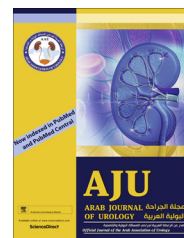




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GENERAL UROLOGY
ORIGINAL ARTICLE

The world's contribution to the field of urology in 2015: A bibliometric study



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KEYWORDS

Articles;
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ABBREVIATIONS

ACGME, Accreditation Council for Graduate Medical Education;
IPP, impact per publication;
SNIP, source normalised impact per paper;
R&D, research and development;
SJR, SCImago Journal Rank

Abstract Objective: To explore factors associated with a successful research atmosphere by investigating the distribution of articles published in the field of urology in 2015 amongst different world regions, as research is undoubtedly a valuable tool that can help shape the future of human health.

Methods: The Scopus® database was searched for publications made by Urology journals enlisted in the SCImago journal and country rank website. Details about each article type, language, and country of origin were collected. Journals' bibliometric measures, as well as their country of origin and the number publications since the year 1996 were also collected. Countries were divided according to the United Nations geoscheme.

Results: In all, 80 of 93 registered Urology journals publishing a total of 10,181 articles were included in the study. Results reveal that the highest contribution came from North America (37.4%) followed by Europe (29.4%), Asia (26.5%), South America (2.2%), Africa (1.9%), and Oceania (1.7%). Bibliometric analysis of the published articles showed significantly higher impact measures amongst North American publications, followed by those from Europe, Oceania, South America, Asia, and Africa ($P < 0.001$). A slight drop in the number of publications was noted in 2015. Finally, a statistically significant regional correlation was detected between the corresponding authors' affiliation and the journals' publishing region ($P < 0.001$).

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Conclusion: North America had the highest contribution to the field of urology in 2015. A significant correlation exists between the origin of the published article and the publishing journal's region.

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Introduction

Health research is undoubtedly valuable to any society. The advancing world calls for research and development (R&D) to cope with the new emerging ailments of industrialised societies. Indeed, the past few decades have witnessed significant discoveries that had a remarkable impact on both health care and public health [1]. From an economic point of view, the enormous influence medical research has on human health and longevity ultimately results in an increase in the productivity of a population and enhances the national economy [2].

Doing research is one thing whilst documenting the creation in scientific bulletins is another. Since the dawn of man, writing has been the most momentous achievement through which humanity prevailed. Science could not have existed without the transmission of knowledge through generations. A published article is an irrefutable evidence of accomplished research that has been accepted by peers. It serves as an indicator of achievement of a certain academic standard. More importantly, a researcher's productivity, portrayed by the number and impact of his/her publications, may essentially influence research funding. Several measurements are used to assess the weight of an individual article or journal. Impact per publication (IPP) [3], source normalised impact per paper (SNIP) [4], and SCImago Journal Rank (SJR) [5] are examples. Publishing scientific papers can be really difficult especially for young researchers who are starting to discover this aspect of medicine. Our present study, triggered by a series of publishing mishaps, is aimed at looking into the world's contribution to the field of urology in 2015. The goal is to understand how this contribution is distributed and how can an environment of research be stimulated.

Methods

The SCImago Journal and Country Rank website (<http://www.scimagojr.com>) was used to retrieve the list of Scopus® indexed Urology journals. Individual journals were then searched using the Scopus database. All articles published during the year 2015 were collected and information on the article type, language used, and country of corresponding author was particularly noted. Moreover, each journal's IPP, SNIP and SJR were collected along with its country of origin and number of publications in previous years as far back as 1996.

Journals' instructions to authors were also explored looking for sentences either instructing authors not to add their names in the main manuscript or stating that the review process was only double blind.

Countries were grouped according to the United Nations geoscheme [6]. The publications type and impact were compared between world regions. The origins of the published articles were compared to the region of the issuing journals. The study did not involve human subjects and hence did not require ethical approval. Numerical data are presented as means \pm SEMs, whilst categorical data are presented as numbers (percentages). Pearson's chi-squared test was used to correlate between articles and journals origin. ANOVA was used to compare the IPP, SNIP and SJR of publications from different regions of the world. Analyses were done using SPSS software 21 (IBM, USA).

Results

A total of 93 Urology journals were indexed in the Scopus database, of which 12 were no longer publishing in 2015 and one was more of a news bulletin than a peer-reviewed medical journal. The remaining 80 journals published a total of 10,181 articles in 2015. All journals with their respective percentage of published articles are listed in Table 1. English was the sole language in 91.2% of articles. Amongst the different kinds of issued manuscripts, original articles were most common (65%), followed by Note (11%), Review (10.8%), Editorial (6.8%), Letter (3.7%), Short Survey (1.3%), Erratum (0.7%), and Conference Paper (0.7%). Fig. 1 shows the percentage contribution of different world regions. The major contribution came from North America with more than one third of all urology publications in 2015 (Fig. 1). A steady increase in the yearly number of publications was noted until 2014. In 2015, a drop in the publications listed by Scopus was detected (Fig. 2). The different types of English manuscripts were compared between world regions. North America had a significantly higher percentage of all types of publications except letters, which were more commonly published by European nations (Fig. 3). Fig. 4 shows the bibliometric contribution of each world region. The mean SNIP, IPP and SJP were significantly highest for North American publications, followed by those from Europe, Oceania, South America, Asia, and Africa ($P < 0.001$).

Table 1 Complete list of journals and their percentage contribution in 2015.

Journal	%	Journal	%
1 <i>Journal of Urology</i>	11.4	41 <i>Scandinavian Journal of Urology</i>	0.8
2 <i>Urology</i>	6.7	42 <i>Urological Science</i>	0.7
3 <i>European Urology</i>	3.8	43 <i>Acta Urologica Japonica</i>	0.7
4 <i>BJU International</i>	3.4	44 <i>Journal of Clinical Urology</i>	0.7
5 <i>Journal of Sexual Medicine</i>	3.3	45 <i>Archivio Italiano di Urologia Andrologia</i>	0.6
6 <i>Neurourology and Urodynamics</i>	2.9	46 <i>Indian Journal of Urology</i>	0.6
7 <i>International Journal of Urology</i>	2.9	47 <i>African Journal of Urology</i>	0.6
8 <i>American Journal of Physiology – Renal Physiology</i>	2.8	48 <i>Arab Journal of Urology</i>	0.6
9 <i>Journal of Endourology</i>	2.5	49 <i>Prostate Cancer and Prostatic Diseases</i>	0.6
10 <i>Abdominal Imaging</i>	2.5	50 <i>Urologic Clinics of North America</i>	0.6
11 <i>Urologic Oncology</i>	2.5	51 <i>Systems Biology in Reproductive Medicine</i>	0.5
12 <i>International Urology and Nephrology</i>	2.4	52 <i>Turkish Nephrology, Dialysis and Transplantation Journal</i>	0.5
13 <i>World Journal of Urology</i>	2.4	53 <i>Nephro-Urology Monthly</i>	0.5
14 <i>Nature Reviews Urology</i>	2.4	54 <i>Turk Uroloji Dergisi</i>	0.5
15 <i>International Urogynecology Journal and Pelvic Floor Dysfunction</i>	2.2	55 <i>Nishinihon Journal of Urology</i>	0.4
16 <i>Prostate</i>	1.9	56 <i>International Neurourology Journal</i>	0.4
17 <i>Asian Journal of Andrology</i>	1.7	57 <i>CardioRenal Medicine</i>	0.4
18 <i>International Braz J Urol</i>	1.7	58 <i>Tijdschrift Voor Urologie</i>	0.4
19 <i>Journal of Pediatric Urology</i>	1.7	59 <i>International Journal of Impotence Research</i>	0.4
20 <i>Andrologia</i>	1.5	60 <i>Therapeutic Advances in Urology</i>	0.4
21 <i>Clinical Genitourinary Cancer</i>	1.5	61 <i>Kidney Research and Clinical Practice</i>	0.3
22 <i>Andrology</i>	1.4	62 <i>Japanese Journal of Urology</i>	0.3
23 <i>Progrès en Urologie</i>	1.4	63 <i>Aktuelle Urologie</i>	0.3
24 <i>Canadian Urological Association Journal</i>	1.3	64 <i>Revista de la Sociedad Espanola de Enfermeria Nefrologica</i>	0.3
25 <i>Urology Annals</i>	1.3	65 <i>Advances in Urology</i>	0.3
26 <i>Urologia Internationalis</i>	1.2	66 <i>LUTS: Lower Urinary Tract Symptoms</i>	0.3
27 <i>Korean Journal of Urology</i>	1.2	67 <i>Open Urology and Nephrology Journal</i>	0.3
28 <i>Japanese Journal of Clinical Urology</i>	1.2	68 <i>International Journal of Urological Nursing</i>	0.3
29 <i>BMC Urology</i>	1.2	69 <i>Journal of Lasers in Medical Sciences</i>	0.3
30 <i>Current Opinion in Urology</i>	1.1	70 <i>Revista Internacional de Andrologia</i>	0.2
31 <i>Central European Journal of Urology</i>	1.0	71 <i>Research and Reports in Urology</i>	0.2
32 <i>Actas Urologicas Espanolas</i>	1.0	72 <i>Renal Society of Australasia Journal</i>	0.2
33 <i>Canadian Journal of Urology</i>	1.0	73 <i>Minerva urologica e nefrologica = The Italian Journal of Urology and Nephrology</i>	0.2
34 <i>Current Urology Reports</i>	1.0	74 <i>European Urology Focus</i>	0.2
35 <i>Archivos Espanoles de Urologia</i>	1.0	75 <i>Journal fur Urologie und Urogynakologie</i>	0.2
36 <i>Urology Journal</i>	0.9	76 <i>Dialisis y Trasplante</i>	0.1
37 <i>Wideochirurgia I Inne Techniki Maloinwazyjne</i>	0.9	77 <i>Basic and Clinical Andrology</i>	0.1
38 <i>Female Pelvic Medicine and Reconstructive Surgery</i>	0.9	78 <i>Current Urology</i>	0.1
39 <i>Urology Case Reports</i>	0.8	79 <i>European Urology, Supplements</i>	0.1
40 <i>Translational Andrology and Urology</i>	0.8	80 <i>Seksuologia Polska</i>	0.1

Of the 80 included journals, 22 (27.5%) stated that a double-blind review process was being practised. Finally, a statistically significant regional correlation was detected between the corresponding authors' affiliation and the journals' publishing region (Fig. 5; $P < 0.001$).

Discussion

Medical research improves the understanding of basic aspects of life, and ultimately assists in the prevention of diseases. Measuring the significance of research is difficult, as major clinical breakthroughs are infrequent and most discoveries are based on tedious, long years of work. Therefore, bibliometric analysis is usually used as a method to estimate quality of research output. The

quality of the publishing journal and the subsequent citations to these publications are the earliest markers of respect or appreciation by peers. Such a system is of course subject to over- and underestimation and has been challenged by many; however, being the only measure available, such exceptions should not disqualify use of the bibliometric system for most cases. The present study evaluated the world's contribution to the field of urology and revealed that in 2015, 10,489 articles were published and were distributed over 87 countries. North America contributed the most publications and also had the highest quality of articles.

Multiple factors may help explain this observation and highlight the building blocks for a successful research atmosphere. The first and probably most important factor is ensuring adequate resources. Wes-

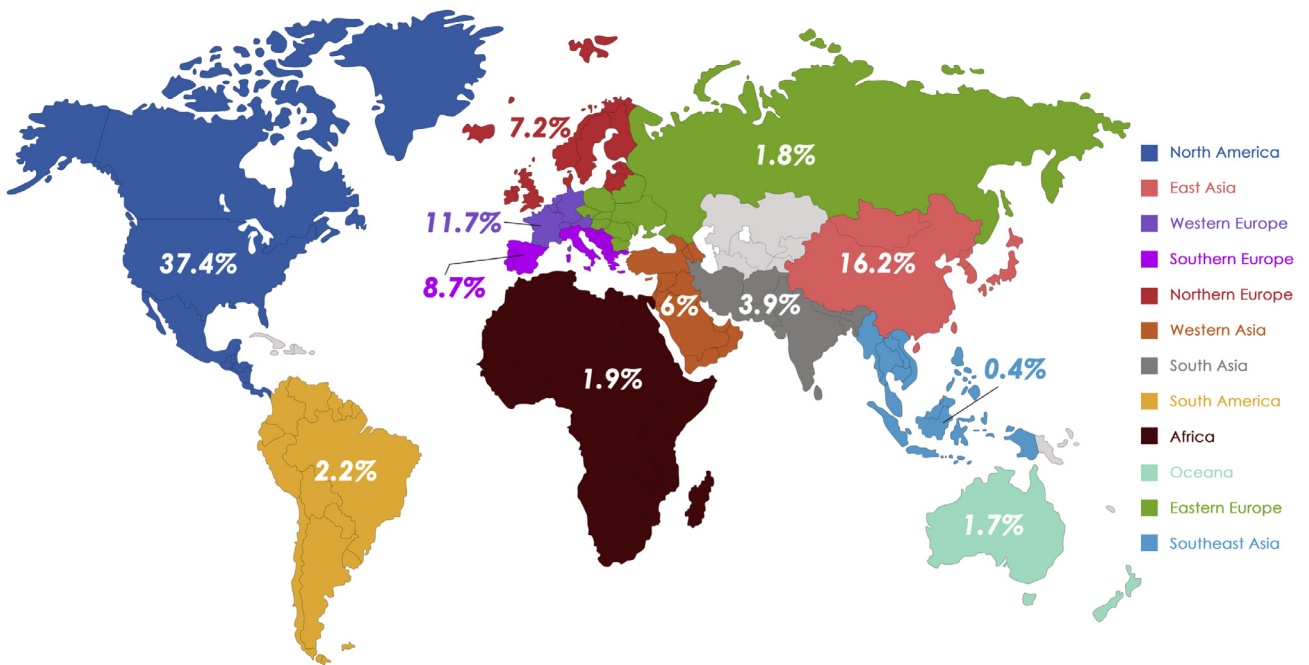


Figure 1 Percentage of contribution of different world regions (based on UN geoscheme).

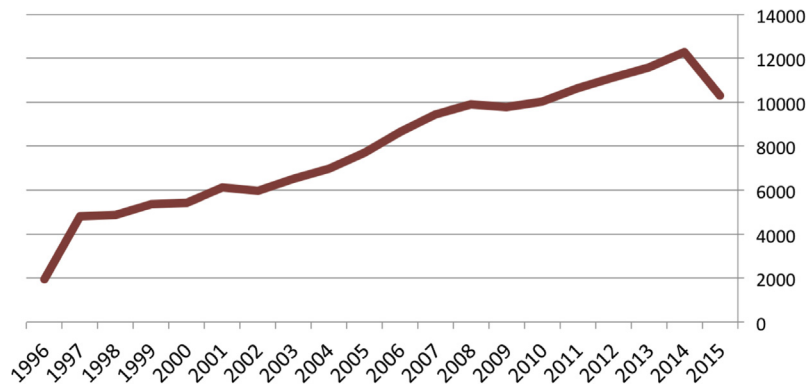


Figure 2 Yearly number of publications in the field of Urology.

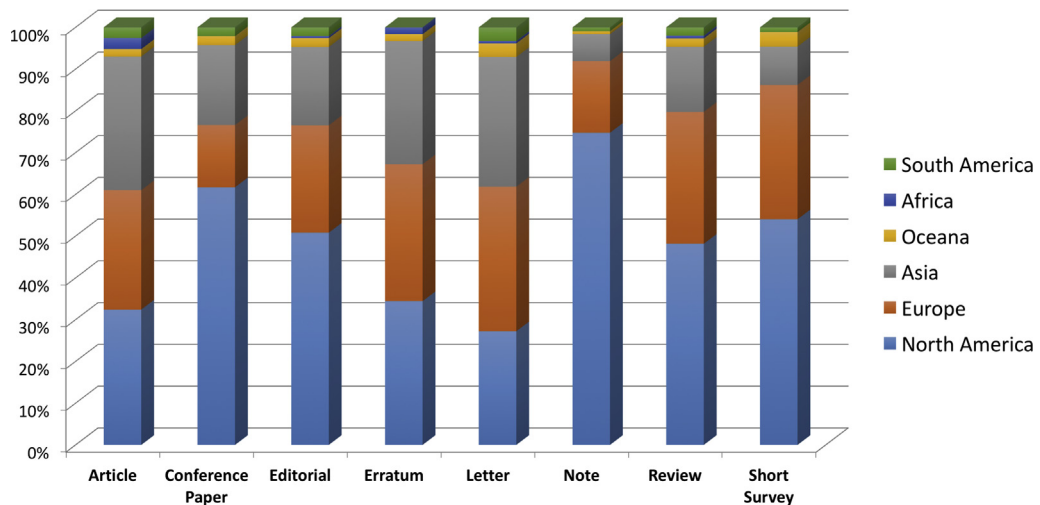


Figure 3 Comparison between world regions according to type of English manuscript.

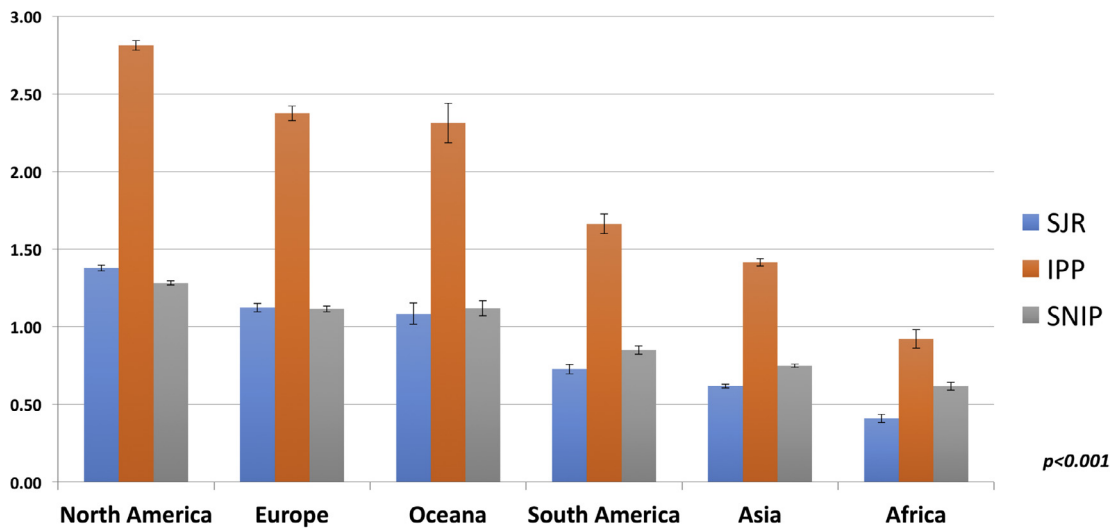


Figure 4 Comparison between world regions according to the impact of publications.

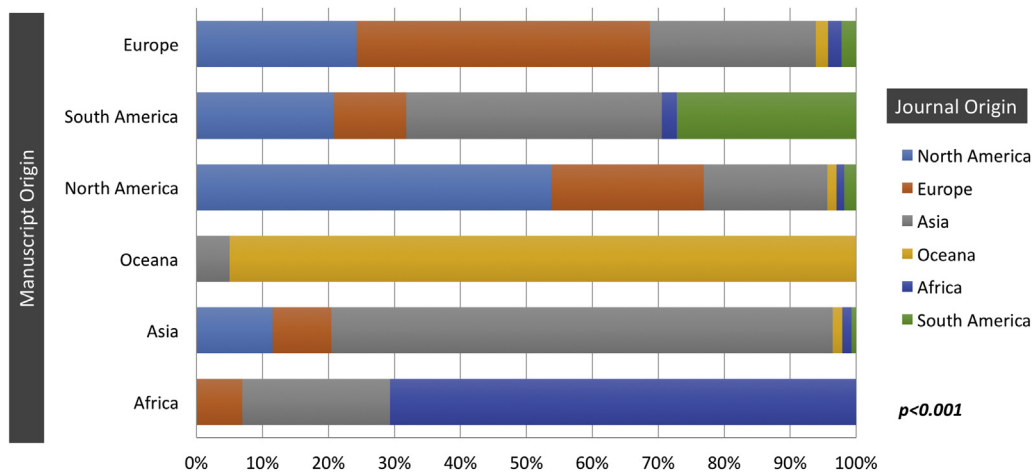


Figure 5 Correlation between the publications origin and the journals origin.

tern countries assign a significant budget for R&D. According to the Organisation for Economic Cooperation and Development (OECD) Science, Technology and Industry Outlook [7], in 2014 the USA maintained its lead in R&D funding with an estimated expenditure of \$16.6 billion, corresponding to about a third of the world's share [8]. Together, the USA, China, Japan and Europe contributed about 78% of the total \$1.6 trillion spent in 2014. Also that same year marked an increase in healthcare R&D expenditure, overall.

The education system is another factor that can have a significant influence on research productivity. Since 1981, the Accreditation Council for Graduate Medical Education (ACGME) has been instrumental in medical training and education in the USA. The ACGME bylaws clearly state that any curriculum must advance residents' knowledge of the basic principles of research, including how research is conducted, evaluated, explained to patients, and applied to patient care. This

serves as an inciting factor for residency programmes and residents equally to actively participate in medical research in order to maintain the ACGME accreditation. In fact, many residency programmes have integrated research rotations in their curricula, which impact research outcomes. After assessing the publication output of 34 training programmes affiliated with the top 50 urology hospitals, Yang et al. [9] reported a mean of 3.5 publications by residents during their training period. The prevailing competitive atmosphere amongst institutes and individuals should not be undermined either. Prasad et al. [10] revealed that the degree of reputation used in USA News and World Rankings was correlated with research productivity amongst cancer hospitals. Moreover, another study evaluated ranking attributes of 218 surgical residency programmes and described a significant influence on the number of publications authored by programme alumni [11]. Medical students matching for residency programmes also

appear to understand the importance of research. In an examination of the characteristics of highly ranked applicants to general surgery residency programmes, research experience and publications were present in 93% and 76% of applicants, respectively [12]. Finally, many medical graduates, mostly international, elect to join research fellowships for a temporary period to improve their chances of accessing USA residency programmes. Undoubtedly, such fellowships should affect research productivity especially that participants are fully dedicated and are not overwhelmed by any clinical demand. One study evaluated an anaesthesia research fellowship programme and revealed that 42% of the projects were published, and that 58% of the students were able to access an anaesthesiology residency programme [13].

Significant influences were detected between the articles' country of origin and impact, as well as source of the publishing journal. In descending order, North America, Europe, Oceania, Asia, and Africa were more likely to publish in high impact journals. Moreover, authors from a particular geographic area were also more likely to publish in journals of the same area. In addition to all the aforementioned factors, such an observation may be affected by other, not necessarily admirable practices. Bias from editors and/or reviewers has been acknowledged by an advisory note from the international council of science [14]. Unacceptable editor bias may occur when the decision to send a paper for review, or to accept it, is influenced by factors other than the scientific content of the paper. Such factors may include authors' affiliations, institution or country, and their language or gender [15]. The note implied that editors' acquaintance with authors or their institutes may influence their decision to send the papers out for review. At certain times, due to inadequate blinding or blinding not being used, reviewers can exercise bias in their decision. This was clearly evidenced through the work of Peters and Ceci [16], who selected 12 articles from prestigious American psychology departments already published in widely read American psychology journals with high rejection rates (80%) and unblinded refereeing practices. After replacing the article's authors and affiliations with fictitious information, they resubmitted each manuscript to its matching journal. Eight of the nine articles that continued to the review process were rejected on the basis of 'serious methodological flaws', and rejection was recommended by 89% of the reviewers [16]. Peters and Ceci concluded that this was evidence of bias against authors from less prestigious institutions.

Efforts for improving research production and quality in developing countries are perhaps as important as understanding the strengths of accomplished nations.

A moral obligation for major scientific associations in enhancing urology research in developing countries is existent. In fact, evidence suggests that young scientists in such countries share similar research eagerness as their peers in developed areas; however, several obstacles interfere with their productivity. An open questionnaire about research activity was administered to 150 medical students in Nairobi. Of the respondents 81.6% expressed interest in research, with only 38.4% actually participating in research activity [17]. Factors such as lack of research mentors (51.9%), knowledge of research methods (37.7%), and funding (29.9%) were amongst the obstacles hindering their productivity [17]. A few simple steps can be adopted by Urology associations to help in this regard. We suggest arranging workshops focused on research methodology and scientific writing during annual meetings and more importantly prioritising submissions of less published candidates. Additionally, similar to all free guidelines available on society websites, guidelines discussing various research topics can be scripted and made available for free download.

This work reports articles enlisted in the SCImago website and published by Scopus and is hence limited to the accuracy of the search engine. Despite a 26%, 27.8% and 32% reduction in the number of publications by the *Journal of Urology*, *Urology* ('Gold journal') and *European Urology*, respectively, the lower publication rate in 2015 may also be influenced by the update completeness of the website. Nonetheless, even if this was the case, the additional data would not have a significant effect on the final result of the present study. Finally, the specific original articles' design was not reported and can be considered as another limitation to the present study.

Conclusion

North America had the highest contribution to the field of urology in 2015, followed by Europe, Asia, South America, Africa and Oceania. Similarly, North American publications had the highest bibliometric measures of impact amongst the different regions of the world. Moreover, a significant correlation exists between the corresponding authors' affiliation and the journals' publishing region.

Conflicts of interest

None.

Source of funding

None.

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