

Published in final edited form as:

JAAPOS. 2012 April; 16(2): 177–181. doi:10.1016/j.jaapos.2011.12.154.

# Training fellows for retinopathy of prematurity care: A Webbased survey

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# Abstract

Purpose—To characterize the training received by pediatric ophthalmology and retina fellows in ROP management.

**Methods**—Pediatric ophthalmology and retina fellowship programs were emailed a Web-based survey to assess fellowship training in ROP management.

Results—Of 140 programs contacted, 42 (30%) participated, resulting in 87 surveys for analysis. Of the 87 respondents, 25 (29%) reported that two-thirds or less of ROP examinations performed by fellows were also seen by an attending. When stratified by specialty, this trend was statistically different between pediatric ophthalmology and retina fellows (P = 0.03). Additionally, pediatric ophthalmology fellows performed fewer laser photocoagulation procedures than retina fellows (P < 0.001). Regarding fellows' perceived competency in ROP management, 3 of 51 (6%) felt competent at the start of their fellowship and 43 of 51 (84%) felt competent at the time of the survey. Only 7% of respondents reported the use of formal evaluations at their programs to assess fellow competence in ROP examination.

**Conclusions**—Training programs for fellows in pediatric ophthalmology and retina vary greatly with respect to ROP training and the quality of clinical care. Many clinical ROP examinations are being performed by pediatric ophthalmology and retina fellows without involvement and/or direct supervision by attending ophthalmologists. Our findings have important implications for the development of a future workforce for ROP management.

> Despite recent advances in the management of retinopathy of prematurity (ROP), the disease remains a major clinical challenge and a leading cause of childhood blindness in the United States. Improvements in medical care have translated into increased neonatal survival rates and a growing number of infants at risk for ROP.<sup>2,3</sup> Meanwhile, the number of ophthalmologists who manage ROP is limited and expected to decrease. A 2006 American Academy of Ophthalmology survey showed that only half of retinal specialists and pediatric ophthalmologists were willing to manage ROP and that over 20% planned to stop providing ROP care in the future because of concerns over issues such as medicolegal liability and the complexity of scheduling care.4

> Presumably in response to such pressures, a recent study showed that a large number of practicing ophthalmologists without pediatric ophthalmology or retina subspeciality training are performing ROP screening and treatment.<sup>5</sup> We are aware of institutions that are utilizing

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fellows and other ophthalmology trainees for primary evaluation of ROP patients because of these logistical difficulties. It is thus important to characterize the training that retina fellows and pediatric ophthalmology fellows are currently receiving in ROP to gauge the current quality of clinical care and to plan for more effective training programs, especially because, as we have previously shown, pediatric ophthalmology and retina fellows are less adept than experienced attending ophthalmologists at identifying clinically significant ROP when examining digital images. We aimed to address this gap in knowledge by characterizing the training received by pediatric ophthalmology and retina fellows in ROP examination and management through responses to a Web-based survey completed by these fellows and their supervising attendings.

## **Methods**

This study was approved by the Weill Cornell Medical College Institutional Review Board and was in compliance with the Health Insurance Portability and Accountability Act. A Web-based survey was created using a publicly available service (http://www.SurveyMonkey.com).

We developed a survey with a combination of multiple-choice and single-response questions; one question allowed for additional free-text comments. Attendings were asked to complete additional demographic and practice questions. Questions were reviewed by all coauthors for face validity and content validity and modified until all authors were satisfied with the survey instrument. Pilot testing was performed on one retinal specialist. A copy of the survey can be viewed online (e-Supplement 1, available at jaapos.org).

All pediatric ophthalmology and retina fellowship programs listed in the San Francisco Match (a service responsible for the coordination, processing distribution, and review of applicants for postgraduate medical education; sfmatch.org) database were invited via email to participate. Initial emails were sent to program coordinators listed in the database, unless specific contact information for the fellowship program directors at individual programs was known by the authors. Those programs that indicated willingness to participate provided email contact information for the fellows (physicians in training) and attendings (supervising physicians) who participated in ROP evaluations. A follow-up email inquiry was sent to nonresponding program directors a month later.

A link to the survey, which included a click-through online informed consent form, was sent to individuals.. Those who did not complete the Web survey within one month were sent a follow-up email reminder. Surveys were completed between January 2010 and June 2010.

Data collection, analysis, and descriptive statistics were calculated using spreadsheet and statistical software (SPSS 19; IBM, Armonk, NY). Comparative analyses were performed with bins using the Fisher exact test of independence to determine if the survey response was independent of responder type.

#### Results

A total of 140 fellowship programs (44 pediatric ophthalmology and 96 retina) were contacted regarding this study. Of these, 56 (40%) responded to our initial inquiry and provided emails of attendings and fellows eligible to participate. This resulted in 123 surveys emailed to willing participants, of which 100 (81%) were completed by participants. This represented an actual survey response from 42 of 140 (30%) of the original programs solicited. Broken down by specialty, we had participation from 19 of 44 pediatric ophthalmology (43%) and 23 of 96 retina fellowship programs (24%).

Eleven respondents were excluded because they indicated they did not take part in ROP evaluation and an additional 2 were excluded due to incomplete surveys, thereby leaving 87 total surveys for analysis. Table 1 shows the breakdown of analyzed responses.

Of the 54 responses from retina programs (19 attendings, 35 fellows), 15 (28%) estimated that fellows performed 1–100 ROP examinations in the NICU over the course of fellowship training, 16 (30%) estimated 101–200 examinations, 10 (19%) estimated 201–300 examinations, 2 (4%) estimated 301–400 examinations, and 11 (20%) estimated >400 examinations. Of the 33 responses from pediatric ophthalmology programs (17 attendings, 16 fellows), 12 (36%) estimated that fellows performed 1–100 ROP examinations over the course of training, 11 (33%) estimated 101–200 examinations, 3 (9%) estimated 201–300 examinations, 3 (9%) estimated 301–400 examinations, and 4 (12%) estimated >400 examinations. Analysis showed that number of ROP examinations was independent of specialty (ie, retina vs pediatric ophthalmology, P = 0.5). Separate analysis showed responses were independent of responder type (ie, attending vs fellow, P = 0.5).

Figure 1 shows all attending and fellow responses, stratified by specialty (pediatric ophthalmology vs retina), estimating the percentage of fellow ROP examinations also seen by an attending. Analysis showed that the percentage of fellows' ROP examinations also seen by an attending was dependent on specialty (P= 0.03). Separate analysis showed that responses were independent of responder type (attending response vs fellow response, P= 0.9). Subset analysis of only retina fellows showed responses were independent of year training (year 1 vs year 2, P= 0.3).

Figure 2 shows all attending and fellow responses, stratified by specialty (pediatric ophthalmology vs retina), estimating the percentage of fellow ROP examinations performed under direct supervision of an attending. Analysis showed that the responses were dependent on specialty (P< 0.001). Separate analysis showed responses were independent of responder type (attending response vs fellow response, P= 0.5). Subset analysis of only retina fellows showed responses were independent of year training (year 1vs year 2, P= 0.8).

Figure 3 summarizes attending and fellow responses regarding the estimated number of ROP laser photocoagulation procedures performed by fellows over their course of training. Analysis showed that estimated number of ROP lasers performed by fellows was dependent on specialty (P< 0.001). Separate analysis showed that responses were independent of responder type (attending response vs fellow response; P= 0.69). Subset analysis of only retina fellows showed responses were independent of year training (year 1 vs year 2; P= 0.7).

We surveyed fellows regarding their self-assessed competency in ROP management before their fellowship and during the time of survey participation (at least 6 months into their fellowship). Of the 51 fellow responses (35 retina fellows, 16 pediatric ophthalmology fellows), 3 (6%) felt competent in ROP management at the start of their fellowship, whereas 43 (84%) felt competent in ROP management during the time of survey participation. Analysis showed that self-reported competence was dependent on status of fellowship training (P< 0.0001). Separately by specialty, 3 of 35 retina fellows (9%) and 0 of 16 pediatric fellows felt competent in ROP management at the start of their fellowship, whereas 30 of 35 retina fellows (86%) and 13 of 16 pediatric fellows (81%) felt competent in ROP management during their fellowships.

Five of 36 attendings (14%) and 1 of 51 (2%) fellows reported there were formal evaluations of fellows' ROP examination. Two of these attendings and the 1 fellow reported that formal evaluation consisted of frequent comparison of fellow examination findings and diagnosis with those of the attending. Of note, 2 other attendings stated they did not have formal

evaluations but also mentioned comparison of fellow findings to their own as an evaluation tool.

### **Discussion**

This study employed a Web-based survey to examine the training of pediatric ophthalmology and retina fellows in the management of ROP. Key findings were: (1) many ROP examinations are being performed by fellows, without involvement and/or direct supervision by an attending ophthalmologist; (2) pediatric ophthalmology fellows performed significantly fewer laser photocoagulation procedures than retina fellows; (3) most pediatric ophthalmology and retina fellows did not feel competent in evaluating ROP prior to fellowship; and (4) there is a lack of formal evaluation of fellows' competency in ROP evaluation.

A large number of ROP examinations performed in the NICU by pediatric ophthalmology and retina fellows were not also seen by an attending ophthalmologist. This trend was significantly different in the training of retina fellows when compared to pediatric ophthalmology fellows (Figure 1). Without follow-up by attending ophthalmologists, fellows were performing ROP examinations unsupervised, though we do recognize the possibility that some of these examinations may have been on babies with a low likelihood or little evidence of severe ROP. This finding may not be surprising in the general context of in-patient academic medicine, where trainees have much more interaction with patients compared to attending physicians. However ROP diagnosis and treatment plans are entirely based on examination findings: under-diagnosis could lead to progression of disease and visual loss, while over-diagnosis could lead to unnecessary examinations and treatment. Therefore our findings raise some concerns, especially because previous data from our group has found that fellows show variability in their recognition of clinically significant ROP when examining standardized digital images. <sup>6,8</sup>

Even among ROP examinations in the NICU performed by both a fellow and an attending ophthalmologist, our study showed that many were performed without attending directly supervising fellows at the time of their examinations (ie, fellow examines baby alone, but attending follows with examination at a different time [Figure 2]). Separate examinations for ROP evaluation result in increased stress for already sick infants as well as logistical challenges with respect to coordination of care in the NICU. Fellows examining under the direct supervision of attendings may minimize these issues while also providing learning opportunities with regard to clinical findings, treatment recommendations, and examination techniques.

Of all the pediatric ophthalmology and retina fellows surveyed, the vast majority did not feel competent in ROP evaluation at the start of their fellowship training; moreover, in a separate Web-based survey of ophthalmology residents, we found that the majority also felt unable to perform ROP examinations competently (Nagiel A, Espiritu MJ, Wong RK, et al. Assessing the quality and extent of ROP training during residency: A Web-based survey. IOVS 2011;52:ARVO E-Abstract 3158). These findings raise concerns because Kemper and colleagues<sup>5</sup> showed that a large proportion of ophthalmologists without fellowship training are performing ROP screening and treatment. Future studies would be helpful in determining whether there is a difference in competency between fellowship-trained ophthalmologists and their counterparts without such training.

Another key finding showed that over the course of fellowship training, pediatric ophthalmology fellows performed significantly fewer ROP laser photocoagulation procedures than retina fellows (Figure 3). Additionally, there was a lack of formal

evaluation of fellows' competency in ROP evaluation. These findings demonstrate possible areas of improvement and standardization regarding fellowship training. Perhaps there is a need to establish minimum number of ROP examinations and laser procedures required during fellowship training, much like those required in ophthalmology residency programs. <sup>10</sup> Currently, the Association of University Professors of Ophthalmology's Fellowship Compliance Committee, which promotes uniform training standards, does suggest minimum operative numbers for retina fellows regarding scleral buckles and vitrectomies. However, no such recommendations exist for pediatric ophthalmology and retina fellows with regard to ROP examinations or laser procedures. <sup>11,12</sup> Furthermore, many current tools used in residency programs, such as ophthalmic clinical exercises (OCEX), 360° assessments, and global faculty performance ratings may warrant some use for ROP training as well. <sup>13–16</sup>

We recognize main limitations of our study. First, the comparison of one-year pediatric ophthalmology fellowships versus two-year surgical retina fellowships. This may create biases because of the increased length of training of retina fellows; however, the purpose of our study was to assess training trends over an entire fellowship. Additionally, we feel our study accurately represents current educational trends and state of practice, where most fellows are considered competent in their speciality upon completion of fellowship, regardless of length of training. Finally, the difference we found for the number of laser procedures performed by pediatric ophthalmology fellows versus retina fellows occurred despite similar numbers of ROP examinations between the two groups.

Second, we surveyed both attendings and fellows, and then combined their responses for much of our analysis. This approach allowed us to incorporate of as many perspectives as possible and gave the most reliable representation of current trends in training. At the same time, it raised the possibility of obscuring potential differences or conflicting data between responses from attendings and fellows (attendings' perceptions of their training of fellows versus fellows' perceptions of how they are being trained). However, analysis did not show any statistically significant differences in responses from all attendings versus all fellows, pediatric ophthalmology attendings versus pediatric ophthalmology fellows, or retina attendings versus retina fellows.

Third, in our analysis some fellowship programs had more participants than others. This raises the possibility that responses from these programs may bias the overall results. However it should be noted that some of these programs were larger ones which contribute more to the overall workforce.

Finally, even though we had a high rate of return for surveys emailed (81%), we may not be able to generalize our results since only 43% pediatric ophthalmology and 24% retina fellowship programs listed in the SF Match database participated; however, this level of participation is comparable to recently published research using surveys, where response rates ranged from 10% to 44%. <sup>17–20</sup> It is possible that some nonparticipating programs did not respond because their fellowships do not offer ROP training, but future studies and a more accurate count of these fellowship programs would be helpful.

# **Supplementary Material**

Refer to Web version on PubMed Central for supplementary material.

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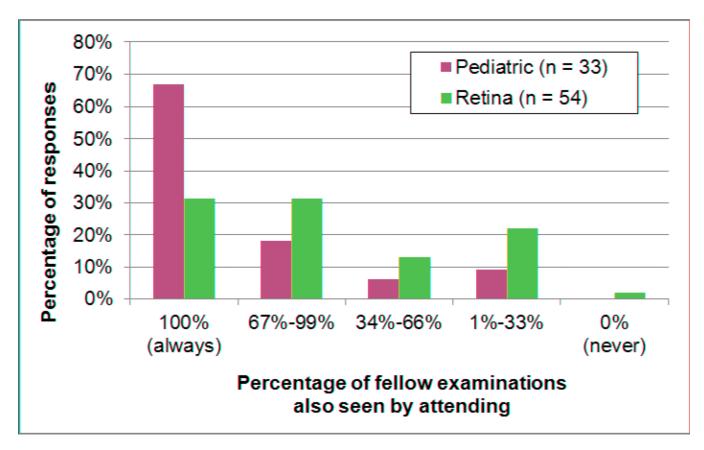
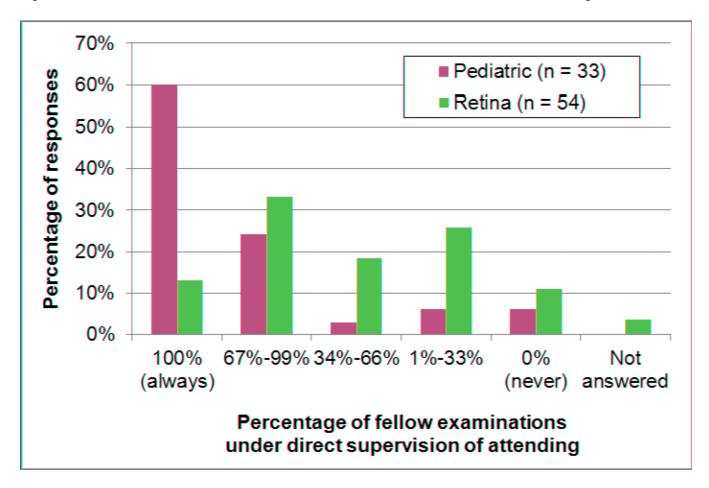
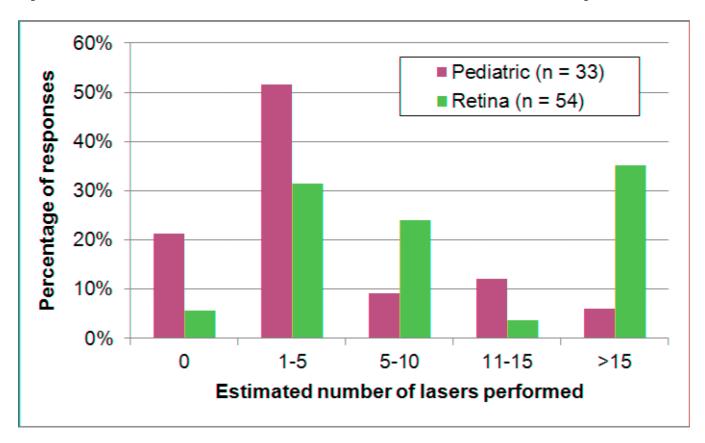


FIG 1. Attending and fellow responses on the percentage of ROP examinations performed by a fellow that are also seen by an attending, stratified by specialty.



**FIG 2.** Attending and fellow responses on the percentage of fellows' ROP examinations performed under the direct supervision of an attending, stratified by specialty.



**FIG 3.** Attending and fellow responses to number of ROP laser photocoagulation procedures performed by fellows during the course of their training, stratified by specialty.

Table 1

Survey participants that were analyzed, broken down by program (retina vs pediatric ophthalmology fellowship) and responder type (attending vs fellow)

A. Retina Programs						
Retina program	Attendings <sup>a</sup>	Fellows <sup>b</sup>	Total participants per program			
1	0	2	2			
2	1	1	2			
3	1	3	4			
4	1	3	4			
5	1	3	4			
6	1	1	2			
7	1	1	2			
8	1	2	3			
9	1	2	3			
10	1	4	5			
11	0	1	1			
12	2	2	4			
13	0	1	1			
14	1	3	4			
15	1	1	2			
16	0	1	1			
17	1	1	2			
18	3	1	4			
19	0	1	1			
20	0	1	1			
21	1	0	1			
22	1	0	1			
Total; n (%)	19 (22%)	35 (40%)	54 (62%)			

B. Pediatric Ophthalmology Programs						
Pediatric ophthalmology program	Attendings <sup>a</sup>	Fellows <sup>b</sup>	Total participants per program			
1	1	2	3			
2	1	1	2			
3	1	1	2			
4	1	1	2			
5	1	1	2			
6	1	1	2			
7	1	1	2			
8	1	1	2			
9	1	1	2			

B. Pediatric Ophthalmology Programs						
Pediatric ophthalmology program	Attendings <sup>a</sup>	Fellows <sup>b</sup>	Total participants per program			
10	1	1	2			
11	1	2	3			
12	1	2	3			
13	1	1	2			
14	1	0	1			
15	1	0	1			
16	1	0	1			
17	1	0	1			
Total; n (%)	17 (20%)	16 (18%)	33 (38%)			

Attendings-supervising physicians who are board-certified ophthalmologists and have completed additional postresidency training in either retina or pediatric ophthalmology.

<sup>&</sup>lt;sup>b</sup>Fellows-physicians in training who are board-eligible or board-certified ophthalmologists and currently in postresidency training in either retina or pediatric ophthalmology.