Article published online: 2023-09-11

The Transition to Ophthalmology Residency: A National Survey of the Combined Ophthalmology PGY-1 Program

Amee D. Azad, MD, MS[1] Melissa Yuan, MD[1] Marguerite Weinert, MD[1] Tatiana R. Rosenblatt, MD[1] Joan W. Miller, MD[1] Alice Lorch, MD, MPH[1]

[1] Department of Ophthalmology, Massachusetts Eye and Ear, Harvard Medical School, Boston, Massachusetts

J Acad Ophthalmol 2023;15:e188–e196.

Address for correspondence Alice Lorch, MD, MPH, Department of Ophthalmology, Massachusetts Eye and Ear, 243 Charles Street, Boston, Massachusetts 02114 (e-mail: alice_lorch@meei.harvard.edu).

Abstract

Background In 2017, the Accreditation Council for Graduate Medical Education announced all ophthalmology residency programs would provide a combined transitional or joint preliminary program for first postgraduate year (PGY-1) residents, with mandatory implementation by 2023.

Purpose This study aimed to survey ophthalmology residency program directors, postgraduate year 2 (PGY-2) ophthalmology residents who were a part of the first, official combined ophthalmology PGY-1 year, and postgraduate year 3 (PGY-3) residents who were a PGY-1 resident the year prior to integration to evaluate characteristics and perspectives on the combined ophthalmology PGY-1 year.

Methods A national, internet survey-based study approved by the Association of University Professors of Ophthalmology (AUPO) was disseminated to the AUPO listserv of program directors (PDs) and PGY-2 and PGY-3 ophthalmology residents from July to August 2022 and then again April to June 2023.

Results Twenty-six PDs completed the survey (response rate 20.3% out of 128 PDs). Forty-one PGY-2 ophthalmology residents who underwent the combined ophthalmology PGY-1 year and 33 PGY-3 ophthalmology residents also completed the survey. Most PGY-1 curricula focused on exposure to comprehensive ophthalmology and provided indirect ophthalmoscope, slit lamp, and refraction skills training to residents. Early exposure to fundamentals and clinical workflows were commonly cited benefits to the integration. When PDs were surveyed about how well-prepared PGY-1 residents who went through the combined year are for the PGY-2 relative to the prior year's class, 16 (61.5%) responded "better prepared." PGY-2 residents also reported a relatively higher level of clinical preparedness and familiarity with ophthalmology co-residents than PGY-3 residents. Several areas of improvement cited by both PDs and residents were identified including a dedicated didactic curriculum and more time in ophthalmology during the PGY-1 year.

Keywords

- combined ophthalmology intern year
- preparedness
- ophthalmology residency
- early exposure
- ophthalmology experience

received
October 20, 2022
accepted after revision
August 10, 2023

DOI https://doi.org/10.1055/s-0043-1774393.
ISSN 2475-4757.

Thieme Medical Publishers, Inc., 333 Seventh Avenue, 18th Floor, New York, NY 10001, USA

Conclusions We found an overall net benefit from the integration of the combined ophthalmology PGY-1 year. Benefits include early exposure to clinical skills and knowledge specific to ophthalmology, leading to increased confidence and preparedness for the rigorous transition to ophthalmology residency. We also identified many areas for improvement to optimize the PGY-1 year including a formal curriculum and additional time in ophthalmology. Programs should work closely with their residents, faculty, and non-ophthalmology PDs to refine the PGY-1 for the benefit of future ophthalmologists.

Ophthalmology residency training has traditionally consisted of 4 years, the first of which (the internship, or first postgraduate year [PGY-1 year]) takes place in non-ophthalmology fields of medicine such as general medicine or general surgery. As the amount of ophthalmology knowledge and skills required during residency training has continued to grow, in recent years, more consideration has been given to integrating ophthalmology training into the intern year while still retaining training in general medicine, as detailed in the 2016 Association of University Professors of Ophthalmology (AUPO) white paper.[1] Prior research shows that historically, ophthalmology residents often chose their internship programs based on quality of life, and that their acquisition of ophthalmology knowledge was quite variable.[2]

In 2017, the Accreditation Council for Graduate Medical Education (ACGME) required ophthalmology residency programs to provide a combined transitional or joint preliminary program for PGY-1 ophthalmology residents, with enforced implementation by 2023 to avoid citation. The intention of this change was to standardize the experience of PGY-1 ophthalmology residents, and to facilitate acquisition of ophthalmologic knowledge and skills during the PGY-1 year.[1] Since the addition of a combined transitional or joint intern year for PGY-1 residents, it has not yet been assessed how the combined intern year has impacted ophthalmology resident preparedness.

Research from prior to the combined intern year demonstrated that the transition to ophthalmology residency is even more stressful than the transition to residency (intern year) in general.[3,4] Prior to the integration of the PGY-1 year, the PGY-1 to PGY-2 transition has not always been one for which ophthalmology residents are well prepared, with much of their previous education and practical training geared toward general medicine.[3]

There is also early evidence that ophthalmology exposure during the intern year is beneficial. For example, 8 to 12 weeks of clinical ophthalmology during the intern year increased preparedness in formulating ophthalmic diagnoses, performing the ophthalmic exam, obtaining adequate history, and proficiency with using electronic medical records in one prospective study.[5] Additionally, Logothetis et al found that residents who felt confident at the start of ophthalmology residency had more hands-on clinical ophthalmology experience than residents who did not feel confident.[2]

Given the recent integration across U.S. ophthalmology programs and previous results indicating a possible benefit of early ophthalmology exposure and integration, this study aimed to survey ophthalmology residency program directors (PDs), postgraduate year 2 (PGY-2) residents, and postgraduate year 3 (PGY-3) residents to evaluate characteristics of the combined ophthalmology PGY-1 year.

Methods

This national, cross-sectional survey-based study was distributed to program directors, current PGY-2 ophthalmology residents, and current PGY-3 ophthalmology residents in U.S. residency programs. The AUPO Data Resource Committee reviewed the survey prior to approval. The survey was then disseminated to the AUPO listserv of program directors with the request of sending the survey along to current PGY-2 and PGY-3 residents. The survey collection period was from July to August 2022. PGY-2 residents included in the final analysis were those who self-reported a position in a combined transitional (medicine and surgery) or preliminary medicine or surgery PGY-1 year that was either integrated or joint with their residency. A second survey collection period was implemented from April to June 2023 with the addition of a question regarding the number of years an integrated ophthalmology internship had been available prior to the 2021 to 2022 academic year. There were an additional 10 program directors, 21 PGY-2s, and 21 PGY-3s who completed the survey during the second survey collection period.

Study data were collected and managed using REDCap (Research Electronic Data Capture) electronic data capture tools hosted at Mass General Brigham.[6,7] REDCap is a secure, web-based software platform designed to support data capture for research studies, providing (1) an intuitive interface for validated data capture; (2) audit trails for tracking data manipulation and export procedures; (3) automated export procedures for seamless data downloads to common statistical packages; and (4) procedures for data integration and interoperability with external sources.

The program director survey consisted of 29 questions on combined PGY-1 program characteristics and perspectives on the program roll-out. The PGY-2 survey consisted of 32 questions focused on demographic data and preparedness for core competencies, as well as perspectives on how to improve the combined ophthalmology PGY-1 year. The PGY-3 survey consisted of 28 questions on similar subjects and asked respondents to reflect back on preparedness for the PGY-2 year.

This study received approval by the Mass General Brigham Institutional Review Board and adheres to the principles set forth in the Declaration of Helsinki. Consent was obtained from all individuals who completed the surveys used in this study.

Results

Combined Ophthalmology PGY-1 Program Characteristics

Forty-two program directors started the survey, but only 26 program directors completed the survey out of a total of 128 program directors on the AUPO listserv (completed response rate: 20.3%). Of the 42, 15 (35.7%) represented programs in Midwest, 12 (28.6%) from the East Coast, 11 (26.2%) from the South, and 4 (9.5%) from the West Coast. Most programs ($n = 37$, 88.1%) reported 3 months of dedicated ophthalmology during the PGY-1 year, and four (9.5%) reported 4 or more months. During the second survey collection, respondents were asked about the number of years an integrated ophthalmology had been previously implemented prior to the 2021 to 2022 academic year. Among the 10 program directors who completed the survey during the second cycle, 60.0% reported that 2021 to 2022 was the first year an integrated ophthalmology internship had existed at their program (►**Table 1**).

Table 1 Characteristics of the integrated ophthalmology PGY-1 year

	n	%
Geographic region ($n = 42$)[a]		
East Coast	12	28.6%
Midwest	15	35.7%
South	11	26.2%
West Coast	4	9.5%
Number of months spent on ophthalmology during PGY-1 year ($n = 42$)[a]		
2	1	2.4%
3	37	88.1%
4+	4	9.5%
Number of years an integrated ophthalmology internship had been implemented at the institution prior to the 2021–2022 academic year ($n = 10$)		
0	6	60.0%
1	3	30.0%
2	4	40.0%
3	0	0.0%
4	0	0.0%
5+	1	10.0%
10+	2	20.0%
Wet lab sessions ($n = 26$)		
Cataract (i.e., EyeSi, wound creation, capsulorhexis, phaco, lens insertion)	13	50.0%
Cornea (i.e., corneal suturing, penetrating keratoplasty, corneal gluing)	8	30.8%
Glaucoma (i.e., conjunctival suturing, trabeculectomy, tube placement, MIGS)	5	19.2%
Retina (i.e., port placement, sclerotomy suturing, intravitreal injection, scleral buckle, laser simulation)	4	15.4%
Oculoplastics (i.e., lid laceration repair, tarsal strip, canthotomy/cantholysis)	11	42.3%
Other	6	23.1%
Resources available ($n = 26$)		
Basic and clinical science course series	18	69.2%
Lectures/didactics	24	92.3%
Slit lamp exam training	21	80.8%
Indirect ophthalmoscopy training	21	80.8%
Standardized patient experiences	1	3.8%
Minor procedure training	10	38.5%
Refraction training	18	69.2%
Patient testing/tech-ing training	18	69.2%
Other	3	11.5%

Abbreviations: MIGS, minimally invasive glaucoma surgery; PGY-1, first postgraduate year.
[a]A total of 42 PDs responded to the demographic questions regarding their programs. In addition, 26 PDs completed the survey.

Most combined PGY-1 ophthalmology programs included exposure to comprehensive clinics ($n = 22$, 84.6%), inpatient ophthalmology consults ($n = 19$, 73.1%), and comprehensive ophthalmology operating rooms ($n = 18$, 69.2%). Half of the programs reported time in ophthalmology emergency department consults ($n = 13$, 50.0%). Few programs included rotations in retina operating rooms ($n = 7$, 26.9%), glaucoma operating rooms ($n = 7$, 26.9%), pediatric ophthalmology operating rooms ($n = 7$, 26.9%), or ocular pathology ($n = 7$, 26.9%). A minority of programs offered rotations at Veterans Affairs hospital ophthalmology operating rooms ($n = 7$, 26.9%) or clinics ($n = 10$, 38.5%) (►**Fig. 1**).

Cataract wet labs (EyeSi, wound creation, capsulorrhexis, phacoemulsification, lens insertion) ($n = 13$, 50.0%) and ophthalmic plastic and reconstructive surgery wet labs (lid laceration repair, tarsal strip, canthotomy/cantholysis) ($n = 11$, 42.3%) were most often offered to PGY-1 residents. Retina (port placement, sclerotomy suturing, intravitreal injection, scleral buckle, laser simulation) ($n = 4$, 15.4%) and glaucoma (i.e., conjunctival suturing, trabeculectomy, tube placement, minimally invasive glaucoma surgery) ($n = 5$, 19.2%) wet labs were the least frequently offered to PGY-1 residents (►**Table 1**).

Resources most commonly made available during the PGY-1 year included lectures/didactics ($n = 24$, 92.3%), indirect ophthalmoscopy ($n = 21$, 80.8%), and slit lamp training ($n = 21$, 80.8%) (►**Table 1**).

Program Director Perspectives

When asked about how prepared the PGY-1 residents who went through the combined year are for the PGY-2 year, 16 (61.5%) program directors responded "well prepared." When program directors were surveyed about how PGY-1 residents who went through the combined year are prepared for the PGY-2 relative to the prior year's class, 16 (61.5%) responded "better prepared."

Program directors felt that the strengths of the combined year included early exposure to fundamentals, such as slit lamp and indirect exam training, systems-level familiarity with clinical workflows, and integration of residents with one another and faculty. Weaknesses included the lack of a formal curriculum, insufficient time on specialty ophthalmology rotations, operating room exposure, and effectively simulating PGY-2 responsibilities. Consistently, program directors remarked that a more formal rotation schedule, backloaded rotations toward the end of the internship year, and increasing the number of dedicated ophthalmology months during the intern year would be preferred.

PGY-2 Perspectives

Responses were received from 41 ophthalmology PGY-2 residents out of a total number of 498 matched residents from the January 2021 cycle (response rate 8.2%).[8] Twenty-one PGY-2 residents (51.2%) were male and 20 (48.8%) were

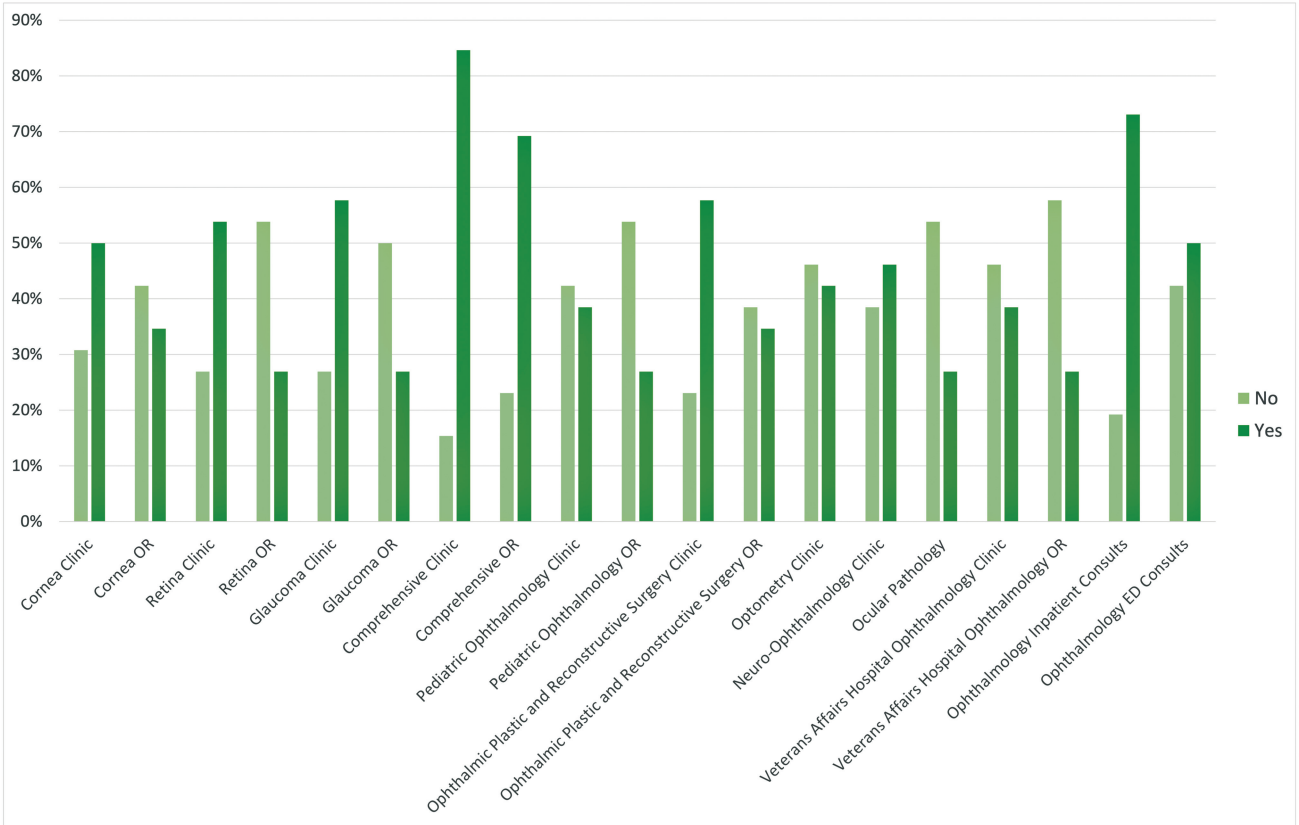

Fig. 1 Distribution of ophthalmology clinic and operating room exposure during the combined ophthalmology PGY-1 year among U.S. ophthalmology residency programs. PGY-1, first postgraduate year.

Table 2 Characteristics of current ophthalmology PGY-2 residents ($n = 41$)

Characteristics	Median/*n*	IQR/%
Age	27	26–28
Gender		
Male	21	51.2%
Female	20	48.8%
Race/ethnicity		
White (Hispanic, Latino, or Spanish)	7	17.1%
White (not Hispanic, Latino, or Spanish)	16	39.0%
Non-white Hispanic, Latino or Spanish	1	2.4%
Black or African American	2	4.9%
Asian	14	34.1%
Other	1	2.4%
Geographic region		
East Coast	18	43.9%
Midwest	10	24.4%
South	8	19.5%
West Coast	4	9.8%
Missing	1	2.4%
Position		
Non-joint preliminary or integrated PGY-1 resident	1	2.4%
Joint preliminary PGY-1 resident (Medicine)	15	36.6%
Joint preliminary PGY-1 resident (Surgery)	2	4.9%
Integrated transitional year PGY-1 resident	21	51.2%
Missing	2	4.9%
Number of months spent on ophthalmology during PGY-1 year		
0	1	2.4%
1	2	4.9%
2	2	4.9%
3	26	63.4%
4	5	12.2%
Missing	5	12.2%

Abbreviations: IQR, interquartile range; PGY-1, first postgraduate year; PGY-2, postgraduate year 2.

female with a median age of 27 (interquartile range [IQR: 26–28]). Fourteen residents identified as Asian (34.1%), 16 (39.0%) as white (not Hispanic, Latino, or Spanish), and 7 (17.1%) as white (Hispanic, Latino, or Spanish). Most residents reported enrollment in East Coast programs ($n = 18$, 43.9%) and in a combined transitional year program ($n = 21$, 51.2%) as opposed to a joint preliminary PGY-1 year in medicine ($n = 15$, 36.6%). Over sixty percent ($n = 26$) reported 3 months of dedicated ophthalmology during their PGY-1 year and only 5 (12.2%) reported 4 months (►**Table 2**).

Most PGY-2 residents felt "somewhat prepared" to "well prepared" to perform basic clinical skills and very few felt "not prepared" (►**Fig. 2**). Similar trends were observed for preparedness for program engagement (►**Fig. 3**).

PGY-2 residents indicated early clinical and surgical exposure, as well as familiarizing themselves with co-residents, staff, and the electronic health records, as strengths. They reported a lack of feedback and a lack of a formal PGY-1 ophthalmology curriculum as weaknesses and opportunities to improve.

PGY-3 Perspectives

Thirty-three PGY-3 residents responded from a matched class of 495 in the January 2020 cycle (response rate 6.7%).[8] Among those surveyed, with a median age of 27 (IQR: 26–29), 13 (39.4%) were male, and 20 (60.6%) were female. Thirteen residents identified as Asian (39.4%) and 12 (36.4%) as white (not Hispanic, Latino, or Spanish). A third of

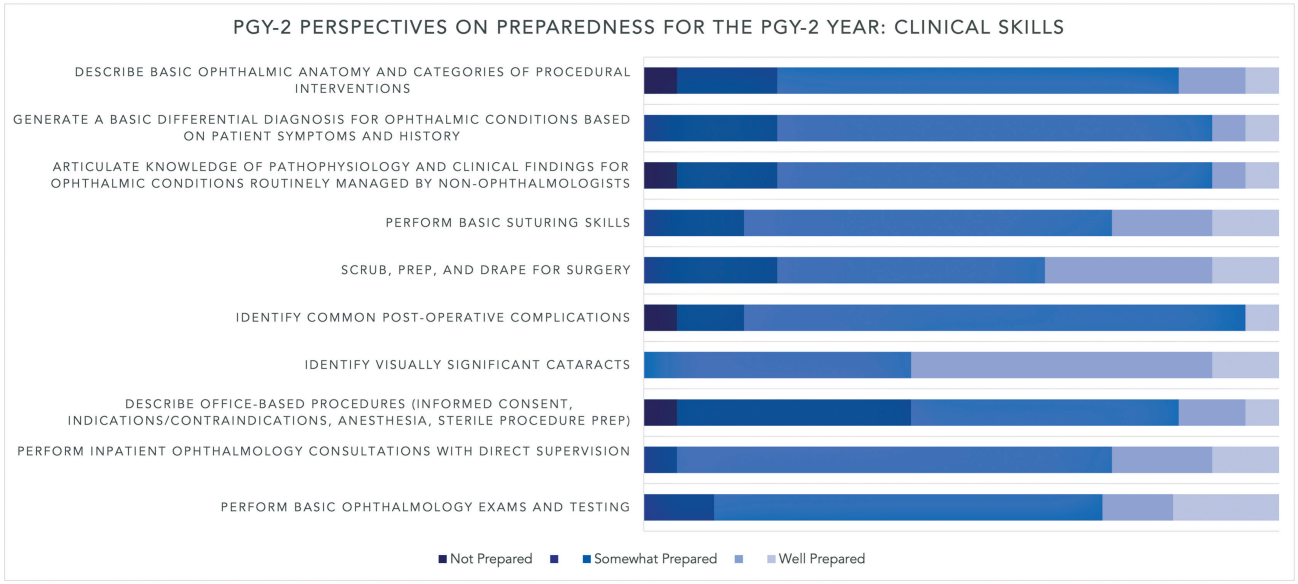

Fig. 2 PGY-2 perspectives on preparedness for the PGY-2 year: clinical skills. PGY-2, postgraduate year 2.

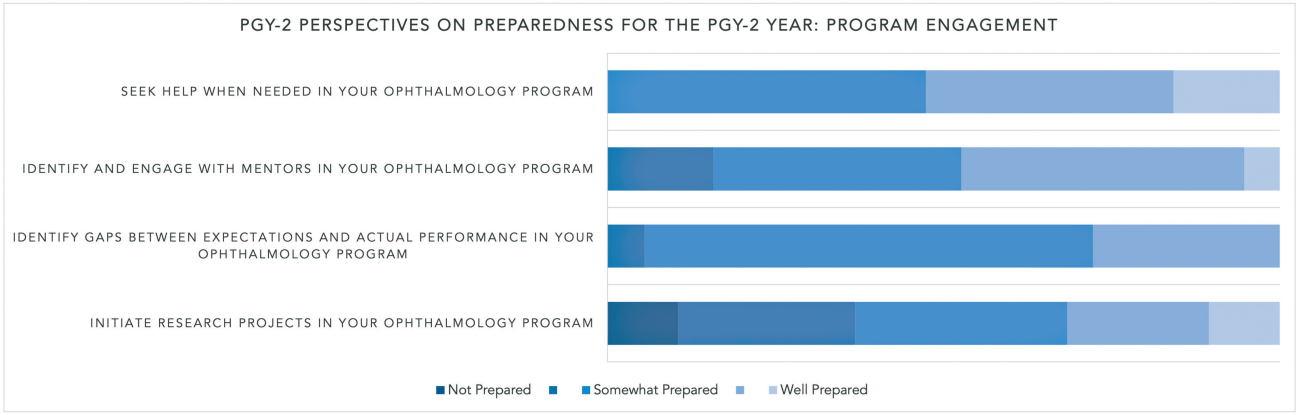

Fig. 3 PGY-2 perspectives on preparedness for the PGY-2 year: program engagement. PGY-2, postgraduate year 2.

PGY-3 residents reported enrollment in an East Coast program ($n = 11$, 33.3%). Most PGY-3 residents had some ophthalmology exposure during their PGY-1 year ($n = 26$, 78.8%), and 5 (15.2%) reported more than 3 months of ophthalmology exposure. Access to educational and training resources was limited (►**Table 3**).

When asked to reflect on preparedness for the first year of ophthalmology residency, many PGY-3 residents felt "not prepared" to perform basic clinical skills (►**Fig. 4**), but there was an even distribution of reported preparedness when asked about program engagement (►**Fig. 5**).

When asked what would be beneficial to ease the transition to the PGY-2 year, PGY-3 residents consistently suggested exposure to clinic, operating rooms, and consults, as well as hands-on practice with basic exam skills and patient encounters.

One third (36.3%, $n = 12$) of PGY-3 residents, the class preceding the mandated integration of the intern year, reported they had gotten to know their co-residents "very well" prior to starting their first year of ophthalmology residency, whereas 74.2% ($n = 23$) of PGY-2 residents, the class that was a part of the first year of the combined ophthalmology intern year, reported this (►**Fig. 6**).

Discussion

This is a national, survey-based study on the recently combined ophthalmology PGY-1 year, as well as program director and resident (PGY-2 and PGY-3) perspectives on the integration. We found that the way residency programs across the country have designed their curriculum is highly variable. However, based on data from 16 institutions, there is a clear focus on exposure to comprehensive ophthalmology clinics and operating rooms, as well as inpatient consults. Wet lab sessions offered to residents primarily covered cataract surgery and ophthalmic plastic and reconstructive surgery procedures. Most programs include basic ophthalmology skills (indirect ophthalmoscopy, slit lamp, and refraction training) in the PGY-1 curriculum. The fact that these shared features can offer a strong foundation for early ophthalmology trainees

Table 3 Characteristics of current ophthalmology PGY-3 residents and their PGY-1 years ($n = 33$)

Characteristics	Median/*n*	IQR/%
Age	27	26–29
Gender		
Male	13	39.4%
Female	20	60.6%
Race/ethnicity		
White (Hispanic, Latino, or Spanish)	3	9.1%
White (not Hispanic, Latino, or Spanish)	12	36.4%
Non-white Hispanic, Latino or Spanish	1	3.0%
Black or African American	1	3.0%
Asian	13	39.4%
Other	3	9.1%
Geographic region		
East Coast	11	33.3%
Midwest	9	27.3%
South	5	15.2%
West Coast	8	24.2%
Number of months spent on ophthalmology during PGY-1 year		
0	7	21.2%
1	5	15.2%
2	2	6.1%
3	14	42.4%
4	5	15.2%
Resources available		
Basic and clinical science course series	11	33.3%
Lectures/didactics	22	66.7%
Slit lamp exam training	18	54.5%
Indirect ophthalmoscopy training	19	57.6%
Standardized patient experiences	5	15.2%
Minor procedure training	8	24.2%
Refraction training	12	36.4%
Patient testing/tech-ing training	17	51.5%
Other	6	18.2%

Abbreviations: IQR, interquartile range; PGY-1, first postgraduate year; PGY-3, postgraduate year 3.

transitioning to the PGY-2 years is evidenced by a relatively higher self-reported clinical preparedness among PGY-2 residents than PGY-3 residents.

Responses from program directors and residents who underwent the combined PGY-1 year indicate several benefits attributed to the integration. The overwhelming benefit cited is early exposure to the unique set of clinical and technical skills that ophthalmology demands. From a systems-level perspective, the combined PGY-1 year allows trainees to gain a sense of clinical workflows, the electronic health record, and familiarity with faculty. These opportunities enhance the professional development of trainees and integrate them into the program as productive and meaningful participants in clinical care.

Residency class comradery and community was evaluated in this survey by asking about familiarity with co-residents. We found that nearly twice as many PGY-2 residents knew their co-residents "very well" relative to PGY-3 residents. This is an important finding because burnout is common among medical professionals and negatively affects both physicians and patients.[9] While much of the literature has focused on individual characteristics that protect against burnout, peer support, community, and a sense of belonging are important factors that contribute to resilience during residency.[10,11]

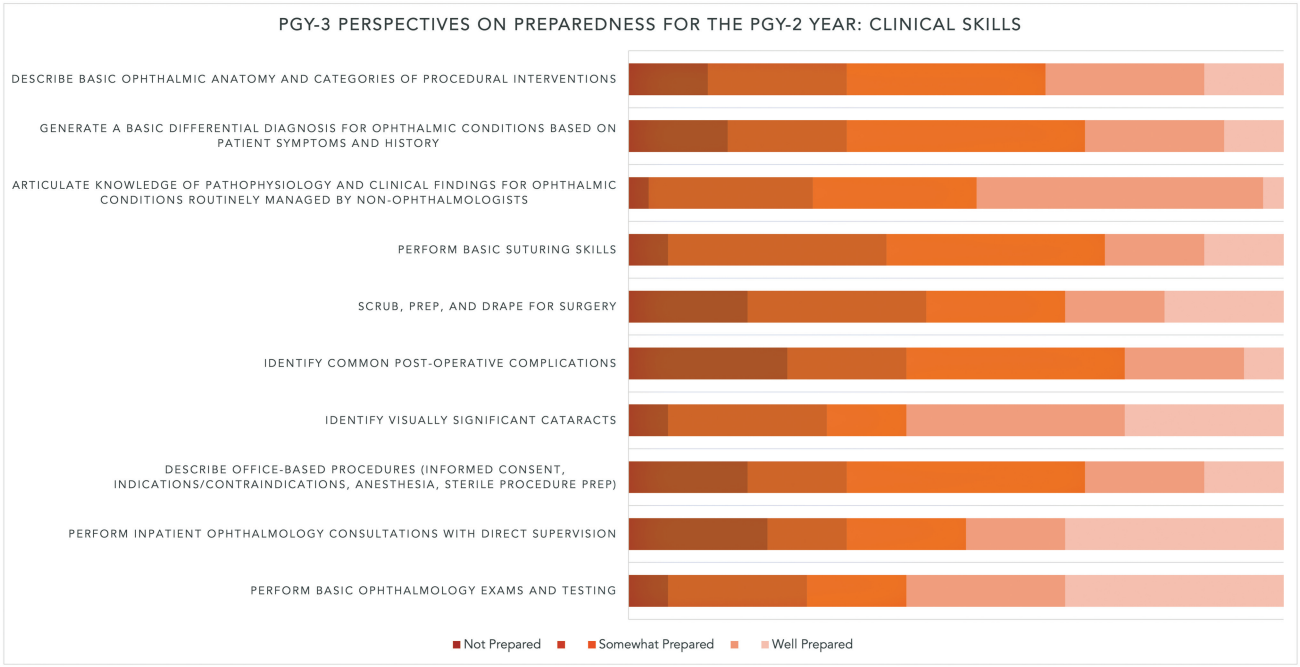

Fig. 4 PGY-3 perspectives on preparedness for the PGY-2 year: clinical skills. PGY-2, postgraduate year 2.

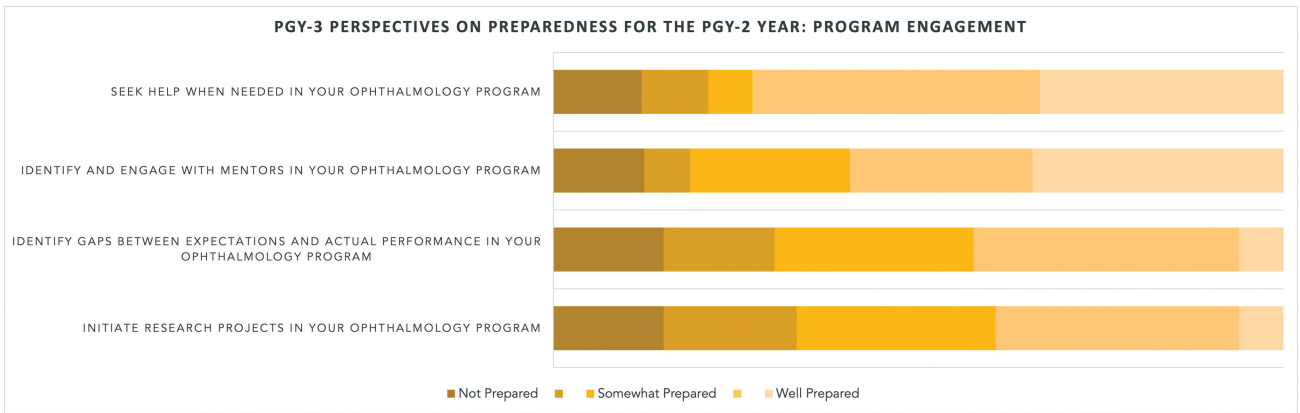

Fig. 5 PGY-3 perspectives on preparedness for the PGY-2 year: program engagement. PGY-2, postgraduate year 2.

Integration of the PGY-1 year is not without challenges or opportunities for improvement. Most program directors suggest increasing the number of months spent on ophthalmology rotations during the PGY-1 year. This is supported by the ACGME requirements of the urology PGY-1 year mandating a minimum of 3 months and a maximum of 6 months on urology rotations.[12] A counter-argument to increasing the number of months on ophthalmology is the loss of medicine or surgery instruction that could become the responsibility of the ophthalmology departments themselves. Furthermore, less time on non-ophthalmology rotations could lead to weaker cross-specialty professional collaborations. Additionally, PGY-2 residents suggested that ophthalmology program directors should work closely with their non-ophthalmology counterpart program directors on selecting PGY-1 year rotations that are the most educational and pertinent, while eliminating those that are less relevant. Most respondents, both program directors and residents, also advocated for a formal curriculum for PGY-1 ophthalmology residents that focuses on dedicated didactics and simulation of PGY-2 responsibilities.

There are several limitations to this study. Due to the survey-based design, our data are subject to selection and recall bias. Due to the low number of respondents, our results have limited generalizability. However, respondents across the three surveys did represent significant geographic diversity. Furthermore, nearly a year passed since the PGY-3 residents first started their PGY-2 year and their recollections may be error prone. Additionally, about one-third of PGY-3 residents indicated 3 or more months of ophthalmology exposure during their PGY-1 year. This is likely because there were ophthalmology residency programs with combined PGY-1 years prior to the ACGME mandate which may contribute to an overestimation of preparedness and resources available. Even so, the results of our survey results indicated generally less preparedness of PGY-3 residents surveyed than PGY-2 residents surveyed for the first year of ophthalmology

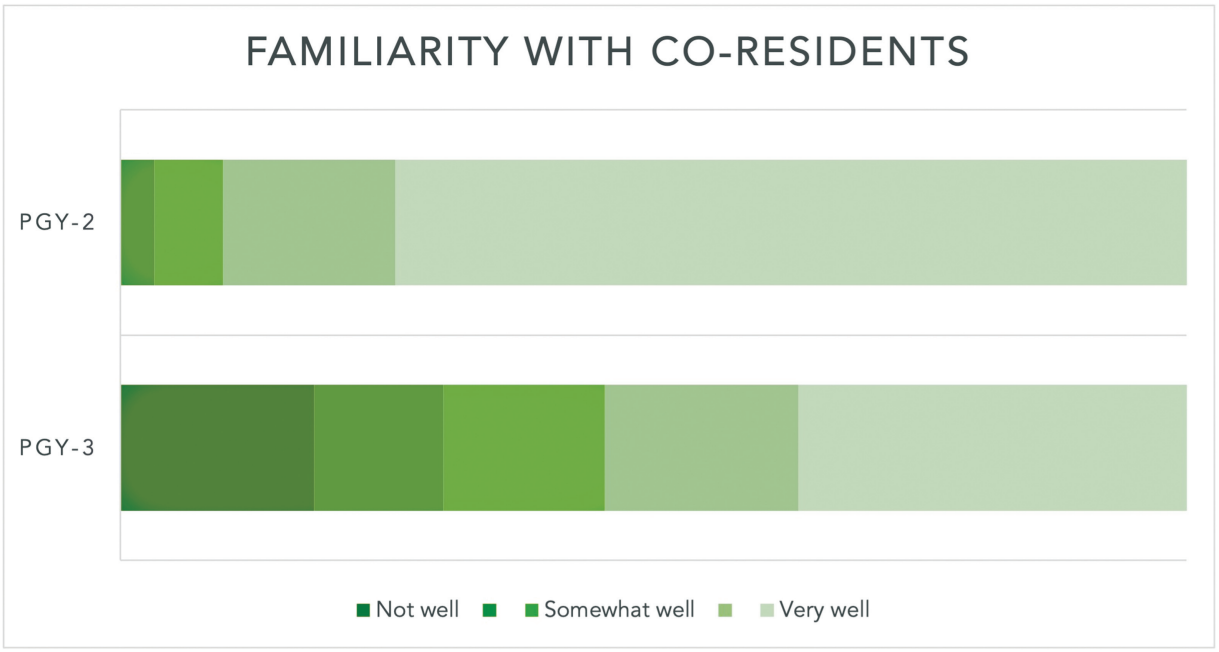

Fig. 6 PGY-2 and PGY-3 perspectives on familiarity with co-residents.

residency. Future studies of the needs of early ophthalmology trainees are necessary to further refine the combined PGY-1 year, as well as studies on the long-term effects of the combined PGY-1 year on career advancement.

Our study demonstrates that there are many benefits of the combined ophthalmology residency program to the professional development of ophthalmologists. We have also outlined many opportunities to improve the experience for trainees. Ophthalmology residency programs should evaluate, optimize, and standardize the combined PGY-1 year to benefit future interns entering the field.

Conflict of Interest

J.W.M. reports personal fees from Genentech/Roche, personal fees from Sunovion, personal fees from KalVista Pharmaceuticals, Ltd., personal fees from Mass Eye and Ear/Valeant Pharmaceuticals, personal fees from ONL Therapeutics, LLC, grants from Lowy Medical Research Institute, Ltd., personal fees from Heidelberg Engineering, other from Ciendias Bio, and personal fees from Aptinyx, Inc., outside the submitted work. J.W.M. also has a patent US 7,811,832 with royalties paid by ONL Therapeutics to Mass Eye and Ear, a patent US 5,798,349; US 6,225,303; US 6,610,679; CA 2,185,644; CA 2,536,069 with royalties paid by Valeant Pharmaceuticals to Mass Eye and Ear. The remaining authors have no relevant financial/conflicting interests to disclose.

References

1 Oetting TA, Alfonso EC, Arnold A, et al. Integrating the internship into ophthalmology residency programs: Association of University Professors of Ophthalmology American Academy of Ophthalmology White Paper. Ophthalmology 2016;123(09): 2037–2041
2 Logothetis H, Pyatetsky D, Baqai J, Volpe N. Ophthalmology residents' internship selection and initial trainee confidence: an observational study. J Acad Ophthalmol 2018;10:e72–e8
3 Redd T, Thomas A, Hwang TS. Improving the transition to ophthalmology residency: a survey of first-year ophthalmology residents. J Clinic Acad Ophthalmol 2016;08(01):e10–e8
4 Nanda T, Gong D, Chen R, et al. The new ophthalmology internship: a trainee curricular survey. J Acad Ophthalmol 2020;12: e134–e42
5 Hou A, Goyal N, Darnley-Fisch D, Edwards P, Goldman D. Exploring the benefit of an integrated ophthalmology internship (PGY-1)—perceived preparedness and the recommended duration of training. J Acad Ophthalmol 2020;12(01):e57–e60
6 Harris PA, Taylor R, Minor BL, et al; REDCap Consortium. The REDCap consortium: building an international community of software platform partners. J Biomed Inform 2019;95:103208
7 Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)–a metadata-driven methodology and workflow process for providing translational research informatics support. J Biomed Inform 2009;42(02): 377–381
8 2022 Summary Report: Ophthalmology Residency Match. Association of University Professors of Ophthalmology; 2022
9 Thomas NK. Resident burnout. JAMA 2004;292(23):2880–2889
10 Olson K, Kemper KJ, Mahan JD. What factors promote resilience and protect against burnout in first-year pediatric and medicine-pediatric residents? J Evid Based Complementary Altern Med 2015;20(03):192–198
11 Matsuo T, Takahashi O, Kitaoka K, Arioka H, Kobayashi D. Resident burnout and work environment. Intern Med 2021;60(09): 1369–1376
12 Xu AJ, Drain AE, Gonzalez AN, Kanofsky JA. The new PGY-1 year: lessons learned. Curr Urol Rep 2020;21(10):42