

Job Analysis Survey of Retinal Angiographer

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Abstract: *A formal job analysis study is an important step in establishing the validity of a certification examination. A job analysis survey of the role of retinal angiographers was conducted to define the current knowledge, skills and abilities necessary for competent practice. The goal of this analysis was to survey the role of, and develop test specifications for, the Certified Retinal Angiographer (CRA) examination.*

The survey was distributed to 1,126 practitioners throughout North America. 480 respondents rated the importance of 162 tasks to determine the criticality of each task to competent practice. Demographic information was also surveyed to ensure that the respondents were representative of practitioners working in a wide variety of settings. The survey identified 133 tasks that are critical to competent performance. New CRA test specifications are based on these results and reflect the current standard of practice.

INTRODUCTION

Validity is recognized as one of the most important characteristics of an examination that measures professional competence.^{1, 2} It establishes a relationship between competent practice of a discipline, and the competencies tested by a certification examination. The first step in the development of a valid and legally defensible certification examination is the delineation of the role that is to be certified. Performing a job analysis and using the resulting data to develop test specifications helps to ensure that

certification candidates are tested on the knowledge, skills and abilities that are relevant to the role for which they are being certified.

Job relevance is just one of the issues involved with the validity of a certification examination program. Generally, validity for certification programs is judged against the following criteria:

1. Is the content of the examination relevant to the role being certified? That is, are the knowledge, skills and abilities being tested required of competent practice, and are the concepts tested representative of what people do on the job?
2. Do the candidates taking the examination have the opportunity to learn the knowledge, skills and abilities being tested?
3. Are the knowledge, skills and abilities being tested appropriate for the level of performance being measured? If most competent retinal angiographers have at least two years of work experience, then it would be appropriate to test skills that an angiographer could gain during two years of service.

There are many other factors that affect the issue of validity, including those as basic as the security of the examination, and methods of examination administration. A successful job analysis is the cornerstone for the development of a valid and defensible certification examination.

In the Spring of 1995, Applied Measurement Services (AMS) and the Ophthalmic Photographers Society Board of Certification entered into a contract for AMS to perform a job analysis for the role of retinal angiographers. The goal of this analysis was to survey the role and develop test specifications to use for the Ophthalmic Photographers' Society, Certified Retinal Angiographer (CRA) Program.

The model used to perform the job analysis for the CRA program was the development and distribution of a survey throughout the United States and Canada. The survey asked respondents to rate the criticality of tasks associated with the role of the retinal angiographer. Surveys were sent to a large representative sampling of ophthalmic photography professionals (1,200 out of an estimated 2- to 3,000 ophthalmic photographers active in the U.S. and Canada) working in a wide variety of practice settings. These steps help to ensure that the data collected was representational of the role as practiced in North America. The translation of the data into the examination specifications helps to provide content validity in terms of the job relevance of the CRA examination.

HISTORY OF JOB ANALYSIS ACTIVITIES

A complete, formal job analysis survey had not previously been conducted for the role of retinal angiographer. However, an informal survey was conducted by the Board of Certification in 1977-1979, the results of which were used to develop the test specifications as used from 1979-1995.

SURVEY DEVELOPMENT ACTIVITIES

On June 10, 1995, AMS conducted a workshop in Philadelphia, Pennsylvania for the purpose of developing the job analysis survey. A panel of subject matter experts (SME) was recruited by AMS and the Board of Certification to participate in the workshop. Panelists were chosen based upon a demographically diverse representation of practice and ethnicity. During the workshop, the panelists were introduced to the goals and methods that were to be used to conduct the job analysis.

Establishing a Profile of the Role of the Retinal Angiographer

The role of the retinal angiographer was comprehensively discussed in order to establish panel consensus on the skill level, job responsibilities, experience and pathways into the profession, of retinal angiographers who would meet performance standards. This was a critical step towards addressing the diversity of practice settings, professional pathways and professional roles. All of these factors must be considered when evaluating the role. Retinal angiographers play a critical role in ophthalmic health care settings, be it a specialty eye hospital, small outpatient surgical center, or private ophthalmology practice. The difference among facilities represents the same diversity of practice found among the professionals working in the role. For instance, in smaller facilities retinal angiographers may hold sole responsibility for managing patients, taking and manually processing all photographs, as well as handling all clerical duties. In other facilities retinal angiographers may be responsible only for taking photographs.

Discussion of the Method of Certification

Once the panel members had established an overview of the role, the panel was asked to discuss the Ophthalmic Photographers' Society's vision of the direction of the retinal angiographer certification process. The current CRA Program deals with the knowledge, skills and abilities of basic experience-level retinal angiographers. While recognizing that some retinal angiographers would perform a wider variety of tasks than others, relative to their specific practice setting, the panel agreed that all retinal angiographers must be competent in the entire range of tasks associated with the role. An important factor in the differences among practice settings is represented by changes in photographic technology, such as digital imaging. The panel felt it important to include queries concerning the impact of digital technology on the role.

The panel discussed the current eligibility standards for retinal angiographers attempting certification. The panel members agreed that the CPR certification, completion of the two-year work requirement and completion of a standardized portfolio were representative of a competent experience level.

The panel then considered the pathway for certification, including meeting the work experience criteria, the submission of an acceptable portfolio, and successful completion of both the written and performance examinations. The panel reached consensus that these tasks provide acceptable demonstration of competent practice.

Development of the Survey

The survey design required the assembly of an exhaustive list of tasks associated with the role of retinal angiographer. The list was formulated to include all tasks potentially associated with the role, as they might be performed in a variety of settings across the U.S. and Canada. The SME panel kept the diversity of practice in mind when developing the list of tasks, and attempted to address these differences by including tasks that might be relevant to many different applications of the role within various ophthalmic health care settings.

The panel developed an overview of the role, which included the following nine content areas:

- Anatomy of the Eye
- Physiology of the Eye
- Pathology of the Eye
- Patient Management
- General Photography Skills
- Patient/Operator Safety
- Fundus Photography
- Fluorescein Angiography
- Pharmacology

By grouping the tasks into the nine content areas, the panel was able to develop a complete and logical outline. The panel identified as many tasks and subtasks as possible in order to provide a full range of tasks, from those that are critical to those that are less-important to competent practice.

The goal was to offer survey respondents the opportunity to review all of the tasks that might be associated with the role, and to then rate each task according to its criticality to competent practice. All judgements are based upon each respondent's personal experience and understanding of the role.

Pretesting the Survey

AMS staff assembled the tasks and subtasks into a draft survey that was reviewed and approved by the OPS Board of Certification. The Board then identified 40 ophthalmic photographers, familiar with the OPS CRA certification program, to fill out the draft survey and provide a test response. The purpose of the distribution of the draft survey was to ensure that there were no technical problems with the survey, that the directions were clear and correct, and to ask the respondents if there were any important tasks that had been inadvertently omitted from the survey. Some minor addi-

tions and changes were recommended by the respondents. The final version of the survey was then produced.

THE SURVEY PROCESS

Sampling Methodology

The value of a job analysis survey is enhanced by the assurance that the respondent group is sufficiently random. In order to have confidence in the resulting data, there must be some confidence that the people responding to the survey are doing so based upon similar motivation. If a survey is directed to a group practicing within a narrow interpretation of the role, or a group holding a specific agenda, then it is possible that the results of the survey could be tainted or skewed to reflect these traits. In order to ensure the complete randomness of the group selected to receive the survey, the mailing list included the entire Ophthalmic Photographers' Society membership, a cross listing of any Certified Retinal Angiographers who were not members of the OPS, and two ophthalmologists who act as advisors to the OPS Board of Certification. In total 1,126 surveys were mailed. While it is impossible to identify and census the universe of ophthalmic photographers practicing in North America, we have great confidence that the mailing list developed for the survey represents the majority of practitioners in the field.

Each name on the list was assigned a code number. This number was placed on the postage-paid return envelope included in the survey, enabling AMS staff to track those who responded and those who did not. While respondents were tracked for purposes of follow-up, once completed surveys were received they were separated from their return envelope. This step subsequently eliminated any challenge that the relationship between individual respondents and their responses was tracked during data analysis.

Each survey contained detailed instructions for completing the survey and a toll-free number which respondents were encouraged to call if they had any questions. Respondents were provided with an opportunity to describe any tasks that they felt may have been inadvertently omitted from the survey. In addition to the survey, respondents were asked to fill out a detailed, anonymous demographic questionnaire. The questionnaire was designed to facilitate development of a respondent demographic profile. Each survey also contained an addressed, postage-paid return envelope, and a small token of thanks as an inducement to complete the survey.

The initial mailing, which was sent August, 16, 1995, received an enthusiastic response. In an attempt to encourage the greatest survey response, AMS sent follow-up postcard reminders to all non-respondents on September 21, 1995. The response to the postcards was also enthusiastic. The quality of the mailing list was reflected in the fact that only 36 surveys were returned as undeliverable.

Survey Response Rates

Surveys were returned to the AMS office via first class mail from August through November, 1995. The survey data was recorded and computer analyzed at the end of November, 1995. Taking into consideration the 36 non-deliverable surveys, and the count of 486 returned surveys, a calculation of a survey response rate of 44.5% was reached. The response data is based upon results from 480 surveys, since six were returned after completion of the data compilation. In our experience, this is an impressive response rate for a job analysis, and suggests that the respondents were willing to commit significant time and effort to an activity designed to further their profession. This commitment increases our confidence that this random group of respondents was likely to provide usable information.

ANALYSIS OF THE SURVEY RESULTS

Demographic Information

In order to establish a profile of the demographic data of the survey respondents, each respondent was asked to provide confidential demographic information based upon the following variables: Gender; Age; Self Description; Current Education Level; Certificates/Licenses Currently Held; Professional Memberships; Length of Professional Experience; Practice Setting Description; Number of Angiograms Performed per Year; Geographic Region and Job Title. Respondents were also asked to provide information describing the Annual Percentage of Angiograms Performed Using a Digital Imaging System. Respondents were reminded that the information was gathered for statistical evaluation only, and that results would not be linked to individual respondents. The results of the demographic survey are described in Table 1.

Overview of Demographic Responses

While 480 respondents completed some information on the demographic questionnaire, not all questions were answered by all respondents. When reviewing the data it is important to note that respondents were asked to indicate all answers that applied for some categories (e.g., professional memberships), so the calculation totals may exceed the total number of respondents.

The gender of the respondents was evenly dispersed (47% male, 49.7% female) and the primary age range was 35 to 44 (43%), with 90% of the respondents falling between the ages of 25 to 54. Of those surveyed 85% were White, with 3% Native American, 1% African American, 1% Mexican American and 2% Hispanic American. The educational data established that 33% of the respondents held a four-year college degree, 15% held a two-year college degree, and 23% had attended college at some point.

Responding to the query about length of professional experience, 46% had 7-15 years of experience, with 19% having between 16-20 years and 13% having more than 20 years experience. The vast majority of respondents work in private practice (66%), with 11% working in a hospital setting and 13% working in a university/academic setting. The practice settings are primarily urban (53%) with the concentration of practices in the Great Lakes/Midwest, Southeast and Northeast Regions (75% total, with an even 25% distribution each).

Respondents were asked to describe the number of angiograms performed each year, with the highest percentage of respondents reporting to take more than 1000 (24%), followed by those taking between 601 and 1000 (22%). This data suggests that the respondents actively and regularly perform the angiographic skills being surveyed.

Additional information was queried concerning respondent use of digital imaging systems. The majority (67%) of respondents reported taking no digital image photographs, with a combined total of 15% taking between 51 and 100% of all photographs with digital imaging systems. This information seems to indicate that while many retinal angiographers do not use or have access to digital imaging systems, that there is a sub-group of professionals using the technology for a significant part of their practice.

Under Certificates/Licenses, 241 respondents held the Certified Retinal Angiographer (CRA) designation, 106 held the Certified Ophthalmic Assistant (COA) designation, and there were 91 Certified Ophthalmic Technicians (COTs). Most Professional Memberships described were in the Ophthalmic Photographers Society (88%), Association of Technical Personnel in Ophthalmology (15%), or other associations not listed on the survey (24%).

From the 410 respondents listing a job title, over 120 different titles or combination of titles were supplied. Titles that were similar or nearly identical have been combined.

The profile of the typical respondent is white, having 7 or more years of experience as an ophthalmic photographer, with achievement of higher education, who is working in an urban private practice.

Rating of Tastes

For each of the tasks on the survey, respondents were asked to judge the importance of the task to the criticality of competent practice on a scale of 1 to 5. Respondents were reminded that they were not to judge criticality according to the amount of time spent performing the task, or the frequency of the task performance. The importance ratings were described in the following manner:

- (5) Extremely Important:** Performance of this task is absolutely critical to competent performance of retinal angiography. All competent, entry-level retinal angiographers must be able to perform this task.
- (4) Very Important:** Performance of this task is very important. Most competent, entry-level retinal angiographers need to be able to perform this task.
- (3) Moderately Important:** Performance of this task is moderately important. Some competent, entry-level retinal angiographers will be able to perform this task.
- (2) Of Little Importance:** Performance of this task is not critical to competent practice. Few, if any, competent, entry-level retinal angiographers are able to perform this task.
- (1) Of No Importance:** Entry-level retinal angiographers do not perform this task. Performance of this task is unimportant, unnecessary, or outside of the scope of practice.

Data were analyzed for each task on the survey to determine the number of respondents who answered the item, a mean value, standard deviation and minimum and maximum ratings. There were 162 tasks on the survey. These tasks and their mean criticality ratings are listed in Table 2.

Data Overview

It is interesting and encouraging to note that there was a high degree of homogeneity in the data, with the majority of the tasks classified within the *Very Important* range. This homogeneity supports the fact that despite the diversity among the roles and professional settings, the survey provided an accurate profile of the important tasks associated with the role, regardless of application.

As a balance to this homogeneity, there were also 29 tasks that were judged to fall within the *Moderately Important -to-Of Little or No Importance* range. The design of the survey was meant to describe a full range of tasks, from those that were very important to those that were less important. These findings give us confidence that the survey, as intended, described a full complement of tasks associated with the role, and that the respondents provided the needed criticality distribution to those tasks. The tasks deemed not critical to competent practice were those receiving a criticality rating below 3.5 (on a scale of 1 to 5).

One representation of the precision of the survey was the standard deviation calculation for each of the responses. This calculation represents the dispersion of the responses about the mean rating. For our survey, the range was represented by values between 0-5, with 5 representing a large dispersion, and 0 an indication that respondents were in perfect

agreement. A review of the standard deviations indicates that all fell in the range of less-than-1 to less-than-1.3, showing very little variability among the respondents rating of task criticality. This lack of variability in standard deviation values gives us confidence in the continuity of the response data.

Respondent Designation of Tasks Omitted from the Survey

Another representation of the precision of the survey was the nature and number of comments received from respondents. There were 106 respondents taking the time to make comments, but only 7 tasks were consistently listed by four or more respondents.

Respondents noted that competent retinal angiographers were often called upon to demonstrate strong communication and presentation skills (the ability to communicate the results of their work to others) as well as the related skill of participating in a full health care team. Six respondents noted that angiographers needed the less explicit skill of "caring" for, or providing "nursing care" for patients. Taking other medical photographs was also mentioned as an important skill, as was the performance of slit lamp examinations and slit lamp photography.

Profile by Content Area

A narrative interpretation of the survey results follows, based upon the relative importance of the tasks. Please keep in mind that with most tasks falling into the higher criticality range, this attempt to discriminate between degrees of importance is designed to highlight the most critical tasks, and to describe those that were deemed unimportant.

The first content area, **Anatomy of the Eye**, contained only four tasks, all of which were deemed important to competent practice. The task relating to the understanding of external ocular structures received the lowest rating of the four tasks.

Physiology of the Eye, the second content area, contained 17 tasks, the majority of which received criticality ratings in the *Very Important to Extremely Important* range. The exception to this was the three tasks relating to the physiology of the external structures of the eye (lids and lacrimal system, ocular muscles and sclera/conjunctiva). These three tasks received ratings in the *Moderately Important* range. This appears to be a reflection of the respondent group view that the retinal angiographer needs to demonstrate an understanding of the anatomy of the external ocular structures, but that knowledge of the physiology of the external structures is not as closely related to competent practice. The tasks receiving the highest ratings in this content area related to an understanding of the circulation properties of the retina and choroid.

The six tasks associated with the third content area, **Pathology of the Eye**, were all deemed important to competent practice, with the tasks of recognizing, identifying and understanding the implications of diabetic retinopathy and macular/retinal degenerations being most critical to competent practice.

Patient Management, the fourth content area, contained twenty tasks, the most critical being the ability of the retinal angiographer to recognize and respond to adverse reactions to pharmacologic agents. The skill of answering patient questions concerning the procedure was also highly critical. Three tasks were only *Moderately Important*: assessment of patient visual acuity prior to dilation, performing punctual occlusion, and maintaining a computer data base. The rating of the first two tasks may be a reflection of the differing scope of practices within different jurisdictions. The third seems to relate to a general rating of clerical tasks as less important.

While the fifth content area, **General Photography Skills**, contained the largest number of tasks (56), it was also the area where the greatest number of tasks (21) were deemed to be non-critical. Tasks that were deemed non-critical appear to relate to the use of Polaroid® (instant) film/cameras, the use of digital capture/storage systems, manual processing of color film, and tasks relating to black and white, or color film automatic processing. The three most critical tasks (falling within the Very Important range) related to the recognition of the sources, and corrections for artifacts on images.

Patient/Operator Safety, the sixth content area, contained only three skills, all of which were given high criticality ratings (4.40 - 4.48).

The seventh content area, **Fundus Photography** contained 21 tasks, all of which were deemed critical to competent practice. The uniformity of the high ratings of these tasks is not surprising, and is a reflection of the fact that the tasks are central to the role. The highest rated tasks related to the proper loading of the film in the camera, the setting of the reticle for accommodative correction, the positioning of the patient and the establishment of alignment and focus.

Of the 27 tasks in the eighth content area, **Fluorescein Angiography**, all but two were rated within the *Very Important* range. Only the tasks related to performance of iris angiography and the use of infra-red (ICG) filters were not critical to competent practice. The most critical tasks related to the angiographers ability to respond to any adverse reactions experienced by the patient.

The last content area, **Pharmacology**, contained only 8 tasks, all of which were rated to be important to competent

practice. Reflective of results seen in other content areas, the tasks relating to the ability to understand and recognize contraindications and adverse reactions to intravenous agents was the most critical task in the content area.

CONCLUSION

The job analysis survey identified 133 tasks with a mean importance rating of 3.5 or greater. The response data indicates that these tasks are critical to competent performance as a retinal angiographer. Test specifications for the CRA written and performance examinations are based on these results and reflect the current standard of practice.

It is generally recommended that job analysis data be reviewed every three to five years to determine each task's continued relevance to the role being certified, and the appropriateness of the technology used in practice. Periodic review would ensure the continued job relevancy of the CRA test specifications in light of changing photographic technology, as well as general changes in health care in North America.

REFERENCES

1. "NCCA Guidelines for Certification Approval, Executive Summary." 1991; National Commission for Certifying Agencies Publication.
2. "NOCA Guidelines for Certification Approval."; National Organization for Competency Assurance Publication.

**Table 1.
Demographic Data Results**

Number of Respondents:	480
 Gender	
Male:	228
Female:	239
 Age:	
Under 25	11
26-34:	128
35-44:	205
45-54:	100
55-64:	19
Over 65:	4

**Table 1. –Continued–
Demographic Data Results**

Self Description:

African American:	5
Asian American:	5
Hispanic American:	10
Mexican American:	7
Native American:	16
Puerto Rican American:	5
White:	412
Other:	15

Current Education:

No High school:	7
High School:	19
Some College:	111
Vocational:	53
2 year degree:	72
4 year degree:	162
Masters:	25
Other:	21

Length of Professional Experience:

Less than 2 years:	10
2 years:	8
3 years:	16
4-6 years:	71
7-15 years:	220
16-20 years:	90
More than 20 years:	63

Professional Setting:

Hospital:	55
Private Practice:	319
University/Academic:	64
Other:	39

Certificates/Licenses Currently Held:

CRA:	241
COPRA:	1
RBP:	2
OD:	3
MD:	5
COA:	106
COT:	91
COMT:	20
LPN:	10
RN:	10

Professional Memberships

Ophthalmic Photographers' Society:	433
Biological Photographers' Association:	33
Assoc. of Technical Personnel in Ophthalmology:	71
Other:	89

Number of Angiograms Performed per Year:

Less than 50:	21
50-100:	24
101-150:	29
151-300:	77
301-600:	98
601-1000:	104
More than 1000:	117

**Annual percentage of Angiograms Performed
Using a Digital Image System:**

None:	324
1%-25%:	55
25%-50%:	1
51%-75%:	12
76%-99%:	33
100%:	28

Practice Setting:

Rural:	56
Suburban:	136
Urban:	280

Geographic Region:

Great Lakes/Midwest:	119
Northeast:	126
Pacific/Northwest:	30
Southeast:	104
West:	65
Other:	33

**Table 1. –Continued–
Demographic Data Results**

Job Titles:

Ophthalmic Photographer	110
Director/Supervisor/Head of Photography	46
Ophthalmic Photographer/Technician	35
Clinic Manager/Supervisor	34
Certified Retinal Angiographer.....	28
Certified Ophthalmic Technician	23
Certified Ophthalmic Assistant	19
Retinal Photographer	12
Ophthalmic Technician	12
Photographer	11
Medical Photographer	11
Technical Supervisor	11
Technician	10
President	10
Nurse	9
Technician/Photographer	7
Certified Ophthalmic Medical Technologist	2
COA/LPN	2
Retinologist	1
Ophthalmologist	1
Other	16
Title Not Supplied	70

**Table 2.
Task Analysis Survey with Data Results**

Tasks with a mean importance rating of 3.5 or greater are considered critical to competent practice.

Description of Task Mean Rating

I. Anatomy of the Eye

A. Demonstrate an understanding of external ocular structures	<u>3</u> .848
B. Demonstrate an understanding of anterior and posterior segment structures	<u>4</u> .278
C. Demonstrate an understanding of ocular landmarks	<u>4</u> .468
D. Demonstrate an understanding and use of directional terminology (anterior, posterior, nasal, temporal, etc)	4.556

II. Physiology of the Eye

A. Understand the physiology of ocular structures including:

1. external structures:	
a. lids and lacrimal system	3 256
b. ocular muscles	3 174
c. sclera/conjunctiva	3 326
2. anterior structures:	
a. cornea	3 856
b. anterior chamber	3 789
c. iris	3 856
d. lens	3 912
e. filtering angle	3 607
3. posterior structures:	
a. posterior chamber	4 212
b. vitreous	4 256
c. retina	4 545
d. pigment epithelium	4 414
e. choroid	4 429
f. optic nerve	4 452

B. Understand the circulation properties of the:

1. retina	4 538
2. choroid	4 479
3. optic nerve	4 391

III. Pathology of the Eye

A. Recognize and identify the ocular manifestations and implications of:

1. systemic diseases including:	
a. diabetic retinopathy	4 348
b. vascular diseases	4 294
2. macular/retinal degenerations	4 331
3. optic nerve disorders	4 148
4. ocular lesions	4 173
5. ocular trauma	3 900

IV. Patient Management

A. Perform a patient flashlight examination to determine:

1. contraindications to dilation:	
a. narrow angles	3 943
b. contact lenses	3 688
c. iris fixated/anterior chamber intraocular lens	3 947
2. media conditions (e.g., scarring/cornea and lens)	3 809
3. presence of inflammation (e.g., infection)	3 723

B. Inform patient of procedures to be performed, pharmacologic agents to be administered, expected outcomes and potential side effects	4_374	3. understand the function and properties of the following materials:	
C. Answer patient questions concerning the procedure	4_438	a. film types including:	
D. Elicit cooperation from uncooperative or physically disabled patients	4_378	(1) 35mm black and white	4_211
E. Provide for written informed consent for angiography	4_140	(2) 35mm color transparency film	4_089
		(3) Polaroid® (instant) color film and black and white	3_332
E Establish/review patient records including:		b. digital storage media	3_043
1. medical/surgical history	3_697	4. understand film properties including:	
2. allergies	4_227	a. ISO/film speed	4_192
3. pregnancy	4_234	b. contrast	4_167
4. ocular history	3_964	c. exposure	4_234
G. Assess patient visual acuity before dilation	3_367	d. color balance	3_827
H. Administer prescribed drops		D. Demonstrate the use of the following image output equipment and materials:	
1. perform punctual occlusion	3_182	1. enlarger	3_609
2. monitor and assess the effects of the drops	3_742	2. contact printer	3_690
I. Recognize and respond to adverse reactions	4_481	3. film processing equipment including:	
J. Maintain documentation of procedures/photographic records	4_329	a. manual processing equipment:	
1. maintain computer data base	3_116	(1) for black and white film	4_055
2. organize manual archival system	3_811	(2) for color film	2_662
V. General Photography Skills		b. automatic processing equipment:	
A. Demonstrate basic computer skills	3_060	(1) for black and white film	3_459
B. Stock and inventory the photographic suite with supplies	3_906	(2) for color film	2_686
C. Demonstrate the use of the following image acquisition equipment and materials:		4. laser/digital printer	2_717
1. understand the function and components of the fundus camera including:		5. slide imprinter/mounter	2_970
a. 35mm cameras	4_410	6. slide copier	2_807
b. Polaroid® (instant film) cameras	3_403	7. slide projector	3_230
c. digital capture systems	3_124	8. papers such as:	
2. perform routine maintenance and equipment troubleshooting including:		a. graded photographic	3_239
a. replacing viewing bulbs and flash tubes	4_346	b. variable contrast photographic ...	3_279
b. replacing fuses	4_265	c. thermal	2_603
c. cleaning equipment, including lenses	4_377	d. dye sublimation	2_441
		e. plain paper and toner medium (used in printers)	2_543
		E. Demonstrate the ability to sort stereo slide pairs	4_205
		E Demonstrate the ability to process black and white film by:	
		1. establishing a light-free environment..	4_200
		2. loading reels and tanks to process film using:	
		a. manual processing equipment	4_144
		b. automatic processing equipment . .	3_637
		3. select and use processing chemicals . .	4_158
		4. coordinate chemical temperature, dilution and timing with film exposure	4_173
		5. monitor processed film for:	
		a. contrast	3_985
		b. density	3_977
		c. granularity	3_855
		6. dry the film	3_909
		7. prepare the film for filing	3_968

G. Demonstrate the ability to print black and white film by:	
1. using appropriate safe-light conditions	3 989
2. generating a contact print with:	
a. an enlarger	3 734
b. a contact printer	3 633
3. generating a contact print:	
a. on paper by:	
(1) using contrast filters	3 474
(2) establishing correct exposure	3 810
b. on film by:	
(1) establishing correct exposure	3 911
4. generate an enlargement on paper by:	
a. using contrast filters	3 445
b. establishing correct exposure	3 647
H. Demonstrate the ability to develop black and white images with:	
1. manual processors	3 951
2. automatic processors	3 397
I. Demonstrate the ability to produce digital images	2 939
J. Recognize the sources, and correct the conditions causing artifacts on images related to:	
a. operator errors	4 326
b. mechanical failure	4 276
c. processing/printing errors	4 251

VI. Patient/Operator Safety

A. Demonstrate proficiency in CPR	4 435
□. Adhere to Universal Precautions as defined by the Center for Disease Control (CDC)	4 487
C. Observe Occupational Safety and Health Administration (OSHA) and The National Institute for Occupational Safety and Health (NIOSH) regulations relating to ophthalmic photography	4 403

VII. Fundus Photography

A. Demonstrate the techniques of image production:	
1. set reticle for accommodative correction	4 582
2. verify photographic request	4 496

3. establish photographic sequence plan	4 442
a. Adjust photo sequence during photography in response to unusual situations or findings	4 418
4. set viewing angle	4 338
5. select camera back	4 448
6. load camera back with film	4 630
7. set flash power	4 591
8. set shutter/flash synchronization	4 446
9. set viewing light	4 355
10. verify filter positions	4 595
11. photograph patient ID	4 434
12. position patient for photography	4 514
13. establish fixation	4 471
14. establish alignment and focus	4 618
15. recognize the need for diopter compensation	4 491
16. perform fundus photography:	
a. non-stereoscopic	4 365
b. stereoscopic	4 407
c. using astigmatic correction device	3 891
17. perform anterior segment photography with a fundus camera to document:	
a. media opacities	4 042
b. gross anterior pathologies	4 057

VIII. Fluorescein Angiography

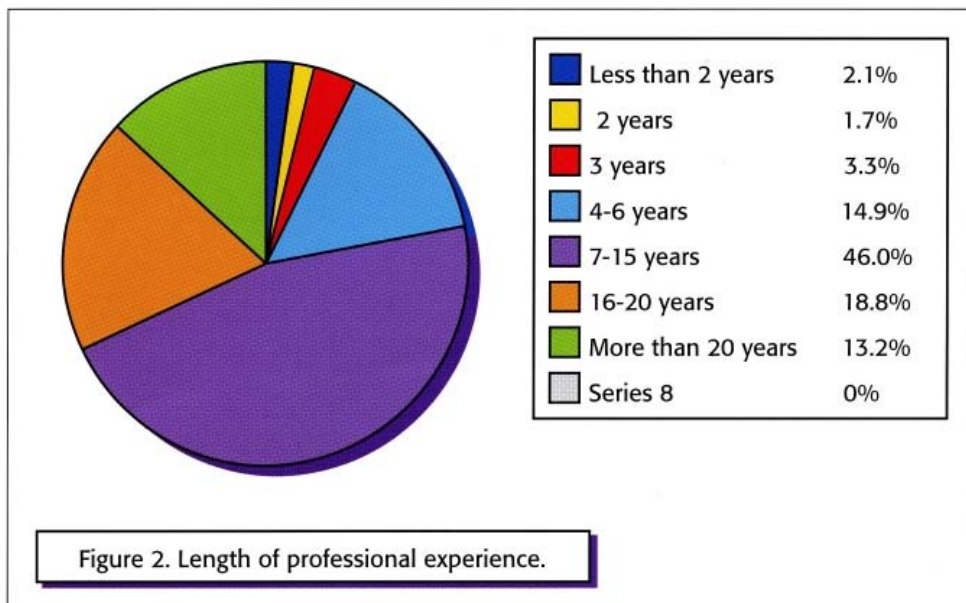
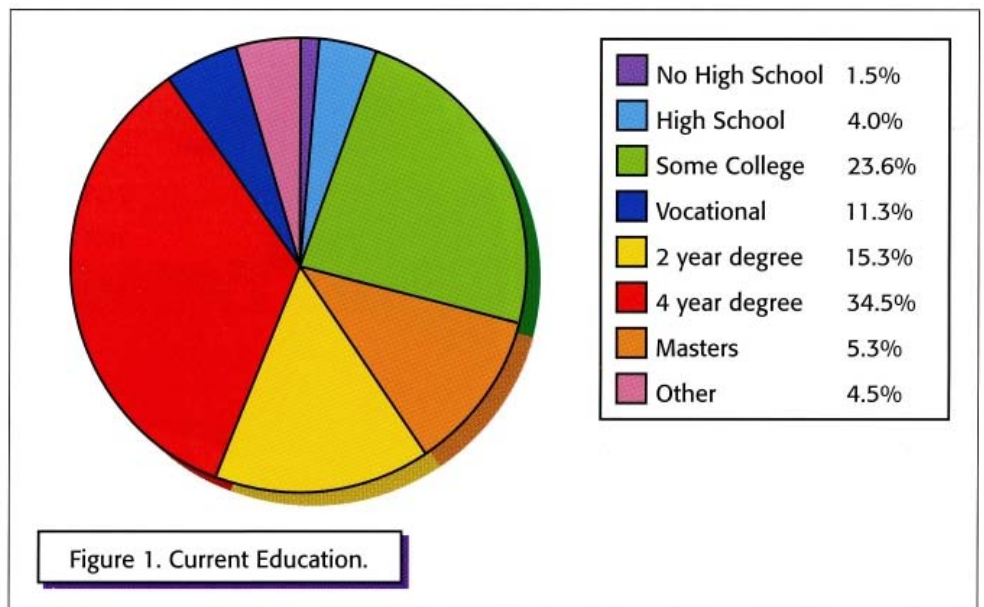
A. Perform fluorescein angiography including:	
1. making preparations for IV fluorescein injection	4 335
2. performing red free photography in:	
a. non-stereoscopic images	4 269
b. stereoscopic images	4 165
3. taking a control photograph	4 126
4. coordinating the establishment of intravenous access to photographic requirements	4 345
5. starting timer concurrent with the administration of dye	4 463
6. executing the pre-determined photographic sequencing of:	
a. non-stereoscopic images	4 303
b. stereoscopic images	4 271
7. monitoring and assessing the patient response to the procedure	4 562
8. responding to any adverse reactions experienced by the patient	4 645
9. iris angiography	3 324
B. Understand the theory of luminescence including:	
1. fluorescence	4 242
2. pseudo- and autofluorescence	4 172

- 3. filtration including:
 - a. excitation filters 4 346
 - b. barrier filters 4 342
 - c. monochromatic filters including:
 - (1) red-free 4 185
 - (2) green-free 3 811
 - d. infra-red (ICG) filters 3 211
- C. Perform descriptive angiographic interpretation by recognizing:
 - 1. the phases of circulation including:
 - a. early phase (filling phase) 4 273
 - b. mid phase 4 252
 - c. late phase 4 265

- 2. the mechanisms of hyperfluorescence including:
 - a. transmission 4 092
 - b. leakage 4 102
 - c. staining pooling 4 100
- 3. the mechanisms of hypofluorescence including:
 - a. blockage 4 100
 - b. filling defects 4 096
- 4. anatomical location of lesions 4 238

IX. Pharmacology

- . Understand and recognize the properties and effects of pharmacologic agents used in ophthalmic photography including:



- 1. topically administered:
 - a. miotics 3 933
 - b. mydriatics 4 006
 - c. cycloplegics 3 979
 - d. anesthetics 3 865

- 2. intravenously administered:
 - a. sodium fluorescein 4 388
 - b. indocyanine green (ICG) 3 500

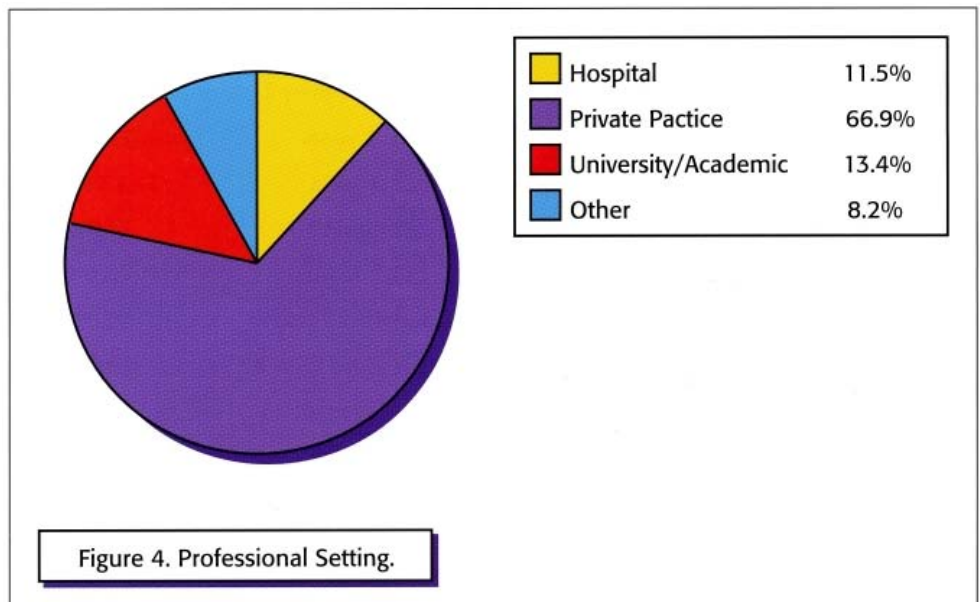
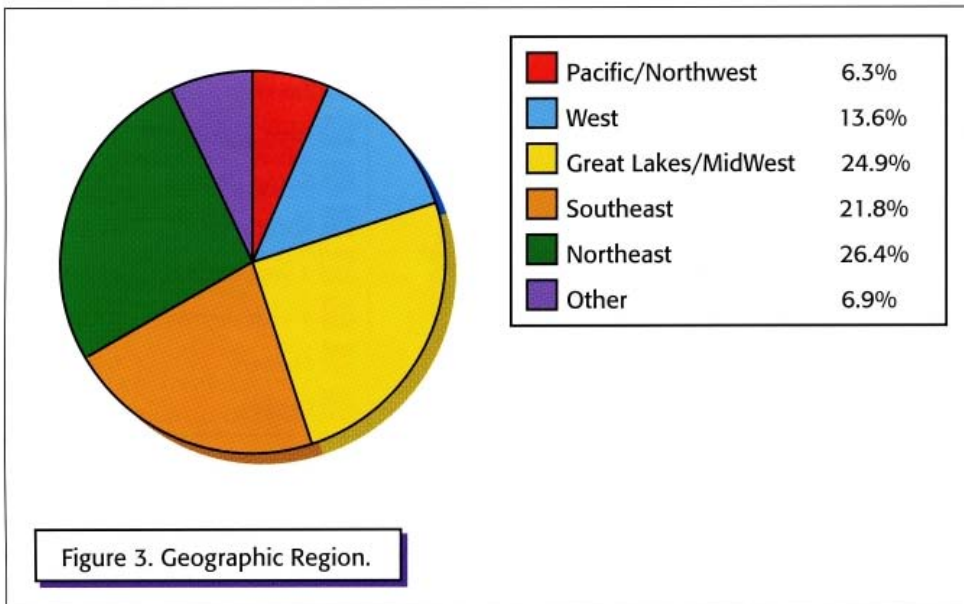
B. Understand and recognize contraindications and adverse reactions to:

- 1. topical agents 4 279
- 2. intravenous agents (e.g., fluorescein, indocyanine green) 4 569

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Key words: Certification, Retinal Angiographer, Job Analysis, Validity

