

# Status of digital standards in Korean medical journals in 2016

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### Abstract

This study aimed to characterize the current status of a variety of digital standards in medical journals published in Korea in 2016. A total of 256 journals listed as member journals of the Korean Association of Medical Journal Editors were searched to evaluate the following items: an independent journal homepage domain; an e-submission system; the use of digital object identifiers (DOIs), CrossMark, and FundRef; the availability of text and data mining; the presence of Open Researcher and Contributor ID (ORCID) information, an open access declaration, and the language of the journal. The search was carried out from July 29 to 30, 2016. Independent journal homepage domains were found for 190 of the 256 journals (74.1%). Of the journals, 216 were equipped with an e-submission system (84.4%), and 218 journals used DOIs (85.2%). CrossMark and FundRef were used in 105 journals (41.0%), text and data mining were available for 31 journals (11.1%), ORCID identifiers were present in 24 journals (9.4%), and an open access declaration according to a Creative Commons license was present for 199 journals (77.8%). The number of English-language journals was 130 (50.8%). Open access journals and English-language journals were found to have implemented more digital standards than non-open access journals and Korean-language journals respectively. The above results demonstrate that digital standards have been rapidly implemented by a considerable number of medical journals in Korea. In order to facilitate the more active promotion of journals to the international level, more journals should utilize these standards. The use of full-text JATS (journal article tag suite) XML is recommended for the easy adoption of DOIs, CrossMark, FundRef, and ORCID.

### Keywords

Access to information; Digital standards; Korea; Medical writing; Open access

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### Introduction

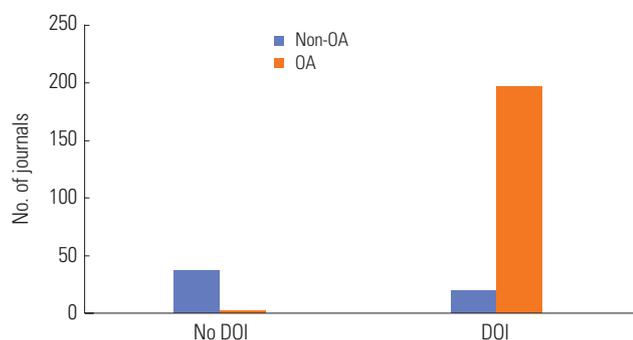
Digital standards for scholarly journals include an independent journal homepage domain, the implementation of an e-submission system, and the use of Crossref, digital object identifiers

(DOIs), CrossMark, FundRef, Crossref text and data mining (TDM), and Open Researcher and Contributor ID (ORCID). The last four items have been discussed in previous training program [1], and the first two items are discussed in this study. Crossref DOIs are digital identifiers of scholarly journal articles and books managed by Crossref, one of registration agencies of the DOI Foundation. CrossMark is a service of Crossref that provides the most recent versions of documents, and FundRef is a unique ID for funding agencies [2]. Crossref TDM is a service providing data access through the Crossref TDM application programming interface (API). This API is designed to allow researchers to easily harvest full-text documents from all participating publishers regardless of their business model [3]. ORCID is a unique ID for researchers that can display their biography, education, funding, and publications [4]. An open access declaration was considered present if a journal declared that a Creative Commons license applied to their content, not merely if they provided free access.

This study aimed to characterize the current status of the adoption of these standards in Korean medical journals. Additionally, comparative analyses were performed of the adoption of digital standards between journals with an open access declaration and those without such a declaration and according to journal language. We also would like to suggest to journal editors or publishers ways of efficiently implementing these standards.

## Methods

From July 29 to 30, 2016, the homepages of 256 medical journals listed by the Korean Association of Medical Journal Editors (KAMJE) were visited. A discrepancy was noted in the number of member journals between the KAMJE journals page ([http://www.kamje.or.kr/intro.php?body= Journals\\_KAMJE](http://www.kamje.or.kr/intro.php?body=Journals_KAMJE)) and the KAMJE publisher page ([http://www.kamje.or.kr/intro.php?body= member-pre](http://www.kamje.or.kr/intro.php?body=member-pre)). Therefore, we included

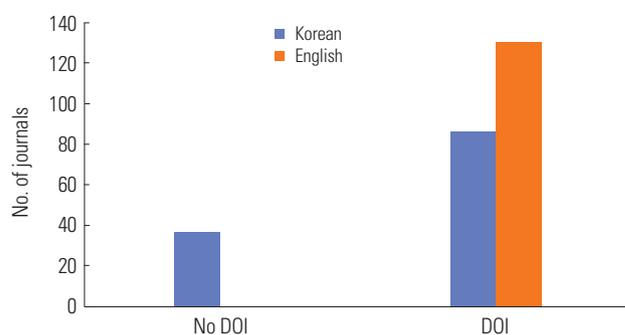


**Fig. 1.** Number of journals with digital object identifiers (DOIs) according to open access (OA) status, based on a sample of 256 Korean medical journals in July 2016.

all journals found on either page. The KAMJE journals include journals from the medical, dental, nursing, veterinary, nutritional, and life sciences fields. The status of the adoption of the abovementioned digital standards was assessed based on the journal homepage and current issues of the journal. An independent journal domain refers to a domain different from the publisher's homepage. Comparative analyses according to the presence of an open access declaration and language were performed using the chi-square test in DBSTAT ver. 5.0 (DBSTAT Co., Chuncheon, Korea; available from: <http://dbstat.com/>).

## Results

Independent journal homepage domains were found for 190 of the 256 journals (74.1%). E-submission systems were present in 216 journals (84.4%). DOIs were provided by 218 journals (85.2%), CrossMark and FundRef were adopted by 105 journals (41.0%), the TDM service was available for 31 journals (12.1%), and ORCID information was available for 24 journals (9.4%). Of the 199 open access journals, 197 had DOIs, in comparison to 20 of the 57 non-open access journals ( $P = 0.000$ ) (Fig. 1). CrossMark and FundRef were present in 105 out of the 218 journals with DOIs (48.2%), of which 31 (14.2%) provided TDM. Of the 24 journals providing ORCID information, 22 were open access journals. All 131 English-language journals used DOIs, in contrast to 88 of the 126 Korean-language journals ( $P = 0.000$ ) (Fig. 2). Of the 256 journals, only 15 were not free-access: five journals required a paid subscription, six required membership registration, and four had no homepage. Therefore, of the 57 non-open access journals, 42 were free-access, and 241 of the 256 journals (94.2%) were free-access or open access with no embargo period. Of the journals, 245 were published in cooperation with publishing or information technology companies in Korea. The remaining 11 journals (8.6%) were published in cooperation with international publishing companies such as

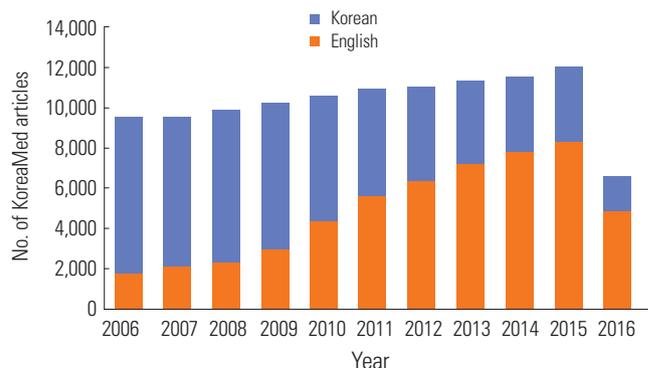


**Fig. 2.** Number of journals with digital object identifiers (DOIs) according to language, based on a sample of 256 Korean medical journals in July 2016.

Elsevier (4), Springer (4), BioMed Central (2), and Nature Publishing Group (1). All journals were published by scholarly societies or non-profit organizations in cooperation with the publishing companies.

## Discussion

It was surprising to find that such a high proportion of the analyzed journals implemented at least some crucial digital standards, such as an independent journal homepage domain (74.1%) and DOIs (85.2%). The DOI system was first introduced to medical journals in Korea in September 2007, and the first adopter of DOIs was the *Journal of the Korean Ophthalmological Society*. Subsequently, the KAMJE has emphasized the adoption of the DOI system to its member journals. Additionally, the DOI system emerged as an evaluation item that is currently mandatory for Korean scientific, technical, and medical journals to receive support from the Korean Government [5]. CrossMark, FundRef, and TDM are very easy to adopt if a journal is registered with the Crossref DOI system. No technical difficulties are involved in introducing these three services. For scholarly journals to implement these digital standards, the publication cost should be invested to information technology work because, these standards additionally requires the participation of a web developer. The importance of the online version may be expected to steadily increase, and the adoption of digital technology by medical journals is an essential part of journal promotion [6]. The market for the online version of journals will likewise expand rapidly. Large commercial publishing companies or publishing organizations have expanded their reach online by developing online mega-journals such as *PLoS One*, *BMJ Open*, and *Scientific Reports* [7]. How can medical journals from Korea survive as local journals in the international journal market where large commercial publishing companies have dominated in: Top six commercial publishers dealt with 52.2% of Journal Article Ranking journals and top eight publisher published 50.7% of Web of Science articles [8]. If local journal publishers want their journals to only be circulated in their countries, it is not as necessary to invest in these digital standards. However, if they want their journals to attain international-level status, they should adopt these standards. Changing the language of journals from Korean to English has been a common phenomenon in Korean medical journals. After the *Journal of Korean Medical Science* was the first Korean journal to be included in PubMed Central (PMC) in December 2008, many publishers and editors have come to understand that converting the language of the journal to English and producing PMC XML (journal article tag suite [JATS] XML) are the best way for their journals to be propagated to



**Fig. 3.** Number of KoreaMed (<http://koreamed.org>) articles in English and Korean from 2006 to July 30, 2016.

researchers worldwide. The main reason some medical journals from Korea have been underestimated is the language barrier, so journals have been changed to English-only and registered in PMC. This has resulted in a rapid increase in the number of articles in English and a decrease of the number of articles in Korean from 2006 to 2016 (Fig. 3).

We make the following suggestions for the efficient adoption of the above standards:

First, an independent journal domain requires no more than 25 US dollars a year. After creating a new domain name, the journal content should be moved from the website of a society or institute to the independent journal domain.

Second, an e-submission system requires an adequate budget. If fewer than 40 manuscripts are submitted annually or the manuscripts are all from Korean researchers, it is not necessary to adopt an e-submission system, because the editorial staff can manage the submissions without difficulty. If editors want their journals be promoted to the level of international journals that receive manuscripts from all over the world, or if a journal receives more than 40 submissions annually, an e-submission system is a convenient way to manage the journal. Again, the publisher must invest funds in such a system.

Third, DOIs, CrossMark, FundRef, and Crossref TDM are all services provided by Crossref. The most straightforward way to adopt these four systems efficiently is the production of JATS XML and registration with the Crossref service [9]. At present, the cost per article for JATS XML production is usually from 30 to 50 US dollars. If the publisher cannot provide these funds, an additional article processing charge for authors may be incorporated. If JATS XML files are produced, they can be deposited to free full-text databases based on JATS XML, such as PMC (<http://www.pubmedcentral.org/>) or ScienceCentral (<http://e-sciencecentral.org/>). PMC accepts only English-language journals; whereas ScienceCentral is a repository for journals in all languages. In Korea, no additional cost is usually required for the adoption of CrossMark,

FundRef, and Crossref TDM, if journals have already adopted the DOI system and produce JATS XML. This is possible due to the excellent state of information technology and engineering in Korea.

Fourth, no extra cost is required for ORCID adoption once JATS XML is produced. If ORCID becomes a mandatory part of all authors' information, it is not difficult to adopt this author identifier system.

Fifth, it is time for the 41 free-access journals to declare an open access policy according to a Creative Commons license. If free-access journals adopt a Creative Commons license, they can immediately be converted into open access journals, at which point it is recommended that they be registered in the Directory of Open Access Journals (DOAJ, <http://doaj.org/>). Some major international reference indexing databases, such as the Web of Science Core Collection, have a policy of recognizing a journal as open access if it is registered in the DOAJ. No medical journal in Korea focuses on the pursuit of commercial profit. All publishers or editors want their content to be widely read and used by researchers, physicians and health professionals, medical students, and patients and their families from all over the world. No additional cost is required to convert a free-access journal to an open access journal. The only difference between an open access journal and a free-access journal is whether it allows secondary use for educational, research, and/or commercial uses. To facilitate the easy and timely use of the journal content, an open access policy and the deposition of full-text JATS XML in international databases is beneficial [10].

Sixth, English-language journal editors whose journals still have not been registered in PMC should file a request with PMC as soon as possible after publishing at least 25 citable articles, such as reviews, original articles, or case reports.

Finally, it should be mandatory for medical editors in Korea to attend the training programs provided by the Korean Council of Science Editors (<http://kcse.org>) and the Korean Association of Medical Journal Editors (<http://kamje.kr>). All editors in Korea work on a voluntary basis. Therefore, it is not a full-time job, but a part-time job, making it important for editors to study international trends and new technology and standards by participating in these training programs.

One limitation of this study is that all medical journals from Korea were not included, because not all journals are members of the KAMJE. It is estimated that at least 700 medical journals are present in Korea according to a reference analysis of the KoreaMed journals (<http://komci.org>); however, the most important and influential medical journals published by major medical societies are all members of the KAMJE.

In conclusion, the degree of adoption of digital standards in Korean medical journals is very high, comparable to inter-

national journals. The adoption of digital standards was more common in the 199 open access journals than in the 57 non-open access journals. The same phenomenon can be observed in the 130 English-language journals, of which 100% were equipped with DOIs. This is due to the devotion and self-sacrifice of the editors and society members of these journals. These standards should be adopted more actively by publishers after sufficient budgetary investments are made into their journals. The production of JATS XML of full-text articles is suggested as an efficient and quick way to adopt those digital standards. The above findings provide basic information regarding the adoption of digital standards by the journals included in this analysis. For Korean journals to become highly accessible and fully comparable to international journals, those standards should be widely adopted in the near future.

## Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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## Supplementary Material

Raw data of the search performed in this study, not including the names of the journals or publishing companies.

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