%	12.0%
Pedestrians	4	1.0%	5.3%
Other	18	4.7%	24.0%
<b>Total</b>	<b>382</b>	<b>100%</b>	

<sup>a</sup> Multiple responses allowed

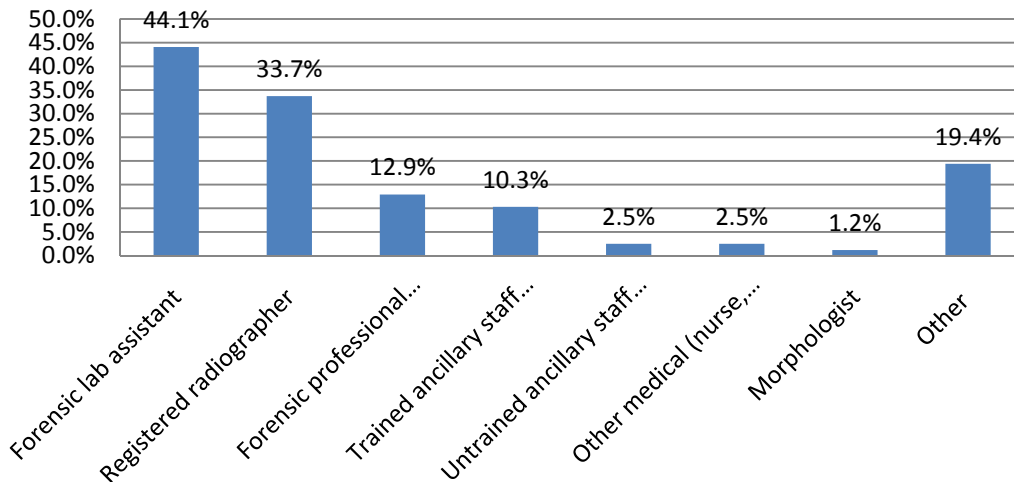
## Cases requiring Imaging Exams



<b>9. Who performs imaging at your facility? <sup>a</sup></b>			
	Frequency	Percent of Total	Percent of Cases
Forensic lab assistant	34	34.6%	44.1%
Registered radiographer	26	26.5%	33.7%
Forensic professional (medical examiner, coroner)	10	10.2%	12.9%
Trained ancillary staff (orderly, clerical)	8	8.1%	10.3%
Untrained ancillary staff (orderly, clerical)	2	2.0%	2.5%
Other medical (nurse, physician assistant)	2	2.0%	2.5%
Morphologist	1	1.0%	1.2%
Other	15	15.3%	19.4%
<b>Total</b>	<b>98</b>	<b>100%</b>	

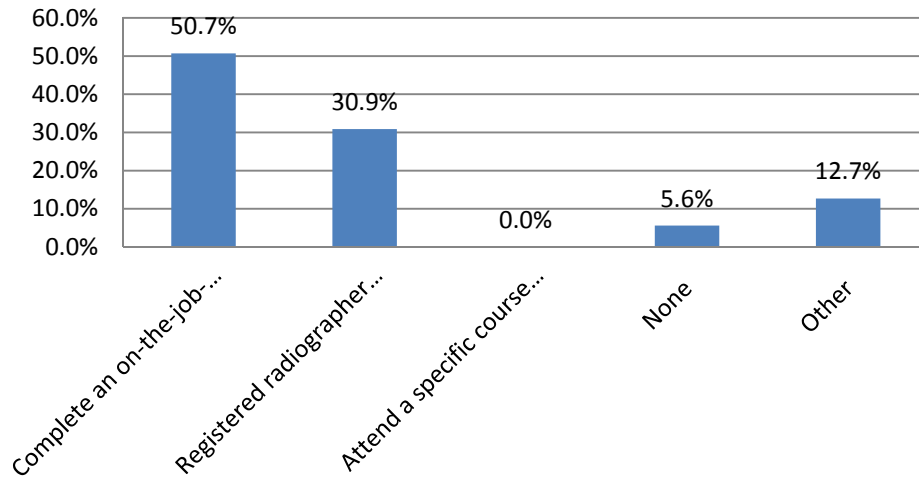
<sup>a</sup> Multiple responses allowed

### Who performs imaging at your facility?



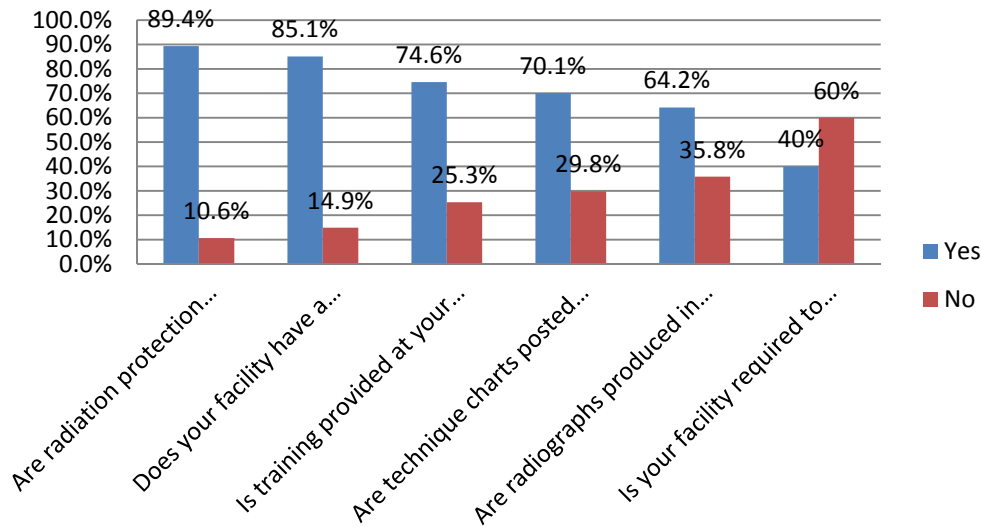
<b>10. What type of training is required for personnel producing radiographic images?</b>			
	Frequency	Percent	Valid Percent
Complete an on-the-job-training course	36	48.0%	50.7%
Registered radiographer [RT(R)]	22	29.3%	30.9%
Attend a specific course of study	0	0%	0%
None	4	5.3%	5.6%
Other	9	12.0%	12.7%
Missing	6	5.3%	
<b>Total</b>	<b>77</b>	<b>100%</b>	

## Training required for personnel producing radiographic images



<b>11. Please select yes or no for the following questions.</b>			
	<b>Valid Percent</b>		
	N	Yes	No
Are radiation protection devices (i.e., lead aprons) available at your facility?	67	89.4%	10.6%
Does your facility have a radiation safety program that includes personnel monitoring via radiation badges and regular reports?	67	85.1%	14.9%
Is training provided at your facility for personnel producing radiographic images?	67	74.6%	25.3%
Are technique charts posted in your facility?	67	70.1%	29.8%
Are radiographs produced in a dedicated x-ray room that provides structural shielding (lead in the walls or equivalent)?	67	64.2%	35.8%
Is your facility required to be specifically licensed to provide radiology services?	65	40.0%	60.0%

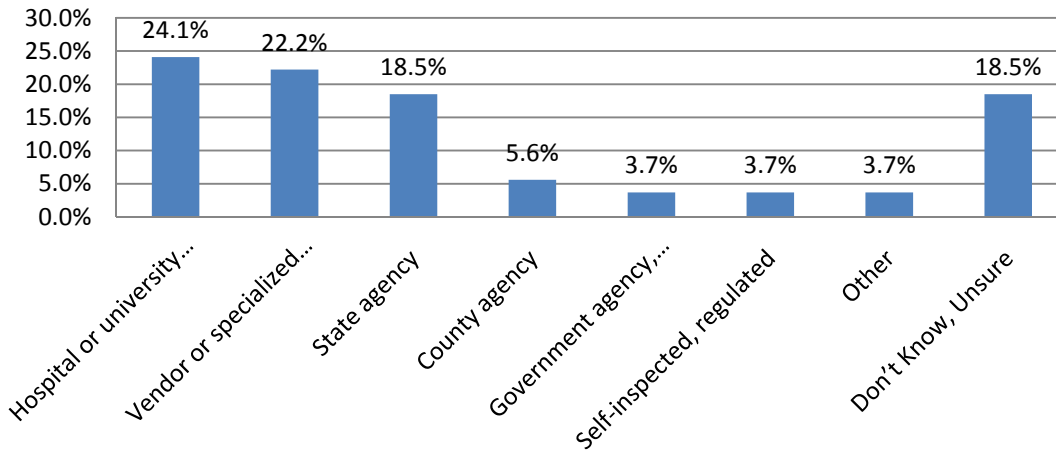
## Items Available at Facility



<b>12. Who regulates or inspects the radiation equipment at your facility?</b>			
	Frequency	Percent	Valid Percent
Hospital or university where facility housed	13	16.9%	24.1%
Vendor or specialized company	12	15.6%	22.2%
State agency	10	13.0%	18.5%
County agency	3	3.9%	5.6%
Government agency, unspecified level	2	2.6%	3.7%
Self-inspected, regulated	2	2.6%	3.7%
Other	2	2.6%	3.7%
Don't know, unsure	10	13.0%	18.5%
Total	54	70.1%	100 %
Missing	23	29.9%	
Total	77	100%	

More than two-fifths (42.9%) of the respondents either didn't answer the question or indicated that they didn't know or were unsure of the answer.

## Who regulates or inspects the radiation equipment at your facility?

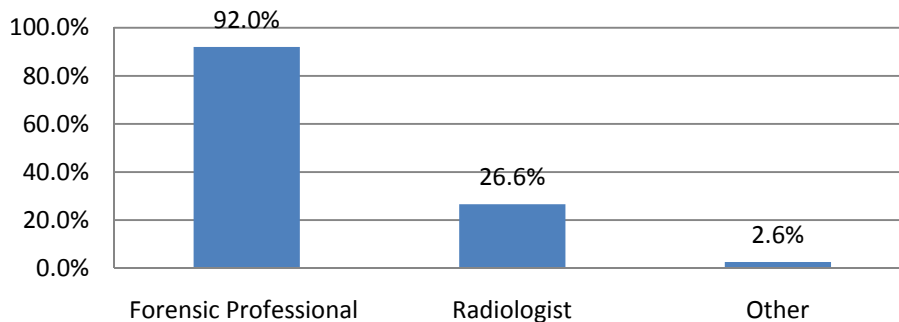


### 13. Who interprets the images that are produced? <sup>a</sup>

	Frequency	Percent of Total	Percent of Cases
Forensic professional	69	75.8%	92.0%
Radiologist	20	21.9%	26.6%
Other	3	2.1%	2.6%
<b>Total</b>	<b>92</b>	<b>100%</b>	

<sup>a</sup> Multiple responses allowed

## Who interprets the images that are produced?

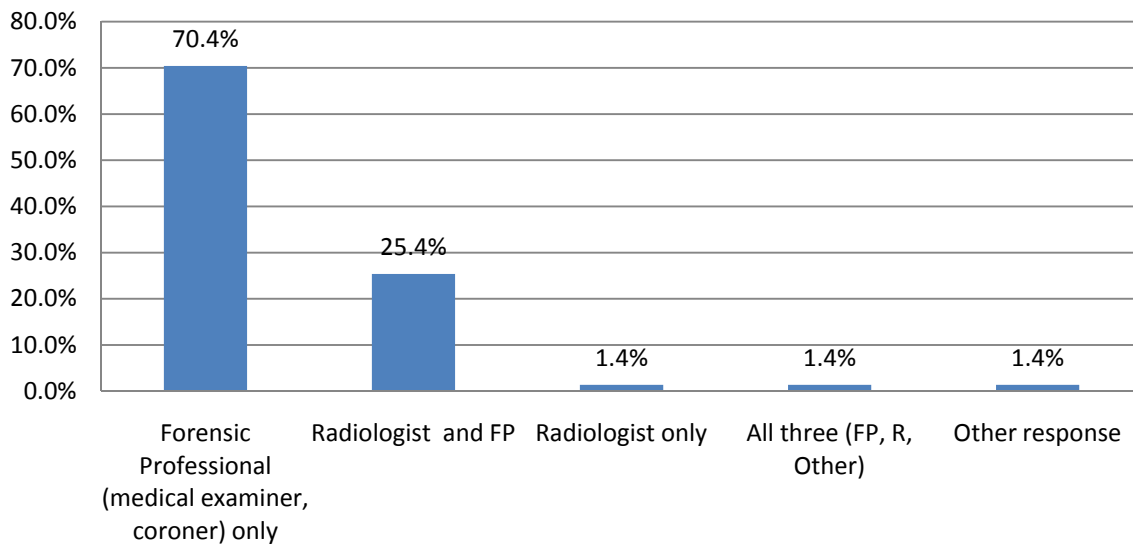


The combinations of professionals who interpret the images and the relationship of those combinations to comments entered in the “Other (please specify)” text box are interesting:

<b>Combination of Professionals who interpret</b>			
	Frequency	Percent	Valid Percent
Forensic professional (medical examiner, coroner) only	50	64.9%	70.4%
Radiologist and FP	18	23.4%	25.4%
Radiologist only	1	1.3%	1.4%
All three (FP, R, Other)	1	1.3%	1.4%
Other response	1	1.3%	1.4%
Total	71	92.2%	100%
Missing	6	7.8%	
Total	77	100%	

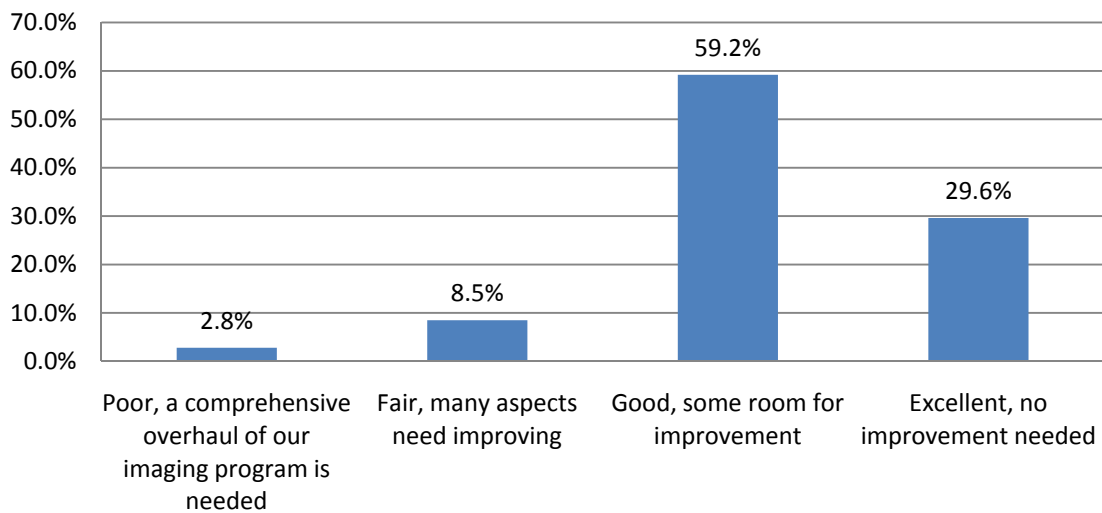
Note that, while over a quarter of the facilities have their images interpreted by a radiologist, only one of those facilities relies solely on the radiologist's interpretation.

### Combination of Professionals who interpret



<b>14. How would you rate the quality of images produced at your facility?</b>			
	Frequency	Percent	Valid Percent
Poor, a comprehensive overhaul of our imaging program is needed=0	2	2.6%	2.8%
Fair, many aspects need improving=1	6	7.8%	8.5%
Good, some room for improvement=2	42	54.5%	59.2%
Excellent, no improvement needed=3	21	27.3%	29.6%
Total	71	92.2%	100%
Missing	6	7.8%	
Total	77	100%	
<b>Overall Mean Rating (Scale : 0=Poor to 3=Excellent)</b>	<b>2.16</b>		

### How would you rate the quality of images produced at your facility?





## Crosstabulations

Is radiographic equipment used in your facility x Is radiography performed at an off-site facility?					
		5. If no, is radiography performed at an off-site facility?			
4. Is radiographic equipment used in your facility?	Statistic	No	Yes	Total Respondents	No Response to q5
<b>No</b>	Count	0	9	9	0
	%	.0%	100%	100%	
<b>Yes</b>	Count	8	0	8	60
	%	100%	.0%	100%	
<b>Total</b>	Count	8	9	17	77
	%	47.1%	52.9%	100%	

Note: Every respondent who previously stated that radiographic equipment was not used in their facility indicated that radiography is performed at an off-site facility (i.e., 100% of the respondents to this questionnaire use radiographic equipment either at their facility or at an off-site location).

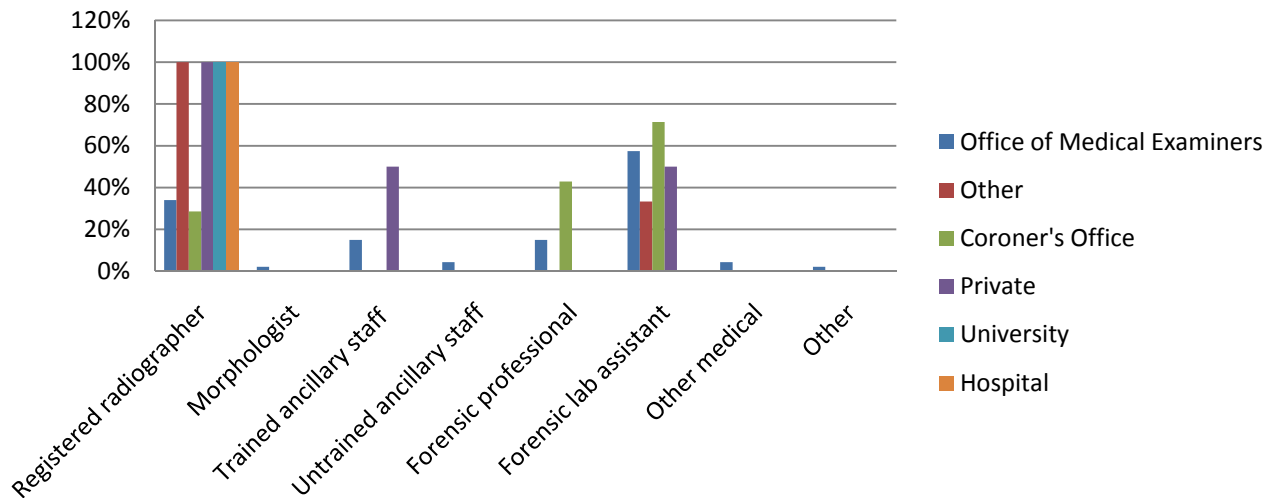
Who Performs Imaging x Type of Facility								
Who performs imaging at your facility? (Multiple responses allowed).	3. In what type of facility are you employed?							Total
	Statistic	Office of Medical Examiners	Other	Coroner's Office	Private	University	Hospital	
<b>Registered radiographer</b>	Count	16	3	2	2	4	5	32
	%	34.0%	100%	28.6%	100%	100%	100%	
<b>Morphologist</b>	Count	1	0	0	0	0	0	1
	%	2.1%	.0%	.0%	.0%	.0%	.0%	
<b>Trained ancillary staff (orderly, clerical)</b>	Count	7	0	0	1	0	0	8
	%	14.9%	.0%	.0%	50.0%	.0%	.0%	
<b>Untrained ancillary staff (orderly, clerical)</b>	Count	2	0	0	0	0	0	2
	%	4.3%	.0%	.0%	.0%	.0%	.0%	
<b>Forensic professional (medical examiner, coroner)</b>	Count	7	0	3	0	0	0	10
	%	14.9%	.0%	42.9%	.0%	.0%	.0%	
<b>Forensic lab assistant</b>	Count	27	1	5	1	0	0	34
	%	57.4%	33.3%	71.4%	50.0%	.0%	.0%	
<b>Other medical (nurse, physician assistant)</b>	Count	2	0	0	0	0	0	2
	%	4.3%	.0%	.0%	.0%	.0%	.0%	
<b>Other (please specify below)</b>	Count	1	0	0	0	0	0	1
	%	2.1%	.0%	.0%	.0%	.0%	.0%	
<b>Total</b>	Count	47	3	7	2	4	5	68

Percentages and totals are based on respondents.

All (100%) of the 14 private, hospital and university-based facilities employ registered radiographers (university- and hospital-based facilities, exclusively), while only one-third (18 of 54) MEOs and coroners' offices do so; chi-square for this difference = 16.437 with

1 df,  $P < .001$ . However, all three of the “other” facility types (a regional and a county medical examiner and a military facility) employ registered radiographers to perform imaging exams. When the two CMEs are added to the office of medical examiners category, the percent of MEOs employing registered radiographers rises to 35.7%, which still is significantly lower than in private, university- and hospital-based facilities (chi-square = 15.283).

### Who Performs Imaging x Type of Facility

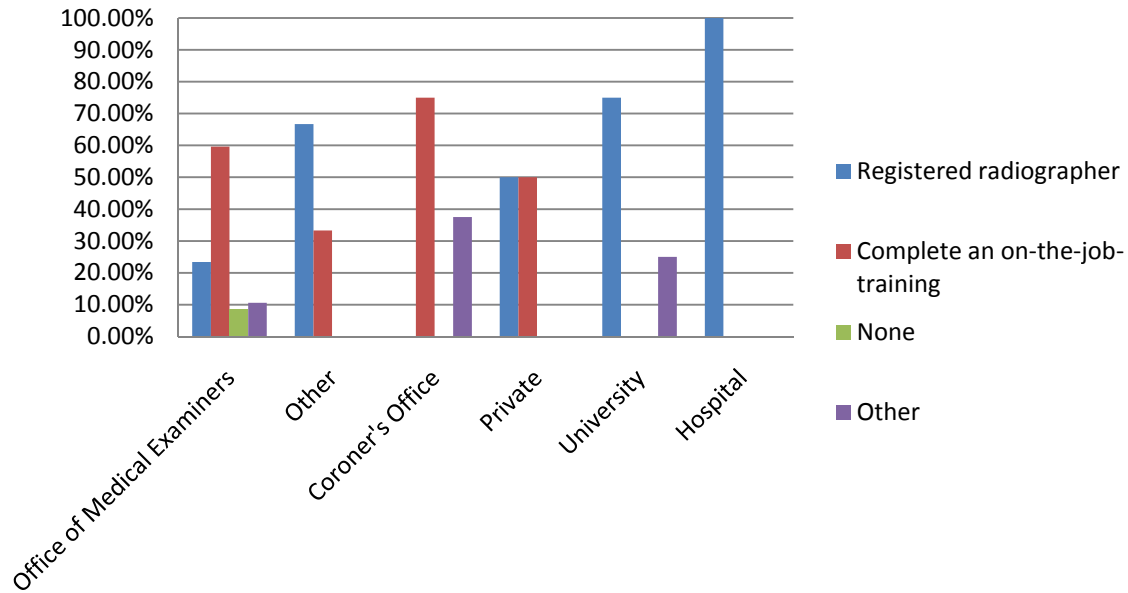


Training Requirement(s) x Type of Facility								
What type of training is required? <sup>a</sup>	Statistic	In what type of facility are you employed?						Total
		Office of medical examiners	Other	Coroner's office	Private	University	Hospital	
Registered radiographer	Count	11	2	0	1	3	5	22
	%	23.4%	66.7%	.0%	50.0%	75.0%	100.0%	
Complete an on-the-job-training	Count	28	1	6	1	0	0	36
	%	59.6%	33.3%	75.0%	50.0%	.0%	.0%	
None	Count	4	0	0	0	0	0	4
	%	8.5%	.0%	.0%	.0%	.0%	.0%	
Other	Count	5	0	3	0	1	0	9
	%	10.6%	.0%	37.5%	.0%	25.0%	.0%	
<b>Total</b>	Count	47	3	8	2	4	5	69

<sup>a</sup> Multiple responses allowed  
 Percentages and totals are based on respondents.

Only about one-fifth (21.1%) of the 57 MEOs and coroners’ offices require radiographer certification, as compared with 81.8% of the 11 private, university-based and hospital-based facilities ( $\chi^2 = 15.595, P < .001$ ). Further, all four of the facilities that have no training requirement were MEOs, although this still represents only 8.2% of the 49 MEOs and the difference between MEOs and other facility types in this respect is not statistically significant.

## Training Requirement(s) x Type of Facility

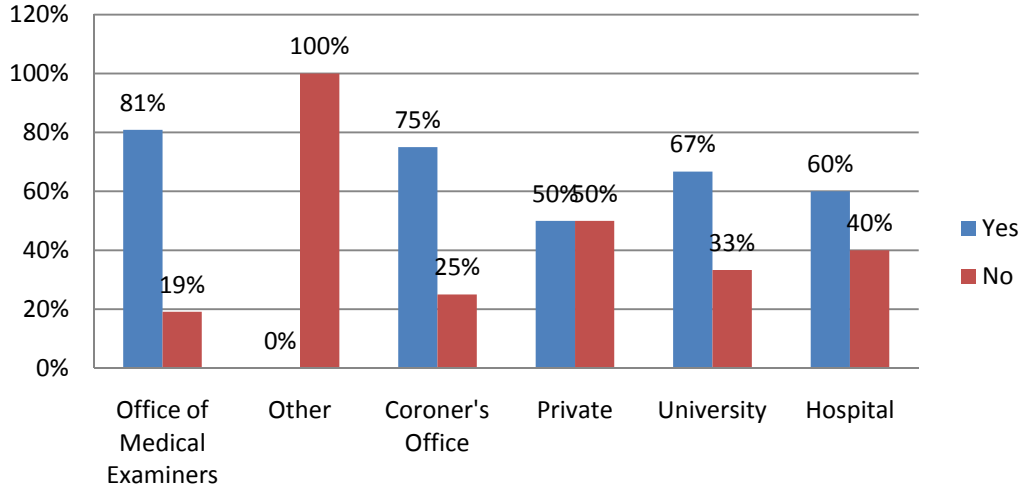


Whether Training Provided at Facility x Type of Facility				
3. In what type of facility are you employed?	Statistic	11. Is training provided at your facility for personnel producing radiographic images?		Total
		Yes	No	
Office of medical examiners	Count	38	9	47
	%	80.9%	19.1%	
Other	Count	0	2	2
	%	0.0%	100%	
Coroner's office	Count	6	2	8
	%	75.0%	25.0%	
Private	Count	1	1	2
	%	50.0%	50.0%	
University	Count	2	1	3
	%	66.7%	33.3%	
Hospital	Count	3	2	5
	%	60.0%	40.0%	
<b>Total</b>	Count	50	17	67

MEOs and coroners' offices were slightly more likely (77.2%) than private, university-based and hospital-based facilities (60%) to provide training at the facility, but neither this difference nor any of the other differences among facility type in this respect was

statistically significant at even the .05 level.

### Whether Training Provided at Facility x Type of Facility

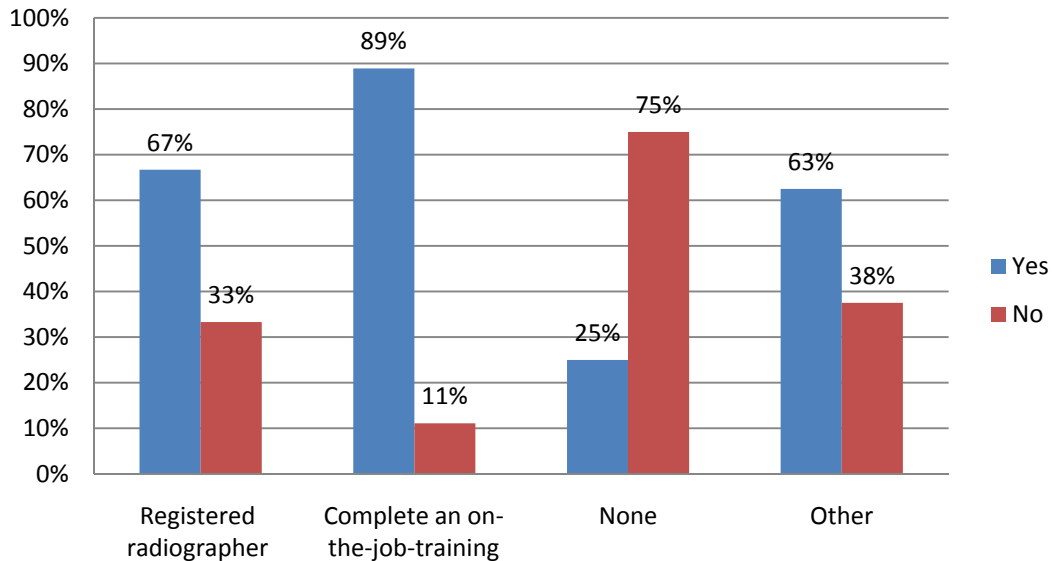


Whether Training Provided at Facility x Type of Training Required				
What type of training is required? (Multiple responses allowed)	Statistic	11. Is training provided at your facility for personnel producing radiographic images?		Total
		Yes	No	
Registered radiographer	Count	14	7	21
	%	66.7%	33.3%	
Complete an on-the-job-training	Count	32	4	36
	%	88.9%	11.1%	
None	Count	1	3	4
	%	25.0%	75.0%	
Other	Count	5	3	8
	%	62.5%	37.5%	
<b>Total</b>	Count	50	17	67

Percentages and totals are based on respondents.

Facilities that require completion of an on-the-job training (OJT) course are more likely (88.9%) to provide training on site than are the 58.1% of facilities that do not require an OJT course ( $\chi^2 = 8.358, P < .01$ ). Facilities that require radiographer certification are slightly less likely (66.7%) to provide some sort of training on site than are those that do not require certification (78.3%), but this difference is not statistically significant at even the .05 level. And one of the four facilities that has no training requirement nonetheless makes training available on site.

## Whether Training Provided at Facility x Type of Training Required

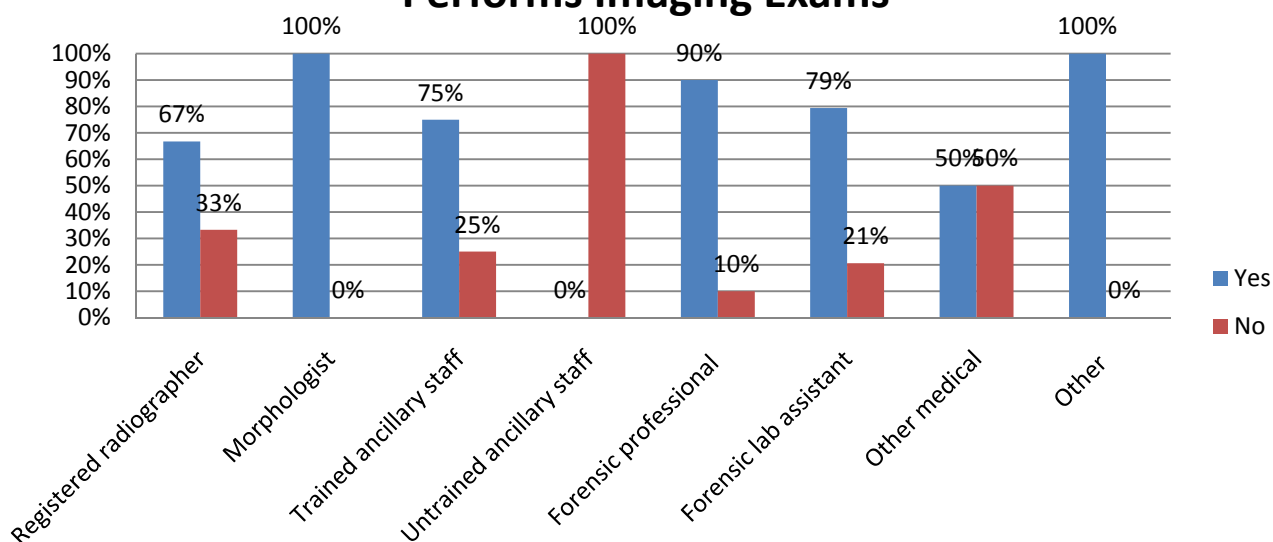


<b>Whether Training Provided at Facility x Who Performs Imaging Exams</b>				
<b>Who performs imaging at your facility?</b>	<b>Statistic</b>	<b>11. Is training provided at your facility for personnel producing radiographic images?</b>		<b>Total</b>
		Yes	No	
<b>Registered radiographer</b>	Count	20	10	30
	%	66.7%	33.3%	
<b>Morphologist</b>	Count	1	0	1
	%	100%	.0%	
<b>Trained ancillary staff (orderly, clerical)</b>	Count	6	2	8
	%	75.0%	25.0%	
<b>Untrained ancillary staff (orderly, clerical)</b>	Count	0	2	2
	%	.0%	100%	
<b>Forensic professional (medical examiner, coroner)</b>	Count	9	1	10
	%	90.0%	10.0%	
<b>Forensic lab assistant</b>	Count	27	7	34
	%	79.4%	20.6%	
<b>Other medical (nurse, physician assistant)</b>	Count	1	1	2
	%	50.0%	50.0%	
<b>Other (please specify below)</b>	Count	1	0	1
	%	100%	.0%	
<b>Total</b>	Count	50	16	66

Percentages and totals are based on respondents.

None of the differences between type of professional performing imaging exams with respect to providing on-site training is statistically significant.

## Whether Training Provided at Facility x Who Performs Imaging Exams



For purposes of the analyses in this subsection, types of facility were characterized as Offices of Medical Examiner (including the two facilities who checked “Other” but included “medical examiner” in their specification of that “other” type), coroner’s offices, and private, university-based, or hospital-based facilities. (There was also one remaining “Other” type of facility – a military facility – that is not included in these analyses.)

Question 11 Responses x Type of Facility (condensed)						
					95% Confidence Interval for Proportion	
Dependent Variable	Type of Facility	N	Proportion “Yes”	Std. Deviation	Lower Bound	Upper Bound
11. Is training provided at your facility for personnel producing radiographic images?	Office of medical examiner	49	0.776	1.578	0.900	0.650
	Coroner's office	8	0.750	1.537	1.140	0.360
	Private, univ, hosp	10	0.600	1.484	0.970	0.230
	Total	67	0.746	1.562	0.850	0.640
11. Are technique charts posted in your facility?	Office of medical examiner	49	0.755	1.566	0.880	0.630
	Coroner's office	8	0.750	1.537	1.140	0.360
	Private, univ, hosp	10	0.400	1.484	0.770	0.030

	<b>Total</b>	67	0.701	1.539	0.810	0.590
<b>11. Are radiation protection devices (i.e. lead aprons) available at your facility?</b>	<b>Office of medical examiner</b>	48	0.917	1.721	1.000	0.840
	<b>Coroner's office</b>	8	0.875	1.646	1.170	0.580
	<b>Private, univ, hosp</b>	10	0.800	1.578	1.100	0.500
	<b>Total</b>	66	0.894	1.690	0.970	0.820
<b>11. Does your facility have a radiation safety program that includes personnel monitoring via radiation badges and regular reports?</b>	<b>Office of medical examiner</b>	49	0.857	1.646	0.960	0.760
	<b>Coroner's office</b>	8	0.750	1.537	1.140	0.360
	<b>Private, univ, hosp</b>	10	0.900	1.684	1.130	0.670
	<b>Total</b>	67	0.851	1.641	0.940	0.760
<b>11. Are radiographs produced in a dedicated x-ray room that provides structural shielding (lead in the walls or equivalent)?</b>	<b>Office of medical examiner</b>	49	0.633	1.513	0.770	0.490
	<b>Coroner's office</b>	8	0.875	1.646	1.170	0.580
	<b>Private, univ, hosp</b>	10	0.500	1.473	0.880	0.120
	<b>Total</b>	67	0.642	1.517	0.760	0.520
<b>11. Is your facility required to be specifically licensed to provide radiology services?</b>	<b>Office of medical examiner</b>	48	0.354	1.517	0.490	0.210
	<b>Coroner's office</b>	7	0.143	1.622	0.490	-0.210
	<b>Private, univ, hosp</b>	10	0.800	1.578	1.100	0.500
	<b>Total</b>	65	0.400	1.506	0.520	0.280

The only difference among the three facility types that reached statistical significance at the .01 level was that private, university and hospital facilities were significantly more likely to have licensing requirements (80% vs. 32.7%) than were MEOs and coroners' offices ( $t_{62} = 3.156, P = .002$ ). In addition, although only significant at the .05 level, private, university and hospital facilities were *less* likely to post technique charts (40% vs. 75.4%) than were MEOs and coroners' offices ( $t_{62} = -2.122, P = .038$ ).

Responses to the following question were coded as follows:

<b>12. Who regulates or inspects the radiation equipment at your facility?</b>			
<b>coded</b>	<b>Response</b>	<b>Frequency</b>	<b>Percent</b>
<b>Blank</b>		<b>23</b>	<b>100.0</b>
<b>State agency</b>	XXX Radiation Regulatory Agency. There are no inspections	1	10.0
	XXX Dept. of health. We are registered as industrial	1	10.0
	Department of Health, Commonwealth of XXX	1	10.0
	XXX Department of Health	1	10.0
	Safety officer/radiology director	1	10.0
	State of XXX	1	10.0
	State of XXX	1	10.0
	State of XXX (Department of Health??) We have regular inspections from the state.	1	10.0
	State of XXX	1	10.0
	XXX Department of Health - Radiation Dept.	1	10.0
	Total	<b>10</b>	<b>100.0</b>
<b>County agency</b>	County agency	1	33.3
	County environmental health inspectors	1	33.3
	county in which we work	1	33.3
	Total	<b>3</b>	<b>100.0</b>
<b>Government agency, unspecified level</b>	Bureau of Radiological Health	1	50.0
	office of radiological health	1	50.0
	Total		<b>100.0</b>
<b>Hospital or university where facility housed</b>	Department of Radiology at the XXX HealthCare, Billings	1	7.7
	I don't know - it is handled by the medical imaging department.	1	7.7
	Occupational health and safety for the university	1	7.7
	Our imagers are provided by the department of radiology	1	7.7
	Radiation safety officer of hospital	1	7.7
	Taken care of by radiology dept	1	7.7
	The hospital deals with this. Any additional radiation equipment related to the medical school is handled by Biomedical or Safety and they tell us what to do.	1	7.7
	The medical school	1	7.7
	The radiology department.	1	7.7
	The University in which we are based.	1	7.7
	XXX Hospital Radiology Department	1	7.7
	University radiation safety officer	1	7.7
	University radiology group does all imaging, we defer to them	1	7.7
	Total	<b>13</b>	<b>100.0</b>
<b>Vendor or specialized company</b>	A licensed radiography company	1	8.3
	XXX	1	8.3

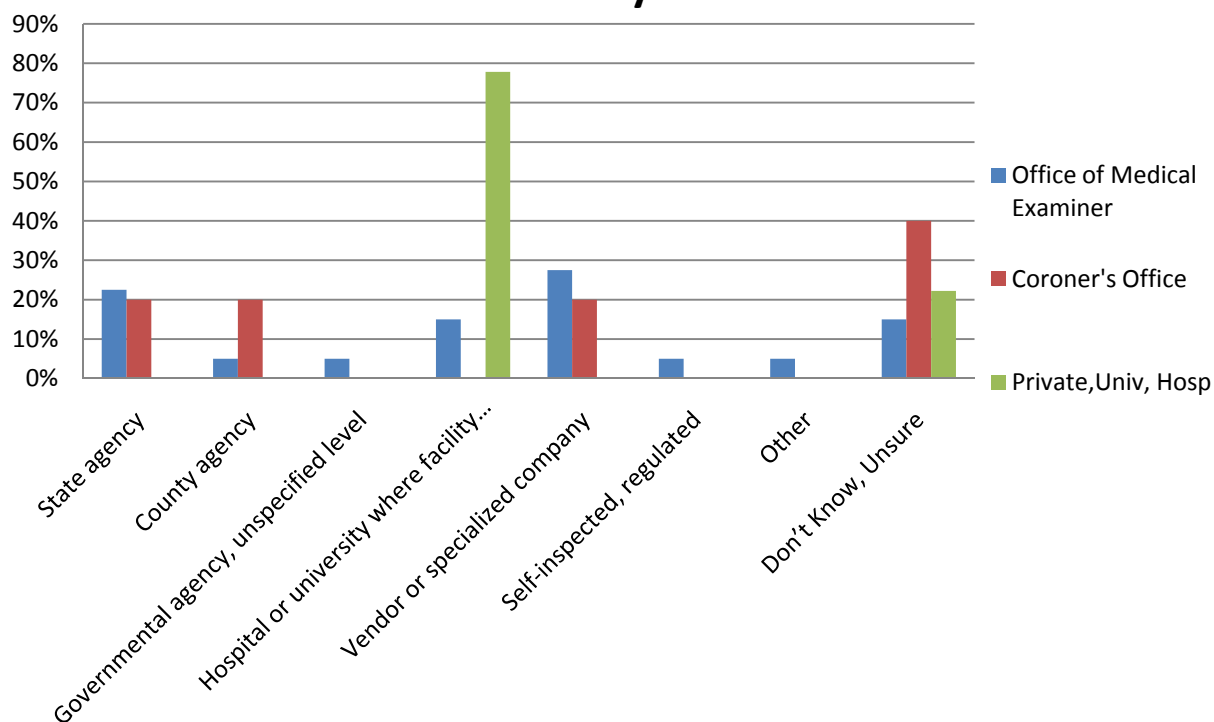


	Contracted Health Physicist	1	8.3
	XXX Monitoring	1	8.3
	outside contractor	1	8.3
	Outside vendor	2	16.6
	Private radiological equipment company.	1	8.3
	XXX	1	8.3
	representative of company	1	8.3
	Vendor with maintenance contract, I think	1	8.3
	We use a portable service and all regulations are handled by them.	1	8.3
	Total	12	100.0
<b>Self-inspected, regulated</b>	Investigative supervisor ensures compliance with state law on annual basis.	1	50.0
	XXX Biomedical Technicians	1	50.0
	Total	2	100.0
<b>Other</b>	XXX	1	50.0
	On the above chart #1 will be considered yes	1	50.0
	Total	2	100.0
<b>Don't know, unsure, undetermined</b>	Don't know	2	20.0
	I do not know. I am not involved in that aspect, but someone inspects us.	1	10.0
	I honestly don't know	1	10.0
	Not sure	2	20.0
	Unknown	1	10.0
	Unsure	3	30.0
	Total	10	100.0

<b>12. Who regulates or inspects, coded X Type of facility</b>					
<b>12. Who regulates or inspects, coded</b>	<b>Statistic</b>	<b>Type of facility, condensed</b>			<b>Total</b>
		<b>Office of medical examiner</b>	<b>Coroner's office</b>	<b>Private, univ, hosp</b>	
<b>State agency</b>	Count	9	1	0	10
	%	22.5%	20.0%	.0%	18.5%
<b>County agency</b>	Count	2	1	0	3
	%	5.0%	20.0%	.0%	5.6%
<b>Governmental agency, unspecified level</b>	Count	2	0	0	2
	%	5.0%	.0%	.0%	3.7%
<b>Hospital or university where facility housed</b>	Count	6	0	7	13
	%	15.0%	.0%	77.8%	24.1%
<b>Vendor or specialized company</b>	Count	11	1	0	12
	%	27.5%	20.0%	.0%	22.2%
<b>Self-inspected, regulated</b>	Count	2	0	0	2
	%	5.0%	.0%	.0%	3.7%
<b>Other</b>	Count	2	0	0	2
	%	5.0%	.0%	.0%	3.7%
<b>Don't Know, Unsure</b>	Count	6	2	2	10
	%	15.0%	40.0%	22.2%	18.5%
<b>Total</b>	Count	40	5	9	54
	%	100.0%	100.0%	100.0%	100.0%

Every respondent from a private, university-based or hospital-based facility who felt they knew who regulated and/or inspected the facility “identified” the hospital or university where the facility is housed. This was true of only 6 (16.2%) of the 37 similarly knowledgeable respondents from MEOs and coroners’ offices. This difference is statistically significant at the .001 level both by chi-square test and by Fisher’s Exact Test. Among MEOs and coroners’ offices, exactly one-third (15 of 45) report being inspected/regulated by a governmental agency (significantly higher at the .05 level than the 0% of private, university and hospital facilities who so report) and another 26.7% say that a vendor or company inspects/regularates them. (This percentage is not statistically significantly higher than the private, university and hospital facilities’ 0 %.)

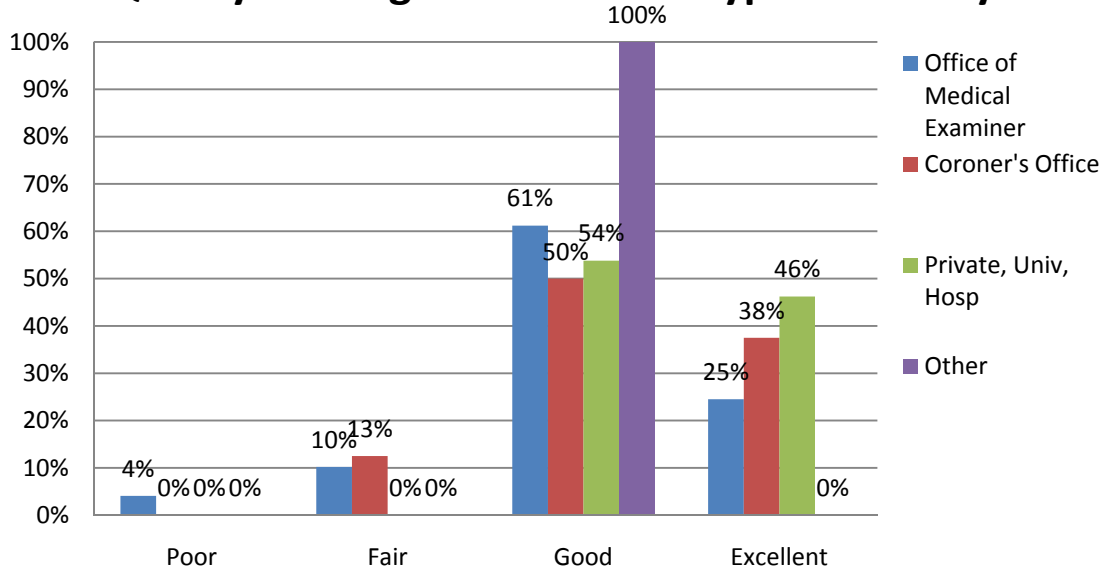
## Who regulates or inspects, coded X Type of facility



Quality of Images Produced x Type of Facility						
14. How would you rate the quality of images produced at your facility?	Statistic	Type of facility, condensed				Total
		Office of medical examiner	Coroner's office	Private, univ, hosp	Other	
Poor, a comprehensive overhaul of our imaging program is needed=0	Count	2	0	0	0	2
	%	4.1%	.0%	.0%	.0%	2.8%
Fair, many aspects need improving=1	Count	5	1	0	0	6
	%	10.2%	12.5%	.0%	.0%	8.5%
Good, some room for improvement=2	Count	30	4	7	1	42
	%	61.2%	50.0%	53.8%	100%	59.2%
Excellent, no improvement needed=3	Count	12	3	6	0	21
	%	24.5%	37.5%	46.2%	.0%	29.6%
Total	Count	49	8	13	1	71
	%	100%	100%	100%	100%	100%
Overall Mean Rating (Scale : 0 to 3)		2.061	2.250	2.462	2.000	2.155

None of the differences among the mean quality ratings was statistically significant at even the .05 level.

## Quality of Images Produced x Type of Facility



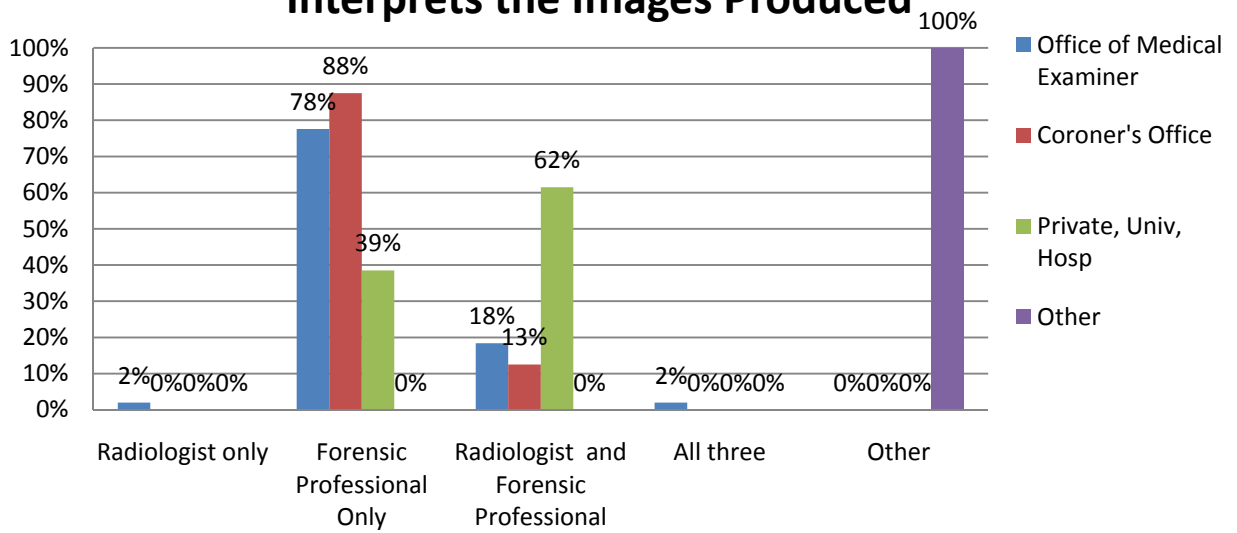
Responses to Invitation to Explain "Other" Responses to "Who Interprets ...?"				
Combination of professionals who interpret the images	Response to "Please specify" request	Frequency	Percent	
No response	Blank	6	100.0	
Radiologist	Blank	1	100.0	
Forensic professional (medical examiner, coroner)	Blank	41	82.0	
	For # 11, I assume 1 is yes and 2 is no. Also, we have two separate facilities, one that was used as the basis for the above answers, and a second hospital-based facility. In the hospital facility, radiology services are provided by the hospital, using a portable unit in the morgue, but images are developed centrally, converted to digital, and a CD is provided to the ME who performs his own interpretation.	1	2.0	
	Forensic pathologists	1	2.0	
	Medical examiner sometimes has films reviewed by a radiologist--especially those on children and infants.	1	2.0	
	Medical examiners	1	2.0	
	Radiologist available for consult	1	2.0	
	Should be digital by year end	1	2.0	
	We can consult with the radiologist at the hospital any time we have questions.	1	2.0	
	We have consultant radiologists available if required	1	2.0	
	Will have radiologist review child/infant films as needed. No radiologist used for shootings, stabbings, fires, etc.	1	2.0	
	Total		50	100.0

<b>Radiologist and forensic professional</b>	Blank	11	61.1
	Child cases done and read by children's hospital pediatric radiologist	1	5.6
	Most are interpreted by the forensic pathologist but in some cases a radiologist consultant will review them at our request.	1	5.6
	Mostly ME but when consults we use the radiologists	1	5.6
	Primary by FP but radiologist available and used for most non-GSW cases	1	5.6
	Radiologist about 60% of the time and ME 40%. The radiologist is consulted by the MEs when there are questions.	1	5.6
	Radiologists at the Medical College of XXX, when requested.	1	5.6
	We ask the radiologists to interpret the infant radiographs. We interpret the gunfire and altered body images ourselves and state "no interpretation necessary" when we do not want misinterpretation of postmortem artifacts introduced into the record.	1	5.6
	<b>Total</b>	<b>18</b>	<b>100.0</b>
<b>All three</b>	Occasionally, a forensic anthropologist	1	100.0
<b>Other response</b>	Case by case	1	100.0

<b>Relationship between Type of Facility and Who Interprets the Images Produced</b>						
<b>Combo of professionals who interpret</b>	<b>Statistic</b>	<b>Type of facility, condensed</b>				<b>Total</b>
		<b>Office of Medical Examiner</b>	<b>Coroner's Office</b>	<b>Private, Univ, Hosp</b>	<b>Other</b>	
<b>Radiologist only</b>	Count	1	0	0	0	1
	%	2.0%	.0%	.0%	.0%	1.4%
<b>Forensic Professional (medical examiner, coroner) only</b>	Count	38	7	5	0	50
	%	77.6%	87.5%	38.5%	.0%	70.4%
<b>Radiologist and Forensic Professional</b>	Count	9	1	8	0	18
	%	18.4%	12.5%	61.5%	.0%	25.4%
<b>All three</b>	Count	1	0	0	0	1
	%	2.0%	.0%	.0%	.0%	1.4%
<b>Other response</b>	Count	0	0	0	1	1
	%	.0%	.0%	.0%	100.0%	1.4%
<b>Total</b>	Count	49	8	13	1	71
	%	100%	100%	100%	100%	100%

More than three-fourths (78.9%) of MEOs and coroners' offices have their images interpreted by a forensic professional only, while this is true of only 38.5% of private, university-based and hospital-based facilities ( $\chi^2 = 8.502, P < .001$ ). Conversely, 17.5% of MEOs and coroners' offices but 61.5% of private, university and hospital facilities have their images interpreted by both forensic professionals and radiologists.

## Relationship between Type of Facility and Who Interprets the Images Produced



## Appendix A. Verbatims

Other Job Title	
	Frequency
Blank	53
Assistant Coroner/Forensic Pathologist	1
Assistant Medical Examiner	1
CHIEF DEPUTY CORONER	1
Chief forensic pathologist	1
Chief Medical Examiner	1
Chief, Forensic Radiology XXX, XXX of Pathology	1
Continued survey - partially finished when it exited	1
Coroner	1
Coroner/medical examiner	1
Deputy Coroner	2
Forensic pathologist	2
Forensic Pathologist at large for about 28 counties, one with a medical examiner and the rest with coroners	1
Forensic pathologist on University faculty	1
Forensic Pathologist/Deputy Coroner	1
Forensic technician	1
Independent Forensic Pathologist (various County Coroners and Private Consultations)	1
Medicolegal Investigator	1
Pathologist	1
Pathology resident	1
Physician Assistant, Director of Forensic Investigations	1
Professor	1
XXX State Administrator	1
Total	77

State	
	Frequency
Blank	1
AI	1
AR	1
AZ	3
CA	6
CO	4
DC	2
DE	2
FL	8

GA	3
IA	2
IN	1
KY	2
LA	1
MI	1
MN	3
MO	3
MT	1
NC	1
ND	2
NH	1
NJ	3
NM	2
NY	3
OH	6
OR	2
PA	1
SC	1
TN	2
TX	3
VA	3
VT	1
WI	1
Total	77

<b>Other type of facility</b>	
	Frequency
Blank	50
Combined with hospital	1
Community Hospital	1
Coroner's Laboratory	1
Coroner's office	3
County Coroner's Office	1
County Coroner	1
Hospital	2
Hospital that contracts with counties to provide Medical Examiner services.	1
I am the County medical examiner in XXX. We do approximately 100 medicolegal autopsies a year	1
Independent Forensic Pathologist (various County Coroners and Private Consultations)	1
Please note additional information for question 6 below. We currently have a new	1



facility under construction which will have CT and MRI capacity.	
Private	1
Private company doing autopsies for Coroners, Medical Examiners and the general public.	1
Private pathologist	1
Regional Medical Examiner XXX Bureau of Investigation XXX	1
Regional office	1
School of Medicine	1
Sheriff-coroner	2
XXX County Medical Examiner's Office	1
University	3
University hospital	1
Total	77

<b>Other type of cases requiring imaging exams</b>	
	Frequency
Blank	43
100% autopsy of all cases- to include deaths from natural causes. This is Department of Defense policy for this military mortuary.	1
Any case involving penetrating trauma such as bombings/explosions, gunshots, stabbings, full body burnings, cases in which identification needs radiography for unique comparisons.	1
Any of the above cases may require radiographs, but only decomposed remains and infant deaths require x-rays uniformly.	1
Bombings, fires with charring of the body, aviation, fragmented remains	1
burn victims	1
burned bodies, unidentified bodies,	1
Burned, fragmented remains Human vs. non-human remains	1
Charred bodies from fires	1
Charring burns reasonable possibility of foreign objects in body	1
Depends on circumstances. Homicide by GSW to head with exit does not get an x-ray in my facility. Violent deaths that are suspected to have remnants of retrievable material are filmed - i.e., stab wounds with tips, gsw's with projectiles, etc.	1
Done in all infant deaths but selectively in others ie would do all GSW but not drug deaths; traffics done if thought to assist evaluation.	1
Each case is individual and not all "types" of cases "require" imaging	1
Fire cases Presumed naturals with indication of heart/lung disease	1
Documentation of orthopedic hardware (usually ID issue)	1
Fire deaths and any other injuries where the skin is burned and/or not intact.	1
Fire deaths, plane crashes	1
Fire deaths, usually when burned beyond recognition.	1
Gunfire injury whether allegedly homicide, suicide, or accident. Bodies	1
Homicides and suicides only if looking for projectiles. Other violent deaths may be done if looking specifically at certain fractures.	1

Only suicides by GSW or stabbing OD's not x-rayed. Unidentified get total body & dental x rays before being released for burial or bioled to boes for indefinite storage	1
Other=unidentified bodies, SCUBA deaths, fire deaths, rare natural deaths Approximately half (not all) homicides and suicides require imaging, including all gunshot wound deaths and select sharp force deaths.	1
Pathologists' discretion. Only gunshot wound suicides require imaging.	1
Pedestrians	2
Pedestrians, severely burned, penetrating injuries (GSW, Sharp: whether homicide or suicide), suspected elder or child abuse, blunt injuries if there are no hospital films.	1
Penetrating injuries (stabs GSWs etc), decomposed bodies, dental,	1
See former answer	1
Selective cases for each	1
Suspected air embolism, charred bodies, and unidentified bodies. Not all homicides and suicides-generally gunshot and some stabbings	1
Unidentified bodies	2
Unidentified remains for radiographic comparison of ante-mortem and post-mortem radiographs (both bony and dental) for identification purposes	1
Vehicular accidents, Light aircraft accidents, Gunshot wound suicides, Some external only examination	1
Victims of fire	1
We typically	1
Total	77
<b>Other "Who performs imaging at your facility?"</b>	
	Frequency
Blank	62
Autopsy tech	1
Autopsy technician	1
Forensic anthropologist	1
Forensic investigators and autopsy technicians.	1
Forensic lab assistants all who are trained as embalmers perform all of the x-rays. The pathologists operate the fluoroscope with some assistance from the lab assistants.	1
Hospital X-ray department	1
Medical Examiner Investigator	1
Medicolegal death investigators and autopsy assistants	1
Morgue Technicians, though I prefer to call them Morgue Technologists.	1
Our investigators/Autopsy assistants as well as the Medical Examiner performs imaging.	1
Performed by hospital radiology personnel with portable equipment. Our morgue is in the hospital.	1
Radiography is done by autopsy assistants which have been trained in-house.	1
The autopsy assistants receive training to do the imaging	1
The autopsy technicians take the radiographs	1

We are using the hospital's "off site" radiology department which is down the hall. The "other" are trainees that the radiographers bring with them.	1
Total	77

<b>Other training</b>	
	Frequency
Blank	67
Done by hospital radiologic techs - I assume they have CE and training	1
I don't know	1
Limited scope certification currently	1
Minimal informal on the job training.	1
No formal training. An experienced user will show the new employee.	1
On the job training. (Instruction is not formalized)	1
One full day of training on-site by a RT followed by annual training by a RT	1
State Board	1
Trained by the provider of the equipment.	1
trained on the job, but not course for wet films; course for digital films	1
Total	77

<b>Who regulates or inspects the radiation equipment at your facility?</b>	
	Frequency
Blank	23
A licensed radiography company	1
XXX Radiation Regulatory Agency There are no inspections	1
Bureau of Radiological Health	1
XXX Dept. of health. We are registered as industrial	1
XXX	1
Contracted Health Physicist	1
County agency	1
County environmental health inspectors	1
County in which we work	1
Department of Health, XXX of XXX	1
Department of Radiology at the XXX HealthCare, Billings	1
Don't know	2
XXX Department of Health	1
I do not know. I am not involved in that aspect, but someone inspects us.	1
I don't know - it is handled by the medical imaging department.	1
I honestly don't know	1
Investigative supervisor ensures compliance with state law on annual basis.	1
XXX	1
XXX Monitoring	1
Not sure	2

Occupational health and safety for the university	1
Office of radiological health	1
On the above chart #1 will be considered yes	1
Our imagers are provided by the department of radiology	1
Outside contractor	1
Outside vendor	2
Private radiological equipment company.	1
Radiation safety officer of hospital	1
XXX	1
Representative of company	1
Safety officer/radiology director	1
State of XXX	1
State of XXX	1
State of XXX (Department of Health?) We have regular inspections from the state.	1
State of XXX	1
Taken care of by radiology dept	1
The hospital deals with this. Any additional radiation equipment related to the medical school is handled by Biomedical or Safety and they tell us what to do.	1
The medical school	1
The radiology department.	1
The University in which we are based.	1
XXX Hospital Radiology Department	1
University radiation safety officer	1
University radiology group does all imaging, we defer to them	1
Unknown	1
Unsure	3
XXX Biomedical Technicians	1
Vendor with maintenance contract, I think	1
XXX Department of Health - Radiation Dept.	1
We use a portable service and all regulations are handled by them.	1
Total	77

<b>Other "Who interprets the images that are produced?"</b>	
	Frequency
	60
Child cases done and read by Children's Hospital pediatric radiologist	1
For # 11, I assume 1 is yes and 2 is no. Also, we have two separate facilities, one that was used as the basis for the above answers, and a second hospital	1
Forensic pathologists	1
Medical Examiner sometimes has films reviewed by a radiologist--especially those on children and infants.	1
Medical examiners	1

Most are interpreted by the forensic pathologist but in some cases a radiologist consultant will review them at our request.	1
Mostly ME but when consults we use the radiologists	1
Occasionally, a forensic anthropologist	1
Primary by FP but radiologist available and used for most non-GSW cases	1
Radiologist about 60% of the time and ME 40%. The radiologist is consulted by the ME's when their are questions.	1
Radiologist available for consult	1
Radiologists at the Medical College of XXX, when requested.	1
Should be digital by year end	1
We ask the radiologists to interpret the infant radiographs. We interpret the gunfire and altered body images ourselves and state "no interpretation necessary" when we do not want misinterpretation of postmortem artifacts introduced into the record.	1
We can consult with the radiologist at the hospital any time we have questions.	1
WE have consultant radiologists available if required,	1
Will have radiologist review child/infant films as needed. No radiologist used for shootings, stabbings, fires, etc.	1
Total	77

## Appendix B. Survey



American Society of  
Radiologic Technologists

**1. Please indicate your job title.**

- Medical Examiner
- Other (please specify below)

Other: \_\_\_\_\_

**2. In what state is your institution located?**

\_\_\_\_\_

**3. In what type of facility are you employed?**

- Office of Medical Examiners
- Other (please specify below)

Other: \_\_\_\_\_

**4. Is radiographic equipment used in your facility?**

- Yes
- No

**5. If no, is radiography performed at an off-site facility?**

- Yes
- No

If you do not use imaging exams in your practice, please scroll to the bottom of the survey and click "Finish." Otherwise, please continue to question #6.

**6. Please indicate the primary location for the types of imaging equipment you have access to.**

	At your facility	Off-site	Do not have access
Fixed radiographic room with film and wet processor			
Fixed radiographic room with digital equipment			
Portable equipment with film and wet processor			
Fluoroscopic Equipment			
Computed tomography (CT) scanner			
Magnetic resonance imaging (MRI) scanner			
Ultrasound equipment			

**7. Approximately what percentage of your cases require imaging exams (radiography, fluoroscopy, CT, etc.)?**

- 25% or less than
- 26%-50%
- 51%-75%
- 76%-100%

**8. What types of cases require imaging exams?**

Please select all that apply.

- Homicides
- Suicides
- Violent death
- Decomposed bodies
- Infant deaths
- Other (please specify below)

Other: \_\_\_\_\_

If your images are only produced off site, please scroll to the bottom of the survey and click "Finish." If images are produced at your facility, please continue to question #9.

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**9. Who performs imaging at your facility?**

- Registered radiographer
- Morphologist
- Trained ancillary staff (orderly, clerical)
- Untrained ancillary staff (orderly, clerical)
- Forensic professional (medical examiner, coroner)
- Forensic lab assistant
- Other medical (nurse, physician assistant)
- Other (please specify below)

Other: \_\_\_\_\_

**10. What type of training is required for personnel producing radiographic images?**

- Registered radiographer [RT(R)]
- Attend a specific course of study
- Complete an on-the-job-training course
- None
- Other (please specify below)

Other: \_\_\_\_\_

**11. Please select yes or no for the following questions.**

	Yes	No
Is training provided at your facility for personnel producing radiographic images?		
Are technique charts posted in your facility?		
Are radiation protection devices (i.e. lead aprons) available at your facility?		
Does your facility have a radiation safety program that includes personnel monitoring via radiation badges and regular reports?		
Are radiographs produced in a dedicated x-ray room that provides structural shielding (lead in the walls or equivalent)?		
Is your facility required to be specifically licensed to provide radiology services?		

**12. Who regulates or inspects the radiation equipment at your facility?**

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**13. Who interprets the images that are produced?**

- Radiologist
- Forensic Professional (medical examiner, coroner)
- Other (please specify below)

Other: \_\_\_\_\_

**14. How would you rate the quality of images produced at your facility?**

- Excellent, no improvement needed
- Good, some room for improvement
- Fair, many aspects need improving
- Poor, a comprehensive overhaul of our imaging program is needed