



OphthoPods: An Analysis of the Educational Content and Changes of Ophthalmology Podcasts

Isaiah I. Greene, BS¹ Fradah E. Gold, BS¹ Nicholas E. Tan, BA¹ Alexander H. Fang, BS¹
Nickisa M. Hodgson, MD, MAS^{1,2}

¹Department of Ophthalmology, SUNY Downstate Medical Center, Brooklyn, New York

²Department of Ophthalmology, Kings County Medical Center, Brooklyn, New York

Address for correspondence Nickisa M. Hodgson, MD, MAS, Department of Ophthalmology, SUNY Downstate Medical Center, 450 Clarkson Avenue, Brooklyn, NY 11203 (e-mail: Nickisa.Hodgson@downstate.edu).

J Acad Ophthalmol 2023;15:e248–e257.

Abstract

Objective Podcasts are a novel modality for digitally disseminating ophthalmic knowledge, yet minimal information exists on their offerings. This study sought to describe the growth of ophthalmology podcasts, characterize their features, and analyze clinically pertinent content trends.

Materials and Methods Apple Podcasts, Spotify, Google Podcasts, and Google Search were queried for English-language shows relating primarily to ophthalmology. Ninety-six podcasts and 3,594 episodes were analyzed.

Results Of the 48 currently active shows, most cover general ophthalmology topics ($n = 25$, 52.1%) and are run by multiple hosts ($n = 29$, 60.4%) in both academics and private practice. The majority of podcasts released episodes monthly ($n = 21$, 21.9%) or less frequently than monthly ($n = 36$, 37.5%). Among all episodes, procedural topics ($n = 951$ episodes, 26.4%) and clinical education ($n = 1385$, 38.5%) were the most prevalent categories. Retina was the most represented subspecialty in podcast production, while oculoplastics and neuro-ophthalmology had the fewest podcasts. Episodes on disease pathophysiology ($p = 0.04$) and published research ($p < 0.001$) each declined over time. The proportion of episodes released from 2020 to 2022 that discussed digital technologies was 33.3% greater versus 2005 to 2019 ($p = 0.005$). Personal retrospective episodes doubled, career guidance and patient perspectives tripled, and wellness and social justice topics increased fivefold (all $p < 0.001$).

Conclusion In summary, the coronavirus disease 2019 pandemic coincided with a rise in ophthalmology podcasts and shifts in content. Podcasts have trended toward practical advice and technologies, reflecting their value in sharing modern, peer-to-peer pearls. Emphases on storytelling and social justice offer unique, clinically relevant perspectives compared with traditional modalities.

Keywords

- ▶ digital media
- ▶ education
- ▶ ophthalmology
- ▶ podcasts

received
April 10, 2023
accepted after revision
October 17, 2023

DOI <https://doi.org/10.1055/s-0043-1776911>.
ISSN 2475-4757.

© 2023. The Author(s).

This is an open access article published by Thieme under the terms of the Creative Commons Attribution-NonDerivative-NonCommercial-License, permitting copying and reproduction so long as the original work is given appropriate credit. Contents may not be used for commercial purposes, or adapted, remixed, transformed or built upon. (<https://creativecommons.org/licenses/by-nc-nd/4.0/>)

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

Asynchronous, learner-directed resources have become an integral part of medical education.^{1–5} Podcasts, in particular, have grown in popularity across all training levels.^{4,6} As a free open-access medical education (“FOAM”) resource, podcasts are a cost-effective, innovative modality for knowledge dissemination and the development of virtual communities.^{7,8} Stepping beyond traditional lectures and text-based teaching, podcasts are widely accessible, brief audio and video series that encourage personalized learning.^{9,10} Notably, podcasts are a primary education medium in select fields, with 80% of emergency medicine residents listening to at least one podcast regularly.¹¹

From undergraduate medical education to specialty-focused training, podcasts are a ubiquitous learning tool.^{12–16} For example, pediatric podcasts have been incorporated into medical school curricula since 2008, gaining preference among students for catering to different study styles and affording greater knowledge retention.^{12,17} Likewise, podcasts have facilitated increased understanding of educational content at the resident training level, such as electroencephalography among anesthesiology residents and clinical decision-making among otolaryngology residents.^{18–20} Podcasts also serve the attending physician population, offering continuing medical education (CME) credit.¹⁵ A survey of retina society members found that 41% of respondents reported listening to at least one podcast weekly, with 68.3% using podcasts during their commute to stay up-to-date on the latest research.²¹ Moreover, with reduced in-person opportunities secondary to the coronavirus disease 2019 (COVID-19) pandemic, podcasts provided tools for career advancement. For example, listeners of the “Doctority” podcast remarked that they gained interviewing skills and learned about residency programs that they would not have otherwise considered. Podcasts have similarly gained use by numerous medical journals to highlight recent developments, and professional societies have utilized podcasts to disseminate information from annual meetings that were canceled due to the pandemic.²² Notably, a review by Succar et al suggests that the COVID-19 pandemic propelled innovation in ophthalmic education through increased utilization of digital platforms.²³

Despite the rise of podcasts across multiple medical and surgical fields, few reviews have been conducted to characterize and explore trends. In 2020, Malka et al analyzed 451 podcasts across five platforms, noting a reduced total episodes and episode frequency in otolaryngology compared with other specialties.¹⁹ Similarly, Jella et al studied the growth of orthopaedic surgery podcasts, describing a more than 12-fold rise of active podcasts between January 2016 and October 2020.²⁴ Venincasa et al surveyed listeners of a podcast providing vitreoretinal education, noting a rapid rise in listenership and efficacy of podcasts for both instruction as well as clinical care.²⁵ Further, survey results suggested that podcasting is as pertinent for educational growth as CME lectures, national conferences, and peer-reviewed journals.²⁵ Likewise, Nguyen et al succinctly overviewed ophthalmology podcast offerings along with their target audience, highlighting an exponential rise in prevalence of this medium in medical education and nearly a majority of shows designed

for practicing ophthalmologists.²⁶ The present review aims to describe the growth of ophthalmology podcasts over time, comprehensively characterize key features of their production, and thematically analyze their content.

Materials and Methods

Methodology followed the Arksey and O’Malley review framework, with an understanding that this was a novel media study rather than a traditional literature review.²⁷ This study was exempt from Institutional Review Board approval.

Google search and the three largest podcasting platforms were queried: Apple Podcasts (Cupertino, CA), Google Podcasts (Mountain View, CA), and Spotify (Stockholm, Sweden). Search terms included “ophthalmology,” “ophthalmologist,” “ophthalmologists,” “ophthal,” “ophtho,” “ophth,” and the common misspelling “ophth.” Podcasts were excluded if they contained inaccessible audio files, discussed mostly non-ophthalmology subject matter, were produced in a non-English language, or had only a single episode. Compiled podcasts were consolidated to generate a unique list of all podcasts and active podcasts (→Fig. 1).

For each unique podcast, several data points were collected following metrics used in a recent analysis of orthopaedics podcasts.²⁴ First, temporal information was captured including the year of initiation, frequency of releases, and total episodes from February 22, 2005 (when the first ophthalmology podcast was released) to March 28, 2022. Second, production elements of each podcast such as the presence of interviews, CME credit, sponsorships, and host features were recorded.

Thematically, each podcast show was classified into one of the seven domains described by Jella et al: clinical knowledge, peer-reviewed journal, professional society, patient-facing, practice management, residency preparation, or general.²⁴ “General” applied to podcasts with broad content that did not fit under the other, more specific domains. Podcasts were labeled as “active” when the most recent episode was released within 90 days of March 28, 2022, and “inactive” otherwise. Episode release frequency was recorded as “daily” if podcasts had episodes released every 0 to 2 days, “weekly” every 3 to 10 days, “biweekly” every 11 to 20 days, “monthly” every 21 to 40 days, and “other” every 40 days or more.²⁴

Subsequently for each podcast, episode-level analyses were then performed. Episode length and topics were recorded by reviewing the title and text description. Content categories relevant to trainees and practicing ophthalmologists were informed by the American Academy of Ophthalmology’s (AAO) “Scientific Program Subject Classification” and “Practice Management Program Subject Classification.”²⁸ Episode content across all categories was indicated using a binary (yes/no) scale, and each episode could be classified under more than one category. Then, major episode-level categorizations were clustered into five groupings to analyze trends: (1) subspecialty, (2) core education, (3) systems education, (4) perspectives, and (5) special topics.

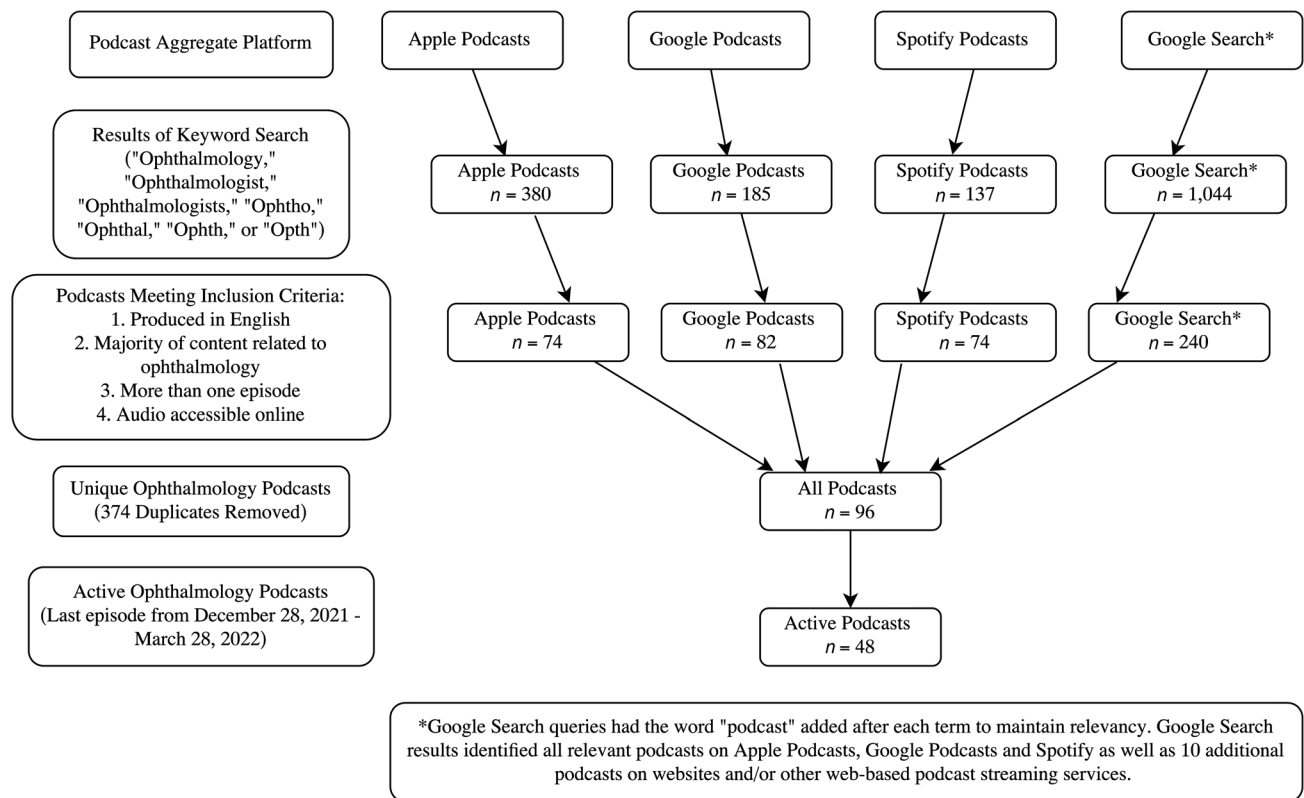


Fig. 1 Selection of ophthalmology podcasts for review. Flow diagram depicting aggregate platforms, keyword searches, and inclusion criteria utilized to identify total and active podcasts.

Changes in these five clusters were analyzed over time. **►Supplementary Table S1** (available in the online version) includes all category descriptions with detailed criteria and a sample episode corresponding to each.

Analyses were performed using Statistical Package for the Social Sciences (v. 28.0.0, IBM). Changes in podcast content and production over time were recorded. Podcast-level characteristics were compared between active and inactive podcasts. Bias was assessed based on sponsorship type by listening to a random sample of podcasts from each sponsorship category and assessing the extent to which the sponsor's product(s) contributed to the content of the podcast episodes. Categories were compared between episodes produced before 2020 to those from 2020 to 2022 using Pearson's chi-square test to evaluate changes in content during the COVID-19 pandemic. Inferential statistical testing was run only for episode-level data to limit multiple comparisons. Categorical values are reported with count numbers and percentages, while linear values are reported as mean \pm standard deviation. Significance was set at two-sided $p < 0.05$.

Results

Podcast Characteristics

A total of 96 unique ophthalmology podcasts were eligible for analysis (**►Fig. 1**). The earliest accessible podcast was produced in 2005. From 2005 to 2012, an average of four ophthalmology podcasts released episodes per year. The first

year with a double-digit number of shows was 2013 ($n = 12$ podcasts), and the first year in which the number of shows exceeded 20 was 2017 ($n = 21$). The greatest increase in number of podcasts that released episodes occurred from 2019 ($n = 29$) to 2020 ($n = 52$). General podcast characteristics are compiled in **►Table 1**.

Over half of all podcasts released episodes either less frequently than monthly ($n = 36$, 37.5%) or monthly ($n = 21$, 21.9%). Mean episode length was $0:26:44 \pm 0:16:13$. Episode length ranged from 49 seconds to 2 hours and 18 minutes. Note that 52.1% ($n = 50$) of podcasts were hosted by men, 15.6% ($n = 15$) by women, and 32.3% ($n = 31$) by both men and women. Attending physicians comprised the majority of all hosts ($n = 60$, 62.5%). However, several hosts were in other professions ($n = 13$, 13.5%), such as journalism or the pharmaceutical industry. Over a third of podcasts were led by individuals who worked in both academic and private practice settings ($n = 34$, 35.4%), while fewer were exclusively academic ($n = 26$, 27.1%) or exclusively private ($n = 21$, 21.9%) (**►Table 1**). The United States was the most common country of residence of the host(s) ($n = 68$, 70.8%), and second was Asia ($n = 10$, 10.4%). In terms of subject matter, podcasts most frequently covered a broad range of general topics ($n = 50$, 52.1%) or focused on clinical knowledge ($n = 19$, 19.8%).

Of all 96 podcasts, 48 (50.0%) were active within 90 days of March 28, 2022 (**►Table 1**). No active podcast released episodes on a daily basis, while a few inactive podcasts did ($n = 8$, 16.7%). Multiple podcast hosts were present in the majority of active shows ($n = 29$, 60.4%), whereas the multihost format

Table 1 Ophthalmology podcast characteristics as of March 28, 2022

Show characteristics	All podcasts (n = 96)	Active podcasts ^a (n = 48)
Podcast domain		
General	50 (52.1%)	25 (52.1%)
Clinical knowledge	19 (19.8%)	9 (18.8%)
Patient-facing	10 (10.4%)	1 (2.1%)
Professional society	8 (8.3%)	6 (12.5%)
Peer-reviewed journal	4 (4.2%)	3 (6.3%)
Residency preparation	3 (3.1%)	2 (4.2%)
Practice management	2 (2.1%)	2 (4.2%)
Episode frequency		
Daily	8 (8.3%)	0 (0%)
Weekly	14 (14.6%)	7 (14.6%)
Biweekly	17 (17.7%)	11 (22.9%)
Monthly	21 (21.9%)	11 (22.9%)
Other	36 (37.5%)	19 (39.6%)
Episode length in h: mins:s (mean ± SD)	0:26:44 ± 0:16:13	0:27:57 ± 0:16:01
Contains interviews	68 (70.8%)	42 (87.5%)
Location		
United States	68 (70.8%)	33 (68.8%)
Asia	10 (10.4%)	3 (6.3%)
Australia/New Zealand	7 (7.3%)	4 (8.3%)
Europe	5 (5.2%)	3 (6.3%)
Canada	3 (3.1%)	2 (4.2%)
International	3 (3.1%)	3 (6.3%)
Host number		
Solo	49 (51.0%)	19 (39.6%)
Panel	47 (49.0%)	29 (60.4%)
Host gender		
Male	50 (52.1%)	18 (37.5%)
Female	15 (15.6%)	9 (18.8%)
Combination	31 (32.3%)	21 (43.8%)
Host title		
Attending	60 (62.5%)	32 (66.7%)
Resident or fellow	8 (8.3%)	4 (8.3%)
Student	3 (3.1%)	2 (4.2%)
Patient	2 (2.1%)	0 (0%)
Other	13 (13.5%)	7 (14.6%)
Combination	10 (10.4%)	3 (6.3%)
Host affiliation		
Academics	26 (27.1%)	16 (33.3%)
Private practice	21 (21.9%)	9 (18.8%)
Combination	34 (35.4%)	17 (35.4%)
Neither or unknown	15 (15.6%)	6 (12.5%)

(Continued)

Table 1 (Continued)

Show characteristics	All podcasts (n = 96)	Active podcasts ^a (n = 48)
Sponsorship		
Academic	16 (16.7%)	11 (22.9%)
Pharmaceutical industry or nonprofit	22 (22.9%)	10 (20.8%)
Combination	6 (6.3%)	6 (12.5%)
Neither	52 (54.2%)	21 (43.8%)
Continuing medical education credit	6 (6.3%)	5 (10.4%)
Associated videos	20 (20.8%)	9 (18.8%)
Associated Web site	65 (67.7%)	37 (77.1%)

Abbreviation: SD, standard deviation.

^aPodcasts were defined as active if the most recent episode had been released within 90 days of March 28, 2022.

was less utilized by inactive shows ($n = 18$, 37.5%). All three podcasts with international host collaborations were active shows. An interview format was present in most active podcasts ($n = 42$, 87.5%), but was less frequent in inactive podcasts ($n = 26$, 54.2%). The active group had a higher rate of associated Web sites ($n = 37$, 77.1%) versus the inactive group ($n = 28$, 58.3%).

Among the 10 podcasts targeted toward patient education (“patient-facing”), only one was classified as active (►Table 1). In contrast, five out of the six podcasts that offered CME credit for physicians were active. Active podcasts had a higher rate of sponsorship ($n = 31$, 64.6%) than inactive podcasts ($n = 17$, 35.4%). Support specifically from an academic entity (journal, university, or professional organization) was also observed more among active podcasts ($n = 11$, 22.9%) versus inactive podcasts ($n = 5$, 10.4%). All six podcasts that had both academic and nonacademic sponsors were active. From a random sampling of five pharmaceutical-sponsored podcasts, one podcast discussed their sponsor’s products in detail throughout the episodes. Within the other four podcasts, the extent of company-related content was limited to only naming

the pharmaceutical entity as a sponsor at the beginning of the episodes. By comparison, among a random sample of 15 podcasts that were supported by journals, specialty societies, or with no sponsorship, the largest impact on content was limited to naming supporting entities at the start of the episodes.

Episode Characteristics

From February 22, 2005 to March 28, 2022, there were 3,594 episodes eligible for analysis. The number of episodes released each year is presented in ►Fig. 2. The greatest surge in production occurred in 2020; nearly half of all episodes were released from 2020 to 2022 ($n = 1,764$, 49.1%). The rise in 2020 ($n = 798$, 22.2%) appears to have plateaued by 2021 ($n = 804$, 22.4%). In 2022, 162 episodes were released from January 1 to March 28.

►Table 2 stratifies episodes by content categories and statistically compares the prevalence of each category before the COVID-19 pandemic (2005–2019) to during it (2020–2022). ►Figs. 3 and 4 present topic clusters with annual changes beginning in 2014, the first year 100 total episodes were released.

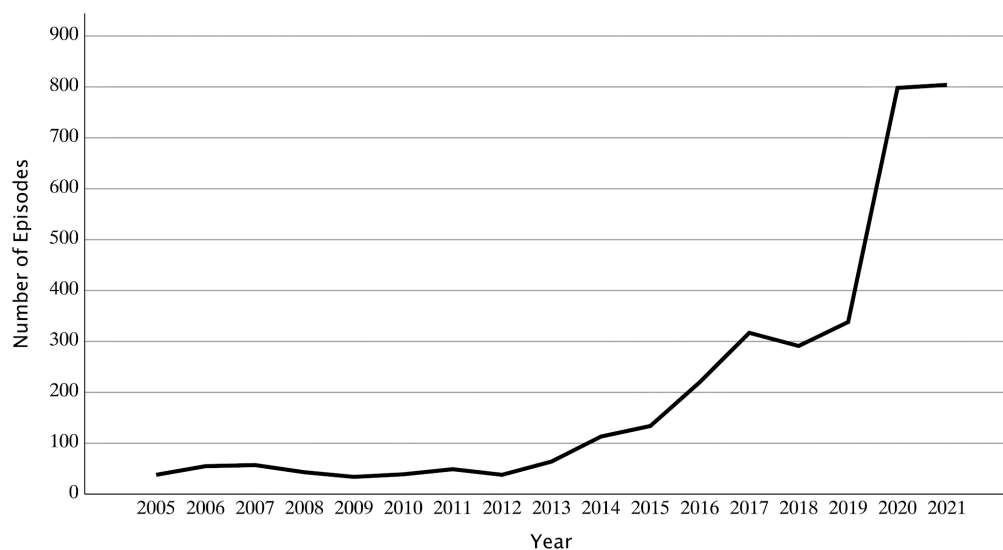


Fig. 2 Ophthalmology podcast episodes released per year. Line graph of the total number of ophthalmology podcast episodes released each year, 2005 to 2021.

Table 2 Ophthalmology podcast episode content

Content category	2005–2019 episodes (n = 1,830)	2020–2022 episodes (n = 1,764)	p-Value
Subspecialty			
Cataract	257 (14.0%)	228 (12.9%)	0.33
Cornea and refractive surgery	343 (18.7%)	254 (14.4%)	< 0.001 ^a
Glaucoma	225 (12.3%)	151 (8.6%)	< 0.001 ^a
Neuro-ophthalmology	85 (4.6%)	42 (2.4%)	< 0.001 ^a
Ocular pathology and oncology	51 (2.8%)	64 (3.6%)	0.15
Oculoplastics and orbit	49 (2.7%)	42 (2.4%)	0.57
Pediatrics and strabismus	73 (4.0%)	87 (4.9%)	0.17
Retina and vitreous	526 (28.7%)	500 (28.3%)	0.79
Uveitis and intraocular inflammation	66 (3.6%)	45 (2.6%)	0.07
Core education			
Career guidance	69 (3.8%)	202 (11.5%)	< 0.001 ^a
Clinical skills	646 (35.3%)	739 (41.9%)	< 0.001 ^a
Disease pathophysiology	384 (21.0%)	323 (18.3%)	0.04 ^a
Procedural skills	422 (23.1%)	529 (30.0%)	< 0.001 ^a
Systems education			
Digital technology and medical records	109 (6.0%)	148 (8.4%)	0.005 ^a
Health policies and organizational policies	24 (1.3%)	34 (1.9%)	0.14
Practice ownership and finances	79 (4.3%)	75 (4.3%)	0.92
Quality improvement	77 (4.2%)	49 (2.8%)	0.02 ^a
Perspectives			
Patient perspective	17 (0.9%)	48 (2.7%)	< 0.001 ^a
Personal retrospective	113 (6.2%)	257 (14.6%)	< 0.001 ^a
Published research	659 (36.0%)	396 (22.4%)	< 0.001 ^a
Special topics			
Diversity among ophthalmologists	11 (0.6%)	48 (2.7%)	< 0.001 ^a
Doctor or student wellness	8 (0.4%)	37 (2.1%)	< 0.001 ^a
Ethics	24 (1.3%)	9 (0.5%)	0.012 ^a
Global outreach	32 (1.7%)	58 (3.3%)	0.003 ^a
Ocular health disparities	11 (0.6%)	29 (1.6%)	0.003 ^a
COVID-19	0 (0%)	188 (10.7%)	n/a

Abbreviations: COVID-19, coronavirus disease 2019; n/a, not available.

Note: Count and percentage values refer to all episodes in which the category of interest was discussed and were inclusive of episodes that covered multiple category topics.

^aStatistical significance at $p < 0.05$ as determined by chi-squared testing.

Retina, cornea, cataract, and glaucoma were the four most common topics (►Table 2). Specifically, from 2014 to 2015, over half of all subspecialty episodes were anterior segment (cornea, cataract, and glaucoma) (►Fig. 3A). Retina episodes increased in 2016 to 2017, with the annual number of retina-only episodes from 2017 onwards exceeding anterior segment-only episodes (►Fig. 3A). Episodes relating to cornea, glaucoma, and neuro-ophthalmology each declined from 2020 to 2022. Cornea episodes were reduced by a relative proportional difference of 23.0% ($p < 0.001$) and glaucoma by 30.1% ($p < 0.001$). Neuro-ophthalmology episodes nearly

halved, from 4.6 to 2.4% ($p < 0.001$). For all other subspecialties, pre- and postpandemic changes were not statistically significant (►Table 2). The most poorly represented subspecialty overall was oculoplastics ($n = 91$, 2.5%).

Episodes classified under the cluster of core education are shown in ►Fig. 3B. Procedural and clinical pearls were the most frequent types of education provided by ophthalmology podcasts since 2014. Episodes featuring those two topics continued to increase during the pandemic, with procedural skills episodes increasing by a relative proportional difference of 29.9% ($p < 0.001$) and clinical skills episodes

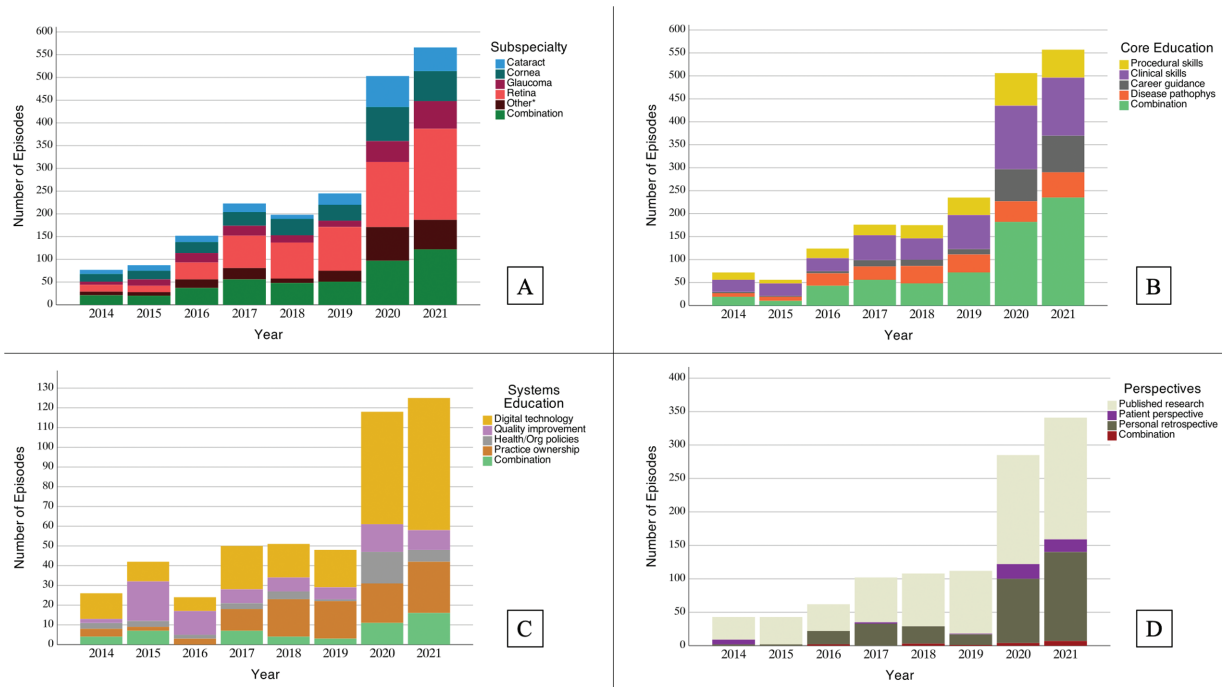


Fig. 3 Major clusters of ophthalmology podcast episode content released annually. Bar graphs of the number of episodes by subspecialty, core education, systems education, and perspectives content clusters, years 2014–2021. *The “other” category in (A) encompasses ocular pathology/oncology, pediatrics/strabismus, neuro-ophthalmology, oculoplastics, and uveitis/intraocular inflammation.

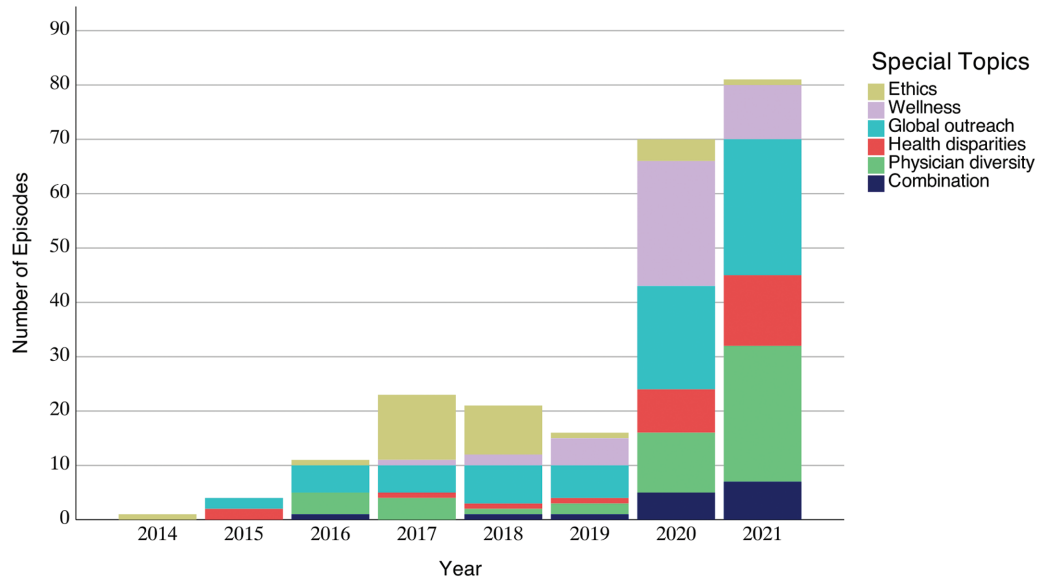


Fig. 4 Ophthalmology special topics podcast episodes released annually. Bar graph depicting the number of episodes released for each special topics content group, years 2014–2021.

increasing by a relative proportional difference of 18.7% ($p < 0.001$) (► **Table 2**). Episodes that shared career guidance tips tripled in the 2020 to 2022 period ($p < 0.001$). In contrast, podcast education on disease pathophysiology declined from pre-2020 to 2020 to 2022 ($p = 0.04$). Recent episodes also more frequently combined core education topics with episodes exceeding the number of standalone procedural skills and standalone clinical skills episodes in 2020 to 2021 (► **Fig. 3B**).

The systems-level education cluster includes “big picture” topics pertinent to the administrative, financial, and leadership demands that ophthalmologists face (► **Fig. 3C**). Within this cluster, education on digital technologies and medical records prevailed from 2020 to 2022.

Episode releases on this topic during the COVID-19 years increased by a relative proportional difference of 33.3% versus pre-2020 ($p = 0.005$, ► **Table 2**). Quality improvement episodes peaked in 2015 to 2016, then emphasis shifted to

practice ownership and finance episodes from 2017 to 2019 (► **Fig. 3C**). Lastly, episodes on health policies and organizational policies experienced an isolated surge in 2020.

“Perspectives” demarcate broad classes of discussion, including conversations related to published research, patient perspectives, and/or personal retrospectives (► **Fig. 3D**). Research discussions comprised almost all episodes in this cluster from 2005 to 2015. However, episodes relating to published research declined by a relative proportional difference of 37.8% in 2020 to 2022 compared with prepandemic ($p < 0.001$, ► **Table 2**). In contrast, personal retrospective episodes that share personal stories and experiences of attendings or trainees in the field have increased considerably since 2016. Such episodes more than doubled during 2020 to 2022 ($p < 0.001$). Episodes covering the patient perspective or patient stories also became more prevalent, tripling compared with the pre-COVID-19 years ($p < 0.001$).

Special topics episodes were initially released at an infrequent rate, with multiple years (2005, 2008, 2011, 2012) having no episodes from this cluster. Global outreach was the most persistent standalone special topic across the years (► **Fig. 4**) and nearly doubled during the 2020 to 2022 period ($p = 0.003$). Ocular health disparity episodes, of which there were no more than two per year prior to 2020, nearly tripled during 2020 to 2022 ($p = 0.003$). Similarly, the number of episodes relating to doctor or student wellness was zero prior to 2017. The proportion of such episodes increased over fivefold during the pandemic ($p < 0.001$). Episodes relating to diversity within the field of ophthalmology also underwent an over fourfold increase ($p < 0.001$). Ethics episodes increased in 2017 and 2018 but declined thereafter, with only nine related releases from 2020 to 2022.

Discussion

Ophthalmology podcasts have grown considerably, with the number of shows steadily trending upwards. The COVID-19 pandemic was associated with a surge in episode releases. Stay-at-home orders, increased digital communications, and demand for remote learning options may have propelled this rise.^{29–32} A potential plateau in episodes was then reached in 2021, raising questions about the sustainability of the podcast boom. It is plausible that a return to in-person activities reduced the time available for podcast development.

Most ophthalmology podcasts covered a broad array of topics, as evidenced by the preponderance of the “general” domain and combination episodes across clusters. Further, many podcasts were run by a panel of collaborators who often worked in both private practice and academics. International host collaborations and sponsorships from both industry and academia were observed especially among active podcasts. Podcast sponsorship seldom affected the content of the podcasts overall, with most podcasts prioritizing education rather than acting as platforms to push industry products. Such trends may reflect the uniquely interconnected, productive relationships spanning academics, private practice, and industry within the field.³³ CME eligibility and sponsorships, such as in the official podcasts of

the AAO, American Journal of Ophthalmology, American Society of Ophthalmic Plastic and Reconstructive Surgery, and American Society of Retina Specialists, also support the legitimacy of ophthalmology podcasts as educational tools.³⁴ Almost all CME-eligible podcasts were active, and nearly a quarter of active podcasts received support from an academic entity.

Generally, practical tips on procedural and clinical skills were favored over basic-science disease pathophysiology, particularly among recent podcasts.^{35–37} Listeners may obtain bite-sized, peer-to-peer practice pearls, perhaps comparable to brief conversations at a national conference.²⁵ Increasing emphasis on career advancement and wellness aligns with growing interests in optimizing personal performance among ophthalmologists.^{38,39} Podcasts, therefore, may help openly disseminate the kind of advice typically gleaned from a mentor-mentee relationship. It is also apt that the digital modality of podcasts promoted digital technology education. Recent advances in both software and hardware, such as artificial intelligence, may explain the surge in this episode topic over time, as innovative technologies have become increasingly important for ophthalmic disease management.⁴⁰ With easy transmissibility, podcasts can provide a streamlined platform for the discussion of cutting-edge developments in advance of formal presentation or publication.

More so than any other subspecialty, retina was highly represented in podcast episodes released over the last 5 years. This may be attributable in part to the high rate of novel technology adoption among retina practitioners. For example, retina surgeons have most utilized new heads-up display visualization systems.⁴¹ Likewise, they may feel more comfortable exploring experimental learning options like podcasts. The decline in anterior segment episode allocations, conversely, may be a byproduct of better representations in other media. For instance, EyeTube and YouTube offer extensive visual learning options for anterior segment techniques, parallel to the increased utilization of YouTube as an educational tool among surgical trainees in other fields.⁴²

Podcast delivery has become increasingly focused on sharing stories rather than lectures, as demonstrated by the greater number of interviews and physician, patient, and trainee reflections in recent years. Though the conversational style of podcasts is not as strictly regulated as formal panel discussions, there is value in communicating the voices of those who are less heard.^{43,44} For instance, the major rise in episodes relating to social justice issues speaks to the ability of podcasts to provide a novel avenue for the circulation of understudied topics. There is a need within ophthalmology for more equal racial and gender representation, as well as for better service of the underserved.^{45–47} Tools like podcasts may be particularly well suited for highlighting such issues often missed by traditional sources of information. This study also identified sectors where podcasts may be of limited utility. For example, use for direct patient education appears to have fallen out of favor, likely secondary to the availability of other modalities, such as videos. Furthermore, the reduction in basic sciences episodes may

reflect the nature of social sciences lending more favorably to the conversational style of podcasts and digital modalities overall.⁴⁸

There are several strengths to our study. Comprehensive keywords and thorough inclusion criteria were used, including only English-language podcasts with accessible audio, more than one episode, and the majority of content related to ophthalmology. By applying strict inclusion criteria, we aimed to capture higher-quality podcasts that would most realistically be heard by patients, trainees, and ophthalmologists.²⁶ Further, this study analyzed 3,594 individual episodes which has not previously been performed. This study also revealed the episode surge coinciding with the COVID-19 pandemic and important podcast content trends. Such information can guide future podcasts in how best to engage with their audience, sustain podcast releases, and disseminate information effectively.

However, this study has limitations. When examining podcast episodes, we used the episode titles and descriptions rather than playing each release in full. This was most feasible given the extensive podcast coverage encompassing over 1,500 hours. It is possible that a text-based examination did not fully capture discussed content, leading to episode category underestimations. This study did not assess viewership, since such data are not publicly accessible. It also did not directly measure the quality or accuracy of podcast content, as there are no validated metrics with high inter-rater reliability for the evaluation of podcast quality.

Conclusion

Ophthalmology podcasts have expanded rapidly and are a pertinent component of digital ophthalmology education and information dissemination. Podcast production elements such as CME credit, collaborations across private practice and academics, pharmaceutical sponsorships, and support from peer-reviewed journals aptly reflect the interconnected, evolving state of the field and support the legitimacy of the medium as a novel learning tool. Key trends in episode-level content include the predominance of clinical and surgical insights, discussions of digital technologies, as well as career and wellness pearls. In terms of subspecialty content, retina has eclipsed the anterior segment in frequency of podcast episodes in recent years, while there is room for growth in oculoplastics and neuro-ophthalmology. Consequently, podcasts may inform the trajectory of clinical practice through exposure to both personal and underrepresented perspectives; at the same time, aforementioned patterns highlight areas for future podcast improvement. Future analyses could consider using commercial-grade speech-to-text software to determine categorizations in an efficient manner. Lastly, to further determine the value of podcasts for listeners, additional direct surveys would be most informative.

Conflict of Interest

None declared.

Acknowledgments

None.

References

- Kelly JM, Perseghin A, Dow A, Trivedi SP, Rodman A, Berk J. Learning through listening: a scoping review of podcast use in medical education. *Acad Med* 2022;97(07):1079–1085
- Cho D, Cosimini M, Espinoza J. Podcasting in medical education: a review of the literature. *Korean J Med Educ* 2017;29(04):229–239
- Al-Khaled T, Acaba-Berrocal L, Cole E, Ting DSW, Chiang MF, Chan RVP. Digital education in ophthalmology. *Asia Pac J Ophthalmol (Phila)* 2021;11(03):267–272
- Malecki SL, Quinn KL, Zilbert N, et al. Understanding the use and perceived impact of a medical podcast: qualitative study. *JMIR Med Educ* 2019;5(02):e12901
- Little A, Hampton Z, Gronowski T, Meyer C, Kalnow A. Podcasting in medicine: a review of the current content by specialty. *Cureus* 2020;12(01):e6726
- Young B, Pouw A, Redfern A, Cai F, Chow J. Eyes for ears—a medical education podcast feasibility study. *J Surg Educ* 2021;78(01):342–345
- Anteby R, Amiel I, Cordoba M, Axelsson CGS, Rosin D, Phitayakorn R. Development and utilization of a medical student surgery podcast during COVID-19. *J Surg Res* 2021;265:95–99
- Ting DK, Boreskie P, Luckett-Gatopoulos S, Gysel L, Lanktree MB, Chan TM. Quality appraisal and assurance techniques for free open access medical education (FOAM) resources: a rapid review. *Semin Nephrol* 2020;40(03):309–319
- Schreiber BE, Fukuta J, Gordon F. Live lecture versus video podcast in undergraduate medical education: a randomised controlled trial. *BMC Med Educ* 2010;10(01):68
- Back DA, von Malotky J, Sostmann K, Hube R, Peters H, Hoff E. Superior gain in knowledge by podcasts versus text-based learning in teaching orthopedics: a randomized controlled trial. *J Surg Educ* 2017;74(01):154–160
- Mallin M, Schlein S, Doctor S, Stroud S, Dawson M, Fix M. A survey of the current utilization of asynchronous education among emergency medicine residents in the United States. *Acad Med* 2014;89(04):598–601
- Chin A, Helman A, Chan TM. Podcast use in undergraduate medical education. *Cureus* 2017;9(12):e1930
- Prakash SS, Muthuraman N, Anand R. Short-duration podcasts as a supplementary learning tool: perceptions of medical students and impact on assessment performance. *BMC Med Educ* 2017;17(01):167
- Milligan KJ, Daulton RS, St Clair ZT, Epperson MV, Holloway RM, Schlaudecker JD. Creation of a student-run medical education podcast: tutorial. *JMIR Med Educ* 2021;7(03):e29157
- Tarchichi TR, Szymusiak J. Continuing medical education in the time of social distancing: the case for expanding podcast usage for continuing education. *J Contin Educ Health Prof* 2021;41(01):70–74
- Roland D, Thoma B, Tagg A, Woods J, Chan TM, Riddell J. What are the real-world podcast-listening habits of medical professionals? *Cureus* 2021;13(07):e16240
- Patrick MD, Stukus DR, Nuss KE. Using podcasts to deliver pediatric educational content: development and reach of Pediatric CME. *Digit Health* 2019;5:2055207619834842
- Vanstrum EB, Badash I, Wu FM, et al. The role of educational podcast use among otolaryngology residents. *Ann Otol Rhinol Laryngol* 2022;131(12):1353–1357
- Malka R, Villwock J, Faucett EA, Bowe S. Podcast-based learning in otolaryngology: availability, breadth, and comparison with other specialties. *Laryngoscope* 2021;131(07):E2131–E2138
- Vasilopoulos T, Chau DF, Bensalem-Owen M, Cibula JE, Fahy BG. Prior podcast experience moderates improvement in electroencephalography evaluation after educational podcast module. *Anesth Analg* 2015;121(03):791–797

- 21 Venincasa MJ, Kloosterboer A, Zukerman RJ, et al. Educational impact of podcasts in the retina community. *Ophthalmol Retina* 2020;4(09):958–961
- 22 Stoehr JR, Hamidian Jahromi A, Gosain AK. Doctority: plastic surgery—an informative podcast for applicants to learn about plastic surgery training programs. *Plast Reconstr Surg Glob Open* 2021;9(07):e3717
- 23 Succar T, Beaver HA, Lee AG. Impact of COVID-19 pandemic on ophthalmology medical student teaching: educational innovations, challenges, and future directions. *Surv Ophthalmol* 2022;67(01):217–225
- 24 Jella TK, Cwalina TB, Acuña AJ, Samuel LT, Kamath AF. Good morning, orthopods: the growth and future implications of podcasts in orthopaedic surgery. *J Bone Joint Surg Am* 2021;103(09):840–847
- 25 Venincasa MJ, Cai LZ, Chang A, Kuriyan AE, Sridhar J. Educational impact of a podcast covering vitreoretinal topics: 1-year survey results. *J Vitreoretin Dis* 2019;3(05):358–362
- 26 Nguyen AX, Ruparella S, Sun F. Social media for pupils: evolution of podcasts in ophthalmology. *Clin Exp Ophthalmol* 2022;50(07):811–814
- 27 Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol* 2005;8(01):19–32
- 28 AAO 2022: Subject Classification/Topics. The American Academy of Ophthalmology. Published 2022. Accessed March 15, 2022 at: <https://www.aaopt.org/annual-meeting/presenter/subject-classification-topics>
- 29 Chatziralli I, Ventura CV, Touhami S, et al; International Retina Collaborative. Transforming ophthalmic education into virtual learning during COVID-19 pandemic: a global perspective. *Eye (Lond)* 2021;35(05):1459–1466
- 30 Ahmady S, Kallestrup P, Sadoughi MM, et al. Distance learning strategies in medical education during COVID-19: a systematic review. *J Educ Health Promot* 2021;10:421
- 31 Budd J, Miller BS, Manning EM, et al. Digital technologies in the public-health response to COVID-19. *Nat Med* 2020;26(08):1183–1192
- 32 Khamees D, Peterson W, Patricio M, et al. Remote learning developments in postgraduate medical education in response to the COVID-19 pandemic - a BEME systematic review: BEME Guide No. 71. *Med Teach* 2022;44(05):466–485
- 33 Jampol LM, Packer S, Mills RP, Day SH, Lichter PRCouncil of the American Ophthalmological Society. A perspective on commercial relationships between ophthalmology and industry. *Arch Ophthalmol* 2009;127(09):1194–1202
- 34 Patel NA, Powers SLD, Parrish RK II. Modernizing the American Journal of Ophthalmology: social media, podcasts, and digital illustrations. *Am J Ophthalmol* 2022;239:ix–x
- 35 Ventola CL. Mobile devices and apps for health care professionals: uses and benefits. *P&T* 2014;39(05):356–364
- 36 Saenger AK, Berkwits M, Carley S, et al. The power of social media in medicine and medical education: opportunities, risks, and rewards. *Clin Chem* 2018;64(09):1284–1290
- 37 Men M, Fung SSM, Tsui E. What's trending: a review of social media in ophthalmology. *Curr Opin Ophthalmol* 2021;32(04):324–330
- 38 Tran EM, Scott IU, Clark MA, Greenberg PB. Resident wellness in US ophthalmic graduate medical education: the resident perspective. *JAMA Ophthalmol* 2018;136(06):695–701
- 39 Gedde SJ, Feuer WJ, Crane AM, Shi W. Factors influencing career decisions and satisfaction among newly practicing ophthalmologists. *Am J Ophthalmol* 2022;234:285–326
- 40 Mishra K, Leng T. Artificial intelligence and ophthalmic surgery. *Curr Opin Ophthalmol* 2021;32(05):425–430
- 41 Zhang Z, Wang L, Wei Y, Fang D, Fan S, Zhang S. The preliminary experiences with three-dimensional heads-up display viewing system for vitreoretinal surgery under various status. *Curr Eye Res* 2019;44(01):102–109
- 42 Luu NN, Yver CM, Douglas JE, Tasche KK, Thakkar PG, Rajasekaran K. Assessment of YouTube as an educational tool in teaching key indicator cases in otolaryngology during the COVID-19 pandemic and beyond: neck dissection. *J Surg Educ* 2021;78(01):214–231
- 43 Dean S, Mathers JM, Calvert M, et al. “The patient is speaking”: discovering the patient voice in ophthalmology. *Br J Ophthalmol* 2017;101(06):700–708
- 44 Mann K, Gordon J, MacLeod A. Reflection and reflective practice in health professions education: a systematic review. *Adv Health Sci Educ Theory Pract* 2009;14(04):595–621
- 45 Atkuru A, Lieng MK, Emami-Naeini P. Trends in racial diversity among United States ophthalmology residents. *Ophthalmology* 2022;129(08):957–959
- 46 Aguwa UT, Srikumaran D, Green LK, et al. Analysis of sex diversity trends among ophthalmology match applicants, residents, and clinical faculty. *JAMA Ophthalmol* 2021;139(11):1184–1190
- 47 Halawa OA, Kolli A, Oh G, et al. Racial and socioeconomic differences in eye care utilization among Medicare beneficiaries with glaucoma. *Ophthalmology* 2022;129(04):397–405
- 48 Zhang J, Ding Y, Yang X, et al. COVID-19's impacts on the scope, effectiveness, and interaction characteristics of online learning: a social network analysis. *PLoS One* 2022;17(08):e0273016