

1-2-2013

Improvement in the accuracy of references in the journal *Emergency Medicine Australasia*.

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Citation

O'Connor AE, Lukin W, Eriksson L, O'Connor C. Improvement in the accuracy of references in the journal *Emergency Medicine Australasia*. *Emergency Medicine Australasia*. 2013;25(1):64-7. doi: 10.1111/1742-6723.12030.

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An Improvement in the Accuracy of References within The Journal Emergency Medicine Australasia.

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Abstract

Objective: To study any change in reference accuracy in the Australasian Emergency Medicine journal (now known as EMA), in the 10 years since a previous analysis was undertaken.

Methods: A sample of 100 randomly selected references was compared to the results from the previous analysis.

Results: There was a significant reduction in the number of citations with errors and in the total number of errors.

Conclusions: The improvement demonstrated is most likely the result of the introduction of a web based peer review as well as improved reference bibliography systems. An increase in the overall standard of paper submitted to the journal is likely to have contributed to this improvement.

Key Words: References, accuracy.

Introduction

The accuracy of the references cited in medical journals has been a problem for journal editors and readers for many years. Studies looking at this issue have quoted an error rate of up to 49%¹⁻⁴

Australasian journals are not immune from this problem⁴. A study by this author looking at the accuracy rate of citations in the journal Emergency Medicine (the predecessor of Emergency Medicine Australasia) showed an error rate of 35%, which was in the mid-range of reference accuracy for Emergency Medicine journals at that time⁵.

Improvements in the accuracy of journal references have been found to be achievable, with some studies showing an improvement of up to 26% when there is a concerted effort on the part of the receiving journal to improve citation accuracy⁶.

In the decade since the index study, there have been a number of changes in the administration of the journal Emergency Medicine Australasia, and also a general improvement in the standard of paper submitted, and these changes would be expected to improve the accuracy of citations in published articles.

The aim of this study was to see if there has been any change in the accuracy of references cited by articles published in Emergency Medicine Australasia in the 10 years since the index study of Volume 12 of the Journal, in 2000.

Method

All references in Volume 22 of Emergency Medicine Australasia (EMA) were listed and numbered consecutively. A sample of 100 references was then selected using the random number generator feature of Microsoft Excel 2000 (Office 2000: Microsoft Corporation, Seattle, Washington).

This method was chosen to allow a direct comparison of the results of this analysis with an identical analysis of the references in Volume 12 of the journal (then known as Emergency Medicine).

In keeping with the previous study, references were excluded when the reference generated was not a medical journal (such as a book, medical college of government report) or not in English. Where a citation was excluded, a further random reference was examined.

Each reference was then searched for on Medline[®], Pre-Medline[®] or the Cumulative Index to Nursing & Allied Health Literature (CINAHL)[®]. When the article in question was not referenced on these databases, the original article was sourced as a first line check. If the reference sourced was identical to that quoted in the article it was deemed to be correct. Where a discrepancy was noted between the two references, the original article was retrieved.

The original article was used as the gold standard against which the original reference was judged. If there was any error in the reference it was deemed to be incorrect.

Each error found was listed and categorised. This was done according to six chosen bibliographic headings (article title, author name, journal name, year of publication, volume, or pages) and also type of error (incorrect spelling, punctuation, numerical inaccuracy, inaccurate wording and incomplete/missing information). The grouping of incomplete/missing information in the citation included those citations which had incomplete titles or author lists, and where it was not indicated that the article was in abstract form only or was in a supplement to the journal.

The results of the analysis of the citations in Volumes 12 and 22 were compared, and analysed using Fishers exact test and a two tailed p value was calculated.

Results

A total of 1108 citations from Volume 22 were included in the study.

A random selection of 100 of these citations was analysed. 9 of these were excluded (6 book references, 3 government reports), and another 9 random references were subsequently analysed.

All referenced articles were able to be retrieved.

15 of the citations were shown to have at least one error, and two citations had two errors. Thus a total of 17 errors were found within the 100 citations analysed.

An analysis of each error and comparison with Volume 12 is tabulated in Tables 1 and 2

Table 1

Volume Number	Number of Citations Analysed	Number of Citations with Errors	Total Number of Errors
12	100	35	41
22	100	15	17

This reduction in the number of citations with errors and in the total number of errors was statistically significant ($p < .005$).

Table 2.

Bibliographic Errors

Volume Number	Title	Author Name	Journal Name	Year of Publication	Volume	Pages
12	25	5	1	0	0	10
22	9	5	0	0	0	3

Table 3

Types of Errors Found

Volume	Spelling	Punctuation	Numerical inaccuracy	Wording	Missing/Incomplete documentation
12	6	11	5	10	9
22	3	5	3	2	4

Discussion

This study demonstrates that the frequency of errors in citations published in Emergency Medicine Australasia had fallen significantly over the past 10 years. The previously published error rate of 35% in Volume 12 of the journal has fallen to 15% of citations containing errors in Volume 22. This rate is at the lower end of previously published studies of this topic concerning other medical journals.

In the intervening decade from the index study, there have been a number of changes to the management of papers submitted to Emergency Medicine Australasia. The most significant of these was in 2005, with the adoption of a web-based peer review and online manuscript submission process (*Manuscript Central*)TM. This system, by ScholarOne (Charlottesville, VA, USA) hugely improved the process of submission, peer review, annotation and formatting of papers submitted to the journal⁷.

The previous process followed by the journal, which was dependant on files being sent by e-mail and by post on discs, and which was recognised as being extremely inefficient.

The new system was fully in place by September 2005, and was the exclusive means for submitting and reviewing papers from Volume 18 onwards.

With the move to the more streamlined, user friendly submission process, it was expected that one of the benefits would be that the accuracy of the citations would be improved.

Along with the changes in administration, the journal has also achieved it's first impact factor in 2009. This impact factor, of 0.901 ranked the journal as the 11th out of the 19 journals in the 2009 ISI Journal Citation Reports Emergency Medicine Category⁸. This reflects the high quality of papers being published in the journal, one measure of this quality being the accuracy of citations within it.

This current study examines changes in reference accuracy in the Australasian Emergency Medicine journal (now known as EMA), in the 10 years since the last analysis was undertaken.

It is also true that the intervening decade has seen an exponential increase in the usage of reference bibliography systems, such as EndNote[®] and Reference Manager[®] and this is also likely to have contributed to the quality improvement seen⁹.

There is reason to question as to whether accurate referencing in scientific journals is important or not. Previous studies have pointed to a high retrievability of articles even with a high error rate¹⁰. Also, even if a reference is accurate, it is impossible to say, without sourcing the original article, whether it is appropriate in the context of the paper in which it is being quoted, or if indeed it addresses the point being made in that paper. Quotation inaccuracies may also have the potential for more serious consequences regarding treatment and patient management by providing misleading information^{11, 12}.

It is known, however, that inaccurate references may affect the computerised citation databases such as *Science Citation Index Expanded*[®], *Web of Science*[®] and *Journal Citation Reports*[®], that are the source of a journals impact factor. It is also true that the citation rate for individual authors and their subsequent metrics like the H-Index may be affected by inaccurate referencing.

Conclusion

This paper demonstrates a significant improvement in the accuracy of references in the journal *Emergency Medicine Australasia* over the past decade. This improvement has most likely resulted from the introduction of a web based peer review and manuscript submission process, as well as improved references bibliography systems by authors. In addition an increase in the overall standard of paper submitted to the journal is likely to have contributed to this improvement.

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