Physician Assistants in Ophthalmology: A National Survey

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• PURPOSE: To evaluate the scope of practice and training of current physician assistants (PAs) in ophthalmology and gauge their interest in further training and involvement in ophthalmology.
• DESIGN: Cross-sectional survey study.
• METHODS: An anonymous survey on vision and ocular care in the PA profession was administered to PAs in ophthalmology within the American Academy of Physician Assistants member database. All survey questions were optional.
• RESULTS: A total response rate of 47/94 (50.0%) was obtained. Respondents reported an average of 9.8 years (SD = 9.0) of experience as a PA in ophthalmology. Over half of the respondents (59.5%) did not have previous experience in vision and ocular health before becoming a PA. Most respondents (79.5%) reported that they are able to provide their primary clinical responsibilities for ophthalmic care independently. In addition to providing clinical ophthalmic care, many of the respondents have duties that involve consenting patients for ophthalmic surgery and procedures (62.5%) and assisting in ophthalmic surgery and minor procedures (65.0%). Only a minority of respondents independently perform procedures, such as intravitreal injections (23.1%) and minor lid procedures (38.5%). Most respondents reported interest in additional training in providing vision and ocular care (69.0%), in continuing their career as a PA in ophthalmology (87.5%), and in joining a specialty organization for PAs in ophthalmology (88.1%).
• CONCLUSIONS: The PAs participating in this survey provide a range of clinical and some procedural ophthalmic care. The development of formal PA postgraduate training programs in ophthalmology may expand the pool of PAs qualified to practice ophthalmology. (Am J Ophthalmol 2020;217:261–267. © 2020 Elsevier Inc. All rights reserved.)

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INTRODUCTION

ADVANCE PRACTICE PROVIDERS (APPS) HAVE increasingly joined the healthcare system to improve access to care, control costs, and enhance patient care. In particular, physician assistants (PAs) represent a unique opportunity for physician-led medical care teams because PA scope of practice is largely defined by that of their collaborating physicians.[1]

Recently, growth in the PA profession has shifted away from primary care into specialty care, specifically surgical subspecialties.[2-5] Although the number of PAs in surgical specialties has risen, there has not been a concurrent rise of PAs in ophthalmology. Historically, PAs have been underrepresented in ophthalmology. A 1990 national survey study funded in part by the American Academy of Ophthalmology could only identify 52 PAs throughout the United States employed in ophthalmologic practice.[6] According to the National Commission on Certification of Physician Assistants (NCCPA) with 131,152 certified PAs in 2018, of the 98,625 PAs who reported their principal clinical position there were only 96 PAs in ophthalmology.[7] And in the American Academy of Physician Assistants (AAPA) 2019 database, there were only 94 PAs in ophthalmology.

In the context of the projected workforce gap in ophthalmic care,[8] low annual growth in ophthalmologists poses a major challenge. As a result, there has been recent interest in incorporating APPs, such as PAs and nurse practitioners (NPs), into ophthalmology to help close the projected workforce gap through increased manpower.[9-11] In particular, NPs and nurses have been performing intravitreal injections at hospitals in Denmark and the United Kingdom,[12-14] and we previously reported how a PA was integrated into an ophthalmology consult service at a US academic hospital.[15] Even more so, PAs in ophthalmology may give the ophthalmologic workforce the necessary scale and flexibility to better accommodate unpredicted workforce gaps generated by novel treatment advancements.

The present survey study evaluates the scope of practice and training of current PAs in ophthalmology and gauges their interest in further training and involvement in ophthalmology.

METHODS

THE WILMER EYE INSTITUTE AND AAPA DEVELOPED A SURvey on vision and ocular care in the PA profession for

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distribution among PAs. The vision and ocular care survey consisted of 53 questions. The questions covered topics including, but not limited to, vision and ocular care experience, training, and perceived current and desired skills and abilities. The Johns Hopkins University School of Medicine Institutional Review Board determined that this survey study did not constitute human subjects research, and thus it was exempt from review.

The present study focuses only on the survey data from the 94 PAs in ophthalmology within the AAPA member database. This study is a subset of a larger general study of all PAs and vision and ocular care involving 8,706 PAs and PA students in the United States randomly selected from the AAPA members database. Survey participants were informed that voluntary completion of the survey served as their consent to participate in the study. All survey questions were optional.

The general survey was distributed electronically using SurveyGizmo (Widgix, LLC dba SurveyGizmo, Boulder, CO, USA) between March and April 2019, during which 4 electronic reminders were sent. Given the small number of PAs in ophthalmology, nonresponding PAs in ophthalmology were subsequently contacted again by US mail and then by telephone.

Response data for PAs in ophthalmology were downloaded and analyzed using SPSS Statistics version 26 (IBM Corp, Armonk, NY, USA). Because all questions were optional, percentages and ratios are reported for data not listed in tables. For perceived ocular skills and abilities in 8 different areas, current and desired skills and abilities were measured on a scale of 1 to 5, with 1 indicating no skills and abilities and 5 indicating strong skills and abilities. Given the ordinal nature and nonnormality of the data, Wilcoxon sign rank tests were conducted to evaluate the differences between the reported current and desired skills and abilities in vision and ocular care among PAs in ophthalmology; this allows for a comparison that is analogous to a paired-samples t-test. Given the increased likelihood of Type I error due to multiple paired-sample tests, we used a Bonferroni corrected significance threshold of $P < .00625$ to determine statistical significance for 8 pairs instead of a traditional $P < .05$. Bonferroni adjustments correct for family-wise Type I error that result from running multiple hypothesis tests. In addition to significance tests, an effect size estimate r was calculated for each pairwise comparison to estimate the magnitude of the effect. For interpretation, $r = 0.1$ indicates a small effect, $r = 0.3$ indicates a medium effect, and $r = 0.5$ indicates a large effect.[16]

RESULTS

• **DEMOGRAPHICS OF PARTICIPANTS:** A total response rate of 47/94 (50.0%) was obtained for which 26/47 (55.3%) identified as female, 19/47 (40.4%) identified as male, and 2/47 (4.2%) did not identify a gender. Respondents in the sample were based in 20 different states in the United States, out of the 27 states listed by PAs in ophthalmology within the AAPA database. All questions were optional, so response rate varied slightly among questions for which respondents provided only partial responses.

TABLE 1. Clinical Disciplines Practiced by Physician Assistants in Ophthalmology

Clinical Disciplines within Ophthalmology	N	%[a]
Comprehensive Eye Care	25	62.5
Cornea, Cataract, and External Disease	25	62.5
Glaucoma	21	52.5
Pediatric Ophthalmology and Adult Strabismus	5	12.5
Retina	22	55.0
Oculoplastics	22	55.0
Uveitis and Ocular Immunology	5	12.5
Other	9	22.5

Question text: Which clinical disciplines within ophthalmology do you, or did you, practice in? Check all that apply.

[a]Percentages are based on N = 40 respondents. Respondents permitted to select all that apply, so percentages may not sum to 100.

Respondents reported an average of 9.8 years (SD = 9.0) of experience as a PA in ophthalmology. Almost all respondents reported high career satisfaction with their career as a PA in ophthalmology, with 5/40 (12.5%) moderately satisfied and 31/40 (77.5%) extremely satisfied. Over half of the respondents (25/42, 59.5%) did not have previous experience in vision and ocular care before becoming a PA. Of those who did have previous experience, the respondents reported an average of 5.9 years (SD = 6.6) of experience. Notably, prior to becoming a PA, a third of the respondents (14/42, 33.3%) worked as an ophthalmic technician and one in six (7/42, 16.7%) worked as an ophthalmic scribe.

• **SCOPE OF PRACTICE WITHIN OPHTHALMOLOGY:** Most respondents (31/39, 79.5%) reported that they are able to provide primary clinical responsibilities for ophthalmic care independently, while some (8/39, 20.5%) are unable to do so independently. As a group, the respondents reported receiving an average of 7.6 months (SD = 6.9) of training before being able to provide their primary clinical responsibilities for ophthalmic care.

Respondents reported being clinically active across all clinical disciplines within ophthalmology, with most (29/40, 72.5%) involved in up to 4 clinical disciplines within ophthalmology (Table 1). The majority of respondents reported clinical activity within comprehensive eye care (62.5%) and cornea, cataract, and external disease (62.5%). Only a minority (12.5%) reported clinical

TABLE 2. Clinical Ophthalmic Duties Among Physician Assistants in Ophthalmology

Clinical Ophthalmic Duties	N	%[a]
Preoperative history and physical	24	60.0
Perform ophthalmic examination (including slit lamp and fundus exam)	33	82.5
Refraction/Retinoscopy	17	42.5
Interpreting ophthalmic tests (eg, optical coherence tomography, biometry, visual field assessment, corneal topography)	33	82.5
Consult coverage of inpatient and/or emergency department	13	32.5
After hours call for the practice	18	45.0
Patient education	33	82.5
Clinical research	12	30.0
Administration/Practice management	12	30.0
Other	12	30.0

Question text: What are, or were, your clinical ophthalmic duties? Check all that apply.

[a]Percentages are based on N = 40 respondents. Respondents permitted to select all that apply, so percentages may not sum to 100.

TABLE 3. Surgical and Procedural Ophthalmic Duties Among Physician Assistants in Ophthalmology

Surgical and Procedural Ophthalmic Duties	N	%[a]
Not applicable	5	12.5
Consenting patients for surgery and procedures	25	62.5
Assist with ophthalmic operating room surgery (ex: sutures, incisions, and local anesthesia)	26	65.0
Assist with minor clinic-based procedures (ex: intravitreal injections, chalazion drainage, and lasers)	26	65.0
Other	12	30.0

Question text: What are, or were, your surgical and procedural ophthalmic duties? Check all that apply.

[a]Percentages are based on N = 40 respondents. Respondents permitted to select all that apply, so percentages may not sum to 100.

activity in pediatric ophthalmology and adult strabismus and uveitis and ocular immunology.

The majority of respondents provide direct patient clinical care (Table 2), including preoperative history and physicals (60.0%), performing ophthalmic exams (82.5%), interpreting various ophthalmic tests (eg, optical coherence tomography, biometry, visual field assessment, corneal topography) (82.5%), and educating patients (82.5%). In addition, many of the respondents have duties that involve consenting patients for ophthalmic surgery and procedures (62.5%) and assisting in ophthalmic surgery and minor procedures (65.0%; Table 3). However, only a minority of respondents independently perform procedures (Table 4), such as intravitreal injections (23.1%) and minor lid procedures (38.5%). Only 2 (5.1%) of 39 respondents perform YAG laser capsulotomy, while none perform laser iridotomy, laser trabeculoplasty, or panretinal photocoagulation.

• **CURRENT AND DESIRED SKILLS AND ABILITIES IN VISION AND OCULAR CARE:** For the 8 skills and abilities described in Table 5, respondents rated themselves as highly competent (4 or 5 on the 1 to 5 scale) for 6 of 8 skills and abilities. On average, the respondents reported neutral to poor competency (1 to 3 on the 1 to 5 scale) for 2 skills and abilities: fundus examination with a direct ophthalmoscope to visualize the nerve and or retina, and removing foreign bodies from the ocular surface.

Based on a nonparametric Wilcoxon sign rank test of significance, the differences between the current and desired skills and abilities of discussing the potential risks and benefits of interventions for common vision and ocular diseases ($z = 2.63$, $P = .009$, $r = 0.28$), checking pupils, extraocular movements and confrontation visual fields ($z = 2.56$, $P = .01$, $r = 0.28$), and checking visual acuity ($z = 1.2$, $P = .23$, $r = 0.13$) were not significant based on the Bonferroni corrected significance threshold of $P < .00625$. For each of the other 5 skills and abilities, the current and desired skills and abilities differed significantly with medium effect sizes.

• **FURTHER TRAINING AND INVOLVEMENT IN OPHTHALMOLOGY:** The majority of respondents reported that participating in a potential PA ophthalmology postgraduate training program would have been moderately or extremely helpful (33/40, 82.5%). The skills respondents indicated would be most helpful for PAs to obtain through a potential ophthalmology postgraduate training program included experience with the ophthalmic exam (92.5%), interpretation of ophthalmic tests (90.0%), and assisting with minor clinic-based procedures (77.5%; Table 6).

Most respondents reported interest in additional training in providing vision and ocular care (29/42, 69.0%), in continuing their career as a PA in ophthalmology (35/40, 87.5%), and in joining a specialty organization for PAs in ophthalmology (37/42, 88.1%).

DISCUSSION

IN OUR SAMPLE OF 50.0% (47/94) OF THE KNOWN CURRENT PA workforce in ophthalmology, we found that the PAs are involved across all clinical disciplines within ophthalmology and provide surgical and nonsurgical ophthalmic care. The current scope of practice for PAs in

TABLE 4. Physician Assistants in Ophthalmology Performing Procedures Independently

Procedures Performed Independently	N	%[a]
Not applicable	14	35.9
Intravitreal injections	9	23.1
Chalazion drainage or other minor lid procedures	15	38.5
YAG laser capsulotomy	2	5.1
Laser Iridotomy	0	0
Laser Trabeculopasty	0	0
Panretinal Photocoagulation	0	0
Other	10	25.6

Question text: Do you, or did you, perform any of the following procedures independently? Check all that apply.

[a]Percentages are based on N = 39 respondents. Respondents permitted to select all that apply, so percentages may not sum to 100.

ophthalmology mirrors that of PAs in otorhinolaryngology/head and neck surgery (ENT),[17,18] where the emphasis is independent clinical care followed by clinic-based procedures and assisting with surgery.

PAs in ophthalmology do more than just preoperative history and physicals. They perform ophthalmic examinations, interpret various ophthalmic tests, and educate patients (82.5%). However, just under half of PAs perform refraction/retinoscopy (42.5%). This may be in part because 13 of 50 states in 2019 have laws and regulations that prohibit PAs from prescribing corrective lenses, prisms, or contact lenses.[1] Nevertheless, PAs in all 50 states may perform routine vision screening and provide most of the scope of ophthalmic care as determined by their collaborating ophthalmologists. These subtle variations in state regulations may affect the growth of PAs in ophthalmology.

Many PAs (65.0%) in ophthalmology reported having duties related to assisting in procedures and surgery. While the PAs are involved with procedures and surgery, the PAs largely do not perform procedures independently. When PAs do perform procedures, their scope is generally limited to intravitreal injections (23.1%) and chalazion drainage or other minor lid procedures (38.5%). Of note, in the United Kingdom, ophthalmic NPs have been independently performing intravitreal injections since 2012 after a period of 200 injections supervised by an ophthalmologist.[14] Though PAs and NPs are not equivalent, they can collaborate with ophthalmologists in similar ways. Lastly, most PAs currently do not perform laser procedures independently, with the exception of 2 out of 39 PAs reporting to independently perform YAG laser capsulotomies.

Despite differences in survey design, a general comparison between this present national survey of 47 PAs in ophthalmology to that of a past 1990 national survey of 40 PAs in ophthalmology[6] suggests that the current scope of practice for PAs in ophthalmology has remained constant since 1990. As before, PAs continue to provide direct patient clinical care and education, and perform diagnostic testing and interpretation. Nonetheless, PAs in the present and past assist with surgery and largely do not perform refractions or laser procedures.

The PAs in ophthalmology reported to have high current competence across most clinical skills and abilities in vision and ocular care listed in Table 5. Because of the very high current competence in the 3 skills and abilities of discussing the potential risks and benefits of interventions for common vision and ocular diseases, checking pupils, extraocular movements, and confrontation visual fields, and checking visual acuity, the differences between the current and desired level of skills and abilities were not significant. However, the PAs indicated relatively lower competence in using a direct ophthalmoscope and removing foreign bodies from the ocular surface. The lower current skill with the direct ophthalmoscope may be attributed to how the PAs primarily use the slit lamp and indirect ophthalmoscope. And the lower current skill with removing foreign bodies is consistent with how PAs generally do not independently perform procedures (Table 4). Nonetheless, the PAs overall reported a statistically significant higher desired level of clinical skills and abilities in vision and ocular care as compared to current levels.

The PAs in ophthalmology reported high career satisfaction (90.0% moderately or extremely satisfied)—comparable to PAs in other fields.[19-23] Specifically, 95.9% of all PAs throughout Minnesota reported satisfaction with their career[21] and 87.3% of PAs in the Association of PAs in Cardiology throughout the United States reported to be satisfied or very satisfied with their job.[23] Furthermore, most of the PAs in ophthalmology (88.1%) reported interest in joining a specialty organization for PAs in ophthalmology.

Despite our findings of thorough involvement in ophthalmic care and high career satisfaction, PAs have historically been and remain underrepresented in ophthalmology. Though the percentage of certified PAs in surgical subspecialties has increased over 70% since 2013,[5] PAs in ophthalmology have only increased from 52 in 1990[6] to the 94 in 2018 who received this survey study invitation. This should be interpreted in the context of how 21.5% (21,164 out of 131,152) of certified PAs in 2018 work in surgical subspecialties. For further comparison, in 2017 the Society of PAs in ENT estimated that 1,000 PAs worked in ENT.[17]

The persistent underrepresentation of PAs in ophthalmology is likely multifactorial. Optometrists are seen as the natural collaborating vision care provider to ophthalmologists due to their training, possibly limiting demand for PAs in ophthalmology. Additionally, ophthalmologists may not be aware of the roles that PAs can

TABLE 5. Current and Desired Skills and Abilities in Vision and Ocular Care Among Physician Assistants in Ophthalmology

Skill or Ability	Rating	Self-Reported Skills and Abilities[a] (% of N = 43)					Test of Significance		Effect Size
		1: None	2	3	4	5: High	Z Value[b]	*P* Value[c]	*r*[d]
Identify patients with key risk factors for vision and ocular disease	Current	0.0	4.7	4.7	32.6	58.1	3.07	.002	0.33
	Desired	0.0	2.3	0.0	4.7	93.0			
Identify signs of vision and ocular health emergencies (such as open globe injury, giant cell arteritis, acute angle closure glaucoma, retinal detachment)	Current	0.0	2.3	2.3	37.2	58.1	3.07	.002	0.33
	Desired	0.0	2.3	0.0	4.7	93.0			
Discuss the potential risks and benefits of interventions for common vision and ocular diseases (such as dry eyes, cataracts, glaucoma, diabetic retinopathy, age-related macular degeneration)	Current	0.0	4.7	7.0	23.3	65.1	2.63	.009	0.28
	Desired	2.3	0.0	0.0	7.0	90.7			
Check pupils, extraocular movements, and confrontation visual fields	Current	0.0	0.0	9.3	23.3	67.4	2.56	.01	0.28
	Desired	2.3	0.0	2.3	2.3	93.0			
Check visual acuity	Current	0.0	0.0	7.0	9.3	83.7	1.20	.23	0.13
	Desired	2.3	0.0	0.0	2.3	95.3			
Slit lamp examination	Current	2.3	7.0	9.3	32.6	48.8	3.35	.001	0.36
	Desired	0.0	2.3	7.0	2.3	88.4			
Fundus examination with a direct ophthalmoscope to visualize the nerve and or retina	Current	4.7	9.3	25.6	23.3	37.2	3.99	<.001	0.43
	Desired	0.0	4.7	4.7	7.0	83.7			
Remove foreign bodies from the ocular surface	Current	4.7	9.3	23.3	23.3	39.5	4.09	<.001	0.44
	Desired	0.0	0.0	9.3	11.6	79.1			

Question text: Please rate your current and desired skills and abilities for the following procedures, tasks, and competencies:

[a]Scale 1 to 5, 1 indicating no skills and abilities and 5 indicating high skills and abilities.

[b]Z statistics based on nonparametric Wilcoxon Rank Sum paired samples test are based on N = 43 respondents.

[c]Owing to Bonferroni correction for multiple comparisons, when $P > .00625$, the difference between current and desired skill or ability is nonsignificant.

[d]The effect size of the difference was evaluated using *r*, where $r = 0.1$ a small effect, $r = 0.3$ a medium effect, and $r = 0.5$ a large effect.

TABLE 6. Skills Most Helpful in a Potential Physician Assistant (PA) Ophthalmology Postgraduate Training Program as Rated by PAs in Ophthalmology

Skills in a Potential PA Ophthalmology Postgraduate Training Program	N	%[a]
Not applicable	1	2.5
Experience with ophthalmic exam (ex: slit lamp and fundus exam)	37	92.5
Refraction/Retinoscopy	27	67.5
Interpretation of ophthalmic tests (ex: Optical coherence tomography, Biometry, Visual Field Assessment, Corneal topography)	36	90.0
On Call Triage of Patients	17	42.5
Assisting with surgery in an operating room	23	57.5
Assisting with minor clinic-based procedures (ex: intravitreal injections, chalazion drainage, and lasers)	31	77.5

Question text: If you had the opportunity to train in a PA residency in ophthalmology, what skills would have been most helpful to learn? Check all that apply.

[a]Percentages are based on N = 40 respondents. Respondents permitted to select all that apply, so percentages may not sum to 100.

potentially play as an alternative collaborating vision care provider. Regional variations that restrict scope of practice, such as laws prohibiting PAs from prescribing corrective lenses, prisms, or contact lenses,[1] might be another barrier. Finally, the lack of early or significant PA exposure to vision care during school and the lack of postgraduate training in ophthalmology for PAs may result in less awareness and interest in the specialty among PAs. In curriculum surveys conducted by the Physician Assistant Education Association representing the 246 currently accredited PA educational programs, the PA curriculum, both didactic as of 2016 and clinical as of 2017, does not have components dedicated to visual sciences and ophthalmology.[24,25] Though there are 104 postgraduate PA training programs total, there are no postgraduate PA training programs for ophthalmology as of December 2019.[26] Among the 104 programs, there are 28 surgical postgraduate PA training programs representing 10 different surgical specialties, including ENT, urology, and orthopedic surgery.

As a result, all PAs in ophthalmology had to learn to practice ophthalmology through on-the-job training, with the exception of one PA who was a foreign trained ophthalmologist. A majority of PAs in ophthalmology (82.5%) reported that a postgraduate training program in ophthalmology would have been moderately or extremely helpful for their current work. Unsurprisingly, in a 2014 survey of PAs who completed postgraduate training programs in various specialties, with the largest being surgical, all PAs felt that their postgraduate program was a valuable experience for their professional career and 95% would recommend formal postgraduate clinical training to other PAs.[27] The PAs in ophthalmology reported that training with the ophthalmic exam, interpretation of ophthalmic tests, and assisting with minor clinic-based procedures would be the most helpful skills to learn in a postgraduate training in ophthalmology (Table 6). These skills reflect what ophthalmology resident training programs strive to teach early on—to provide independent clinical care and assist in clinic-based procedures. Comparatively, the PAs reported skills in assisting with surgery in an operating room less helpful. This is consistent with the overall current nonsurgical scope of practice of PAs in ophthalmology as determined in this study.

The implications of this study may be limited by a 50% response rate of an already small number of PAs in ophthalmology available for survey. This prohibits more granular analysis, such as state specific variations in the adoption of PAs in ophthalmology and their scope of practice. Additionally, some PAs in ophthalmology may not have received the survey due to being misclassified in the AAPA data base as practicing in another specialty or not being members of the AAPA. As a result, the data may not accurately reflect the scope of practice of PAs who did not respond to or did not receive the survey. Furthermore, the survey did not explore barriers that restrict PA scope of practice. Thus, it is unknown why so few PAs perform procedures independently. The barriers may include lack of training, restrictions set by the collaborating ophthalmologist, or simply a lack of opportunities to perform procedures. Another limitation of the study is that the PA skills and abilities are self-reported and were not objectively confirmed with this study design. Further studies will be needed to assess true competence of PA skills. Finally, while there are limited reports on the impact a PA can have in ophthalmology including both academic and private practice,[10,11,15] this study did not assess the perspective of ophthalmologists on the matter of PAs in ophthalmology.

Despite the current barriers for PAs to learn to practice ophthalmology, PAs as a group should not be overlooked as potential vison care providers. PAs may be more versatile members of the medical team than optometrists due to their broader medical training. In addition to outpatient ophthalmic care, PAs can provide ophthalmic care in the inpatient and emergency consult setting.[15] Our survey demonstrates high levels of engagement by PAs in ophthalmology as evidenced by their broad range of ophthalmic care duties, high career satisfaction, and interest in more training, continuing their career, and joining a specialty organization for PAs in ophthalmology. The development of formal PA postgraduate training programs in ophthalmology may expand the pool of PAs qualified to practice ophthalmology.

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