TITLE PAGE

Full title:

The fate of abstracts presented at international ophthalmology meetings: 2-year and 5-year publication rates

Short title:

The fate of ophthalmic research abstracts

Edoardo Villani[1], Stela Vujosevic [2], Claudia Specchia[3], Filippo Tresca Carducci[4], Stefano De Cillà[2], Paolo Nucci[1]

1. Department of Clinical Sciences and Community Health, University of Milan. Eye Clinic San Giuseppe Hospital, IRCCS Multimedica, Milan.
2. Eye Clinic, Azienda Ospedaliero-Universitaria Maggiore della Carità, Novara, Italy
3. Department of Molecular and Translational Medicine, Università degli Studi di Brescia. IRCCS Multimedica, Milan.
4. Istituto Clinico San Siro, Milan.

Corresponding author: Edoardo Villani, Eye Clinic San Giuseppe Hospital, IRCCS Multimedica, via San Vittore 12, 20123 – Milan, Italy. Edoardo.villani@unimi.it

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Abstract

Purpose: To quantify the 2-year and 5-year publication rates of abstracts presented at five major international ophthalmology meetings and to evaluate factors associated with publication and the respective journal impact factor.

Methods: In this observational retrospective study, we analyzed a random selection of 20% of free papers and posters presented at the 2010 meeting of the Association for Research in Vision and Ophthalmology (ARVO), the American Academy of Ophthalmology (AAO), the European Association for Vision and Eye Research, the Asia-Pacific Academy of Ophthalmology and the 2009 meeting of the European Society of Ophthalmology. The Pubmed (MEDLINE) database was searched to identify matching journal articles. Data collection included: topic, geographical origin, presentation type, publication status, and impact factor (IF). A multivariate logistic regression model was used to assess odds of publication and IF.

Results: Our analysis included 1.742 research abstracts. The overall 2-year and 5-year publication rates were 33.3% (n=579) and 47.2% (n=823), respectively. The highest publication rates were found for ARVO (36.1% and 51.9%, p<.0001), paper presentations (44.5% and 60.5%, p<0.0001), researches from Oceania (35.8% and 57.1%, p<.05) and North America (36.2% and 50.5%, p<.05), and Basic science studies (44% and 60.3%, p<.01). After adjustments, higher odds of publication were shown by ARVO and AAO (p<.0001), papers (p<.0001), and Basic science (p<.05). The median IF was 3.20 (IQR=1.90-3.40).

Conclusions: Less than half of abstracts presented at major ophthalmology meetings reach publication within 5 years of their initial presentation. These data can be read in two ways: as a warning to professionals attending meetings, who should adopt a critical approach to the preliminary results reported in presented abstracts, and as a spur to the scientific community for making efforts to increase publication rates and reduce publication bias.

Keywords: Abstract, congress, ophthalmology, publication, research

Introduction

Scientific conferences provide an important forum to disseminate information regarding current research and to share ideas about medical advances among colleagues. The abstract presentation at a meeting is an ideal opportunity for researchers to communicate new concepts and receive peer feedback. Nevertheless, the abstracts often present preliminary results with partial information and without final conclusions. The meetings' abstracts may have a greater influence on clinical practice and encourage scientific discovery if published as full-length papers, providing an accessible and reliable record of information.

However, a relatively small number of conference abstracts reaches publication. The conversion rate to publication of meeting presentations has been reported to be 44.5% in a 2007 Cochrane systematic review[1]. Reasons for non-publication include lack of time, publication bias and inadequate study quality, since a more rigorous peer-review process is required by most scientific journals for the publication of research papers. Failure to publish leads to loss of resources and prevents advances in clinical practice.

In recent years, several studies have reported a wide range of publication rates across different medical specialties[2-10]. However, limited and heterogeneous information is available on publication rates of presented abstracts in the field of ophthalmology.[11-16]

The primary aim of this study was to investigate publication rates of abstracts presented at five major ophthalmology international meetings including: Association for Research in Vision and Ophthalmology (ARVO), American Academy of Ophthalmology (AAO), European Society of Ophthalmology (SOE), European Association for Vision and Eye Research (EVER) and Asia-Pacific Academy of Ophthalmology (APAO) within 2 and 5 years of their initial meeting presentation. The secondary aim was to evaluate the factors associated with an increased likelihood of publication.

Methods

All abstracts presented at the annual meetings of ARVO, AAO, EVER and APAO in 2010 and at the SOE meeting in 2009 (it takes place every 2 years) were identified. Inclusion criteria required poster presentation or paper presentation (free paper) at the aforementioned meetings.
Abstracts were either retrieved online or provided by the associations in PDF format.
ARVO abstracts were identified on the official association website (http://www.arvo.org). The search included the following steps: *Annual Meeting*, *Meeting Info*, *Past Annual Meetings*, and *Online Abstract Search & Itinerary Builder* for the 2010 annual meeting. *Session Type* was set at first to *Paper Session* and then to *Poster Session*. Every session was searched fully to display all the related presentations. AAO abstracts were identified on the official association website (https://www.aao.org) with the following steps: *Annual Meeting*, *Meeting Information*, *Meeting Archives*, and *Program Search and Meeting Archive*. *Year* was set to *2010*, *Meeting* to *Annual meeting*, *Topic* to *All topics*, *Sort by* to *Event number*, *Event type* at first to *Paper* and then to *Scientific Poster*, *Special interest* to *All special interests*. EVER meeting abstract book was retrieved online in PDF format. SOE and APAO meeting abstract books were provided by the associations in PDF format.

A total of 20% of all free papers and posters presented at each conference was randomly selected and reviewed. The selection was made manually, counting one in five consecutive abstracts (i.e. abstract number 1, 6, 11, etc.), using the online archives (for ARVO and AAO) and the abstract books (for EVER, SOE and APAO). Withdrawn abstracts were excluded from the count.

MEDLINE database was manually searched to identify peer-reviewed full-length publications arising from presented abstracts. The PubMed Central interface was used for this study (US National Library of Medicine, National Institutes of Health)[17].
A search algorithm was developed to assess publication rates and two reviewers independently performed a manual literature search. The search field was narrowed down between 6 months

before the conference and 5 years after the conference. For the initial search, the last name and the first name's initial of the first author of the abstract were used. If the initial search successfully identified more than 20 publications, a second search was performed adding keywords from the abstract title. The manuscripts were then evaluated by title, keywords and authorship.

An abstract was considered to match a full publication only if the authorship, the title and the content of the published manuscript corresponded highly with the presented abstract. Specifically, the full publication had to show the following features: authors' list including at least the first and the last authors of the abstract, title including the same keywords of the title of the abstract, material and methods clearly reproducing those of the abstract. Publications including a different sample size (compared to the abstract) were considered a match if the authorship criterion was respected and the aim and methods of the study were identical to the abstract. Disagreements between the two reviewers were resolved by discussion or by recourse to a third researcher where necessary. If the search algorithm did not successfully find a match, the abstract was considered as not published in a journal available on Pubmed. The search was concluded once a suitable match was found. No effort was made to evaluate if an abstract lead to multiple publications. Analyses of all abstracts were carried out between July the 1st, 2016 and January the 1st, 2017.

Information about title, first author, topic, geographic zone, time to publication, presentation type, journal name and impact factor were retrieved for all published abstracts. Topic assignment was based on the sub-specialty of the presentations (Cataract, Cornea-External Disease, Glaucoma, Intraocular Inflammation-Uveitis, Neuro-Ophthalmology, Ocular Tumors and Pathology, Orbit-Lacrimal-Plastic Surgery, Pediatric Ophthalmology-Strabismus, Refractive Surgery, Retina-Vitreous, Basic Science, Other). Geographic zones were identified on the author information section on Pubmed, retrieving the country of origin of the first author (North America, Europe, South America, Oceania, Asia, Africa). The publication status was analyzed for each abstract using a 5 year follow-up period. Thus, abstracts were categorized as not published, already published at the time of presentation or published within 2 or 5 years of the meeting date. Journal names were

paired with information from ISI Journal Citation Reports to assess the publication year impact factor (IF) for the journal (Journal Citation Reports® published by Thomson Reuters)[18]. Data were collected in a computerized database (Microsoft Excel; Microsoft, Inc, Redmond, WA).

The proportion of researches presented as abstracts during the considered scientific meetings and then published as full-length peer-reviewed journal articles was calculated considering three time points: (i) meeting date (i.e. data that were already published in a peer-review journal at the time of the meeting), (ii) from the date of the meeting to the second year after the meeting date (iii) from the third year to the fifth year after the meeting date.

Cumulative proportions at 2-year and at 5-year were also calculated.

The Pearson's chi-square test was used in an univariate analysis to compare full-length publication proportions according to selected abstract characteristics such as meeting, type of presentation (oral session or poster session), topic and geographic zone. A multivariable logistic regression model was used to evaluate the association between selected abstract characteristics and the probability to be published in a full-length peer-reviewed journal article.

Linear multiple regression using rank-transformation was used to evaluate the association between journal's impact factor and the selected abstract characteristics.

All reported p-values were two sided. A $p<.05$ was considered as statistically significant.

All analyses were performed using R (www.r-project.org).

Results

A total of 9.000 scientific abstracts was accepted for presentation at the ARVO 2010, AAO 2010, EVER 2010, SOE 2009 and APAO 2010 annual meetings, of which 6468 were accepted at ARVO, 676 at AAO, 469 at EVER, 695 at SOE and 692 at APAO.

Of these 9.000 abstracts, a total of 1.742 (19.3%) was randomly selected for analysis, including 1.237 abstracts from ARVO, 136 from AAO, 91 from EVER, 139 from SOE and 139 from APAO.

Table 1 shows the characteristics of the selected abstracts in total and by meeting.

Five years after the meeting presentation, 919 abstracts (52.8%) were not published as full-length articles. The overall 2-year publication rate was 33.3% (n=579) and the overall 5-year publication rate was 47.2% (n=823).

For abstracts that went on to successful publication, the 0-2 year conversion rate was higher than the 3-5 year conversion rate (28.2%, n=491 vs 14%, n=244). A limited number of presentations were already published at the time of the meeting (5.0%, n=88).

Publication status of the selected abstracts was significantly different according to the meeting ($p<0.0001$), type of presentation ($p<0.0001$), geographic zone ($p=0.01$) and topic ($p=0.009$) (Figure 1, Table 2).

The highest 2-year and 5-year publication rates were found for ARVO meeting (36.1%, n=446 and 51.9%, n=642, respectively; $p<0.0001$), paper/oral presentations (44.5%, n=106 and 60.5%, n=144, respectively; $p<0.0001$), researches from Oceania (35.8%, n=15 and 57.1%, n=24, respectively; $p<0.05$) and North America (36.2%, n=277 and 50.5%, n=386, respectively; $p<0.05$), and Basic science studies (44%, n=103 and 60.3%, n=141, respectively; $p<0.01$).

Meeting, presentation type, and topic confirmed to be associated to the publication rate in a multivariable logistic regression (Table 3).

Compared to ARVO, the AAO presentations showed a similar chance of publication (OR=0.83, $p=0.43$), while abstracts presented at APAO, EVER and SOE were associated with a significant lower probability to be published (OR=0.25, 95%, $p<0.001$; OR=0.59, $p=0.03$; OR=0.46, $p<0.0001$, respectively). Papers had more than double of the probability to be published than the posters (OR=2.15, 95% $p<0.0001$). Basic science topic was associated with higher odds of publication compared to several major clinical topics (Cataract; Cornea, External Disease; Pediatric Ophthalmology, Strabismus; Refractive Surgery; Retina & Vitreous).

The factors influencing publication rate were the same for all the meetings (heterogeneity p-value: p=0.88 for the interaction between meeting and type of presentation; p=0.69 for the interaction between meeting and geographic area; p=0.96 for the interaction between meeting and topic).

The median IF of the journals publishing the papers included in this analysis was 3.20 (0-33.6) and it showed significant differences based on the characteristics of the originating abstract (Figure 2, Table 4).

The highest median IF was associated to ARVO (3.20, IQR=2.00-3.60, range=0.00-33.60; p<0.0001), papers/oral presentations (3.40, IQR=2.70-4.40, range=0.00-33; p<0.0001), researches from North America (3.40, IQR=2.40-3.90, range=0.00-15.00, p<0.0001), and Basic science abstracts (3.40, IQR=2.70-4.60, range=0.00-15; p<0.05). (Figure 2, Table 4).

Discussion

To the best of our knowledge, this study is the first study evaluating and comparing the fate of abstracts presented at several major international ophthalmology meetings.

We found that 33.3% of all presented abstracts were published at 2 years and 47.2% were published at 5 years after the meetings. These data are consistent with those reported on a wide range of biomedical specialties in a large Cochrane metanalysis[1] and in a systematic review by von Elm et al.[10] , both reporting a publication rate of approximately 44%.

In the field of Ophthalmology, old researches, performed in the 90s, had documented a higher publication rate for the ARVO and the AAO meeting abstracts (approximately 60%)[11-13] when compared to our data: 51.9% for the ARVO and 46.3% for the AAO. However, recent researches reported lower publication rates (39-46%)[14-16], more in line with our results.

Literature investigated several factors potentially associated with publication including: reporting only positive results and data from randomized controlled trials, large sample size, oral presentation, basic science, higher quality, multicentricity, pharmaceutical funding and accademic affiliation.[1, 12-26] In the present study, conference, presentation type and topic all showed to be

associated with publication rates. (Table 4) In fact, the ARVO meeting was associated with the highest 2-year (36.1%) and 5-year (51.9%) publication rates; the abstracts presented as paper (oral) presentation had the highest 2-year (44.5%) and 5-year (60.5%) publication rates; and Basic science had the highest 5 year (52.1%) publication rates. These results are in agreement with those previously reported by other Authors in different medicine specialties.[1, 4, 5, 8] The meeting committee usually assigns oral presentations to higher quality abstracts, thus the meeting program committee peer-review process may play a significant role in the preliminary selection of research studies that meet the quality standards needed for publication in high impact scientific journals[4, 27]. The majority of first authors were from North America (43.9%, n=764), which showed a significant 5 year conversion rate of 50.5% (n=386), slightly lower than Oceania (57.1%, n=24). However, as recently described by Mimouni M and colleagues analyzing the fate of the 2008 AAO abstracts,[14] the North American abstracts were associated with the highest median IF of publication (3.40). As already suggested,[14] this might be due to larger availability of resources for US researchers or to the language barrier. Native English speakers, whose first language currently is the language of science (and of ophthalmology), might have an advantage in the peer-review process.

A minimum 24 months follow-up period is recommended for studies aiming to assess publication rates[1]. We investigated the publication status of 1.742 abstracts at 2 and 5 years of their initial presentation in a meeting. This method had been previously adopted by Fosbol et al. in major cardiovascular conferences from 2006-2008 [6]. In contrast, Rabenda et al[8] assessed the publication status of presented abstracts at the European Congress on Osteoporosis, Osteoarthritis and Musculo-Skeletal Diseases in 2011, 3 years after the conference, and Winnik et al[7] selected a 4-year follow up after the European Society of Cardiology Congress in 2006. De Meier et al. proposed to use 5-year abstract-to-publication ratio as a novel quality indicator for objective comparison between scientific meetings. [22] Therefore, to make comparisons possible with future similar studies, we suggest to select analogous follow-up periods.

Meeting committees are in charge of judging the quality of research abstracts for acceptance at scientific conferences. This peer-review selection process is the first step in dissemination of knowledge, playing a crucial role in the scrutiny of the medical findings that may reach subsequent publication in peer-reviewed journals[4]. Winnik et al[7] reported that accepted abstracts have higher odds of publication than rejected abstracts and that they are published in journals with higher impact factor. These results, together with the higher publication rate of orally presented abstracts compared to posters, support the hypothesis that abstract peer-review at conferences is a valid method for the selection of high quality studies worthy of publication and suited for acceptance by journal peer-review. [4, 27]

More than half of presented abstracts is unpublished within five years of the conference, revealing that on one side efforts should be made to increase publication rate of abstracts presented at international meetings, and on the other side meetings abstracts should be cautiously interpreted. Publication of results as full-length papers in peer-reviewed journals may not represent a priority for medical professionals[21] and preparation of abstracts and presentation at a conference may be encouraged as educational experiences, especially in academic institutions. However, investigators should be reminded that the goal of scientific research is for patients to benefit from medical discoveries. This purpose can be fulfilled only by publishing results. Authors should be encouraged to further develop the subject of their studies, collaborating with academic research teams to generate manuscripts of adequate quality to be submitted for peer-review evaluation. University institutions should focus on improving critical appraisal of scientific literature and writing skills of fellow students and residents, providing guidance for standing up to peer-review processes[2] and teaching that failure to publish amounts to research waste and, arguably, to scientific misconduct, for example violating the trust that patients place in scientists when giving informed consent.[15] Moreover, the relatively low publication rate of research abstracts, together with the frequent substantial discrepancies between the data submitted in the abstract, presented at the meeting, and

published in the final paper[28] suggest that researchers should interpret preliminary data presented at scientific meetings with caution.[14]

There were several limitations to this study. Publication rates may have been underestimated because Pubmed was the only database we searched, such that articles published in non-indexed journals may have been excluded from our consideration. Published manuscripts may contain new data and may have been developed by different authors than the corresponding abstract. In this case our search algorithm may have not identified a possible match. Although it is unlikely, some manuscripts may be under current submission and still be published in the near future. In our study we reported that the majority of published abstracts reach publication within 2 years of initial presentation, so the number of articles that may be found in peer-reviewed biomedical journals after the selected follow-up period should be small. Abstract books and online archives assessed in this study didn't include rejected abstracts, thus we couldn't evaluate their rate of conversion despite non acceptance for meeting presentation. Due to lack of collectible information from our data sources, we couldn't analyze the association between odds of publication and the following important factors: positive results, academic affiliation, pharmaceutical or state funding and study design. Professional societies should request authors to specify these details during the abstract submission period, facilitating further collection of data for future studies.

In conclusion, the almost 50% overall publication rate of abstracts presented at five major ophthalmology conferences, at the same time is an encouraging information and highlights that there is much work to be done. Conferences committees seem to be doing a good job in evaluationg and selecting the submitted abstracts. In this sense, if publication rates may be used as metrics of quality of a meeting, ARVO showed an outstanding result, with the highest number of presented researches, the highest publication rates, the highest odds of publication and the highest median IF of publication. However, professionals attending meetings should adopt a critical approach to the preliminary results of presented abstracts. Efforts should be made to increase publication rates and

reduce publication bias, as well as to improve support and guidance of trainees in developing manuscripts of adequate quality, worthy of publication as full-length papers on peer-reviewed journals. The dissemination of medical advances in the scientific community, enabling research data to have a real impact on clinical practice and benefit the greatest number of patients, should continue to be our major goal.

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Tables

Table 1. Characteristics of the selected abstracts.

		AAO (2010) No. 136		APAO (2010) No. 139		ARVO (2010) No. 1237		EVER (2010) No. 91		SOE (2009) No. 139		Total No. 1742	
		N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)
Type	Paper	24	17.6	22	15.8	142	11.5	34	37.4	16	11.5	238	13.7
	Poster	112	82.4	117	84.2	1095	88.5	57	62.6	123	88.5	1504	86.3
Zone	North America	43	31.6	7	5.0	703	56.8	5	5.5	6	4.3	764	43.9
	Europe	31	22.8	10	7.2	284	23.0	73	80.2	107	77.0	505	29.0
	South America	8	5.9	0	0.0	54	4.4	0	0.0	2	1.4	64	3.7
	Oceania	3	2.2	3	2.2	34	2.7	1	1.1	1	0.7	42	2.4
	Asia	45	33.1	118	84.9	158	12.8	10	11.0	19	13.7	350	20.1
	Africa	6	4.4	1	0.7	4	0.3	2	2.2	4	2.9	17	1.0
Topic	Cataract	20	14.7	18	12.9	51	4.1	3	3.3	14	10.1	106	6.1
	Cornea, External Disease	22	16.2	16	11.5	183	14.8	19	20.9	17	12.2	257	14.8
	Glaucoma	16	11.8	13	9.4	161	13.0	11	12.1	19	13.7	220	12.6
	Intraocular Inflammation Uveitis	4	2.9	3	2.2	69	5.6	4	4.4	4	2.9	84	4.8
	Neuro-Ophthalmology	5	3.7	8	5.8	69	5.6	8	8.8	7	5.0	97	5.6
	Ocular Tumors and Pathology	4	2.9	6	4.3	43	3.5	7	7.7	8	5.8	68	3.9
	Orbit, Lacrimal, Plastic Surgery	6	4.4	16	11.5	0	0.0	1	1.1	9	6.5	32	1.8
	Pediatric Ophthalmology, Strabismus	10	7.4	8	5.8	15	1.2	2	2.2	13	9.4	48	2.8
	Refractive Surgery	13	9.6	7	5.0	55	4.4	3	3.3	3	2.2	81	4.6

	Retina & Vitreous	31	22.8	20	14.4	277	22.4	26	28.6	38	27.3	392	22.5
	Basic science	0	0.0	6	4.3	225	18.2	1	1.1	2	1.4	234	13.4
	Epidemiology	5	3.7	16	11.5	70	5.7	5	5.5	4	2.9	100	5.7
	Other	0	0.0	2	1.4	19	1.5	1	1.1	1	0.7	23	1.3
Publication status	Not published	73	53.7	106	76.3	595	48.1	51	56.0	94	67.6	919	52.8
	Published at time of presentation	2	1.5	11	7.9	64	5.2	4	4.4	7	5.0	88	5.0
	Published 0- 2 yr	37	27.2	17	12.2	382	30.9	28	30.8	27	19.4	491	28.2
	Published 3-5 yr	24	17.6	5	3.6	196	15.8	8	8.8	11	7.9	244	14.0

Table 2. Publication status of the selected abstracts according to the meeting, type of presentation, geographic zone and topic.

		Publication status								
		Not published		**Already published**		**Published 0-2 yr**		**Published 3-5 yr**		**p-value**
		No.	**(%)**	**No.**	**(%)**	**No.**	**(%)**	**No.**	**(%)**	
All abstracts		919	52.8	88	5.1	491	28.2	244	14.0	-
Congress	AAO (2010)	73	53.7	2	1.5	37	27.2	24	17.6	<0.0001
	APAO (2010)	106	76.3	11	7.9	17	12.2	5	3.6	
	ARVO (2010)	595	48.1	64	5.2	382	30.9	196	15.8	
	EVER (2010)	51	56.0	4	4.4	28	30.8	8	8.8	
	SOE (2009)	94	67.6	7	5.0	27	19.4	11	7.9	
Type	Paper	94	39.5	12	5.0	94	39.5	38	16.0	<0.0001
	Poster	825	54.9	76	5.1	397	26.4	206	13.7	

Zone	North America	378	49.5	36	4.7	241	31.5	109	14.3	0.01
	Europe	273	54.1	19	3.8	143	28.3	70	13.9	
	South America	40	62.5	2	3.1	10	15.6	12	18.8	
	Oceania	18	42.9	2	4.8	13	31.0	9	21.4	
	Asia	198	56.6	27	7.7	82	23.4	43	12.3	
	Africa	12	70.6	2	11.8	2	11.8	1	5.9	
Topic	Cataract	63	59.4	5	4.7	30	28.3	8	7.5	0.009
	Cornea, External Disease	139	54.1	12	4.7	67	26.1	39	15.2	
	Glaucoma	109	49.5	3	1.4	71	32.3	37	16.8	
	Intraocular Inflammation Uveitis	39	46.4	7	8.3	27	32.1	11	13.1	
	Neuro-Ophthalmology	49	50.5	6	6.2	25	25.8	17	17.5	
	Ocular Tumors and Pathology	34	50.0	6	8.8	20	29.4	8	11.8	
	Orbit, Lacrimal, Plastic Surgery	24	75.0	2	6.3	4	12.5	2	6.3	
	Pediatric Ophthalmology, Strabismus	31	64.6	1	2.1	10	20.8	6	12.5	
	Refractive Surgery	52	64.2	3	3.7	21	25.9	5	6.2	
	Retina & Vitreous	218	55.6	20	5.1	100	25.5	54	13.8	
	Basic science	93	39.7	19	8.1	84	35.9	38	16.2	
	Epidemiology	53	53.0	3	3.0	27	27.0	17	17.0	
	Other	15	65.2	1	4.3	5	21.7	2	8.7	

Table 3. Results from a multivariable logistic regression model evaluating the association between selected abstract characteristics and the probability to be published in a journal.

		Odds Ratio	95% CI	p-value*
Congress	ARVO (2010)	reference	-	
	AAO (2010)	0.86	0.59-1.26	0.43
	APAO (2010)	0.25	0.15-0.40	<0.001
	EVER (2010)	0.59	0.37-0.95	0.03
	SOE (2009)	0.46	0.30-0.70	<0.0001
Type	Poster	reference	-	
	Paper	2.15	1.60-2.90	<0.0001
Zone	North America	reference	-	
	Europe	1.14	0.88-1.47	0.33
	South America	0.68	0.40-1.17	0.16
	Oceania	1.47	0.77-2.83	0.25
	Africa	0.61	0.21-1.82	0.38
	Asia	1.36	1.00-1.85	0.05
Topic	Basic science	reference	-	
	Cataract	0.56	0.34-0.92	0.02
	Cornea, External Disease	0.62	0.43-0.90	0.01
	Epidemiology	0.68	0.42-1.11	0.12
	Glaucoma	0.75	0.51-1.10	0.15

Intraocular Inflammation Uveitis	0.79	0.48-1.32	0.37
Neuro-Ophthalmology	0.72	0.44-1.17	0.18
Ocular Tumors and Pathology	0.76	0.43-1.33	0.33
Orbit, Lacrimal, Plastic Surgery	0.44	0.18-1.08	0.07
Pediatric Ophthalmology, Strabismus	0.49	0.25-0.96	0.04
Refractive Surgery	0.39	0.23-0.67	0.0007
Retina, Vitreous	0.59	0.42-0.83	0.0022
Other	0.40	0.16-0.99	0.05

Table 4. Relationship between IF and congress, type of presentation, geographic zone and topic. Only the published abstract were evaluated (number, 823).

		No. Published	**Median**	**IQR**	**Range**	**p-value***
All abstracts		823	3.20	1.90-3.40	0.00-33.60	-
Congress	AAO (2010)	63	2.08	0.76-3.40	0.00-8.10	<0.0001
	APAO (2010)	33	2.08	0.94-3.04	0.00-6.75	
	ARVO (2010)	642	3.20	2.00-3.60	0.00-33.60	
	EVER (2010)	40	1.91	1.07-3.05	0.00-6.52	
	SOE (2009)	45	1.91	0.34-2.98	0.00-6.14	
Type	Poster	679	3.00	1.90-3.40	0.00-33.60	<0.0001
	Paper	144	3.40	2.70-4.40	0.00-33.60	
Zone	North America	386	3.40	2.40-3.90	0.00-15.00	<0.0001
	Europe	232	2.80	1.68-3.40	0.00-33.60	

	South America	24	1.36	0.40-2.40	0.00-3.40	
	Oceania	24	3.20	1.60-3.40	0.00-6.50	
	Asia	152	2.43	1.47-3.40	0.00-12.50	
	Africa	5	1.91	0.96-2.08	0.70-2.30	
Topic	Cataract	43	2.72	1.60-3.60	0.00-9.70	0.02
	Cornea, External Disease	118	2.70	1.60-3.40	0.00-10.90	
	Glaucoma	111	3.05	1.90-3.40	0.00-13.30	
	Intraocular Inflammation Uveitis	45	3.30	2.00-3.90	0.00-11.50	
	Neuro-Ophthalmology	48	2.90	1.91-3.40	0.00-15.00	
	Ocular Tumors and Pathology	34	2.75	1.60-3.40	0.00-6.75	
	Orbit, Lacrimal, Plastic Surgery	8	2.42	2.08-2.90	0.02-4.03	
	Pediatric Ophthalmology, Strabismus	17	1.00	0.90-3.40	0.00-6.10	
	Refractive Surgery	29	2.40	1.80-3.47	0.00-7.70	
	Retina, Vitreous	174	3.20	1.90-3.40	0.00-33.60	
	Basic science	141	3.40	2.70-4.60	0.00-15.00	
	Epidemiology	47	2.40	1.40-3.40	0.00-6.75	
	Other	8	3.20	2.25-3.40	1.47-3.90	

Figure Legends

Figure 1. Research abstracts publication rates.

Barplot showing the publication rate at 2-yr (Panel A) and at 5-yr (Panel B), according to congress, type of presentation, geographical zone and topic (the red dashed line represents the overall publication rate).

Figure 2. Impact factor of journals that published papers reporting the included researches.

Boxplot showing the Impact Factor distributions for the published abstracts according to congress, type of presentation, geographical zone and topic. Only the 823 published abstract were evaluated. The vertical axis is on a log scale. The red dashed line represents the overall median IF.