Do Authors Check Their References? A Survey of Accuracy of References in Three Public Health Journals

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Abstract: We verified a random sample of 50 references in the May 1986 issue of each of three public health journals. Thirty-one per cent of the 150 references had citation errors, one out of 10 being a major error (reference not locatable). Thirty per cent of the references differed from authors' use of them with half being a major error (cited paper not related to author's contention). *Am J Public Health* 1987; 77:1011–1012.)

Introduction

Several studies[1,2] have examined the bibliographic accuracy of citations in medical journals, but few have gone beyond this to determine whether the source cited actually made the assertions that were claimed for it. Here we present results of a survey which examined both citation and "quotation" accuracy in three public health journals.

Methods

We examined the May 1986 issue of *American Journal of Public Health, Medical Care,* and *American Journal of Epidemiology*. For each journal, consecutive numbers were assigned to references from articles and short communications. Using a table of random numbers, references were selected until for each of the three journals, 50 references to journal articles were obtained. Citations from foreign language journals and journals not in the medical school library, as well as all non-journal references (books, government publications, etc.) were recorded but not included in the 150 references selected.

Citation Errors

Errors of citation involved authors' name, title of article, name of journal, volume number, year of publication, and pages; punctuation mistakes were not counted as errors.

A major citation error was one that "prevented immediate identification of the source of the reference,"[3] e.g., incorrect journal name, omission of year and volume, and incorrect pages that did not overlap with correct pages.

A minor error included misspellings, minor omissions (not preventing identification) and substitutions, and incorrect author initial or article last page number. If a single error locus contained more than one error, only one error was recorded; if both major and minor, only the major was recorded.

Quotation Errors

In a major error of quotation (indirect rather than direct), the cited reference either failed to substantiate, was unrelated to, or even contradicted the author's assertion. Example: "The average blood levels seen in our population (of human subjects) are below that usually associated with renal insufficiency." The cited reference, a study of lead poisoning in rats, reported that in adult rats poisoned with lead when young, renal insufficiency persisted even after blood lead levels had fallen to normal.

Minor errors were those which did not seriously affect the author's assertion, such as oversimplification or drawing conclusions which the authors of the cited reference were unwilling to do. Example from a paper dealing with *ovarian* cancer: "[In a recent study] no association was found between the level of serum retinol and the subsequent development of cancer." The cited reference found to association between serum retinol and *breast* cancer.

Classification and Analysis of Errors

Citation errors could be objectively classified as major or minor. Quotation errors were so classified by three individuals independently of each other. Unanimous agreement was achieved, in many cases only after discussion. When a single locus contained both a citation and a quotation error, both errors were counted.

When a reference was cited more than once in an article, all quotations were checked; if more than one error was found, only one was recorded (the major error if both minor and major).

Frequently a selected reference belonged to a series of references coming at the end of a sentence containing multiple assertions (quotations). We recorded an error only if the source of the selected reference was at variance with all of the multiple assertions, unless the source explicitly contradicted some portion of the assertions. Example: "The picture of the homeless population which is emerging from contemporary research is of a younger population with histories of frequent arrests and contacts with the mental health system.[15,21–27]" The selected reference (number 21)

TABLE 1—Major and Minor Citation Errors and Error Rates in Three Public Health Journals*

Journal	Citation Errors		
	Minor	Major	Total(%)
American Journal of Epidemiology	11	3	14(28)
American Journal of Public Health	13	1	14(28)
Medical Care	17	1	18(36)
Total	41	5	46(31)

*Based on 50 randomly selected journal references verified for each journal, May 1986.

TABLE 2—Major and Minor Quotation Errors and Error Rates in Three Public Health Journals*

Journals	Quotation Errors		
	Minor	Major	Total(%)
American Journal of Epidemiology	5	7	12(24)
American Journal of Public Health	2	9	11(22)
Medical Care	15	7	22(44)
Total	22	23	45(30)

*Based on 50 randomly selected journal references verified for each journal, May 1986.

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TABLE 3—Errors and Errors per Selected Reference for Articles Arranged by Quartiles According to Number of Selected References in Article

No. of Articles (1)	No. of References in Article (2)	No. of Selected References (3)	Errors		Errors per Selected Reference		
			Citation (4)	Quotation (5)	(4)/(3)	(5)/(3)	(4)+(5)/(3)
9	3–14	15	2	2	.13	.13	.27
9	16–21*	29	7	7	.24	.24	.48
9	21*–28	44	16	13	.36	.30	.66
10	29–53	62	34	22	.55	.36	.90

*Three articles had 21 references. One of the three was randomly assigned to the second quartile.

did indeed find a high incidence of arrest and psychiatric hospitalization, but the majority of the homeless men studied were over 45 years of age. (We classified as a minor quotation error.)

We also checked out all the references in a sentence with multiple assertions, but did not add these to the 50 references per journal.

We recorded the total number of references in each article whose references were selected for study, divided the selected articles into quartiles on the basis of the number of references in each article, and calculated the number of errors per selected reference in each quartile.

Seventy-three references, one-third of the total selected by random numbers, were not included among the 150 journal references verified. They included: 17 foreign language journals or journals not in library, 31 books or book chapters, 17 government publications, and 8 miscellaneous documents.

Results

The most common citation errors were misspellings and minor omissions in author names or article title. A total of 78 citation errors were found, 20 of which occurred more than once (although we counted each one only once) in a single cited reference. Although almost a third of the references contained one or more citation errors, there were only five major errors, 3 per cent of the 150 references checked (Table 1).

The quotation error rates are shown in Table 2 and total to approximately the same rate as citation errors. Major errors were more frequent, however, occurring in one out of every 6.5 references checked.

There were 24 instances of multiple assertions accompanied by a series of references, 127 in all. We located only 20 of these multiple instances and, in one, the entire series failed to substantiate the assertions

When all three journals are considered together, there is a direct relation between the number of references in an article and the number of errors per selected reference (Table 3). However, the median number of references per article was highest in *Medical Care*, which also had the highest error rates. When we calculated the error rates of an equal number of articles above and below the median number of references separately for each journal, we found that error rates for *Medical Care* were about the same for articles above and below the median, while the relation between error rates and number of references per article held up for the other two journals.

Discussion

Our total citation error rates are comparable to those of deLacey, *et al,*[3] who reported a similar study of six medical journals, although we found somewhat fewer major citation errors. With the increasing availability of computerized medical data bases, it becomes more important to spell an author's name correctly. In this survey, misspelling of authors' names was found to be the most common type of citation error.

Both our total quotation error and our tally of major errors are in general higher than those found by deLacey, *et al.*[3] The differences could be due to differences in the journals or the authors of the papers studied, or to differences in the judgment of raters.

Quotation errors could be avoided if an original source was read carefully and in its entirety. One reason a higher error rate is correlated with papers with many references in two of the journals may be that, as the number of references increases, authors become less willing to read all their references carefully.

At least 10 per cent of the 223 randomly selected references were not accessible in an otherwise adequate medical school library, and 14 per cent referred to books without citing exact pages in most cases.

When multiple references are used in a sentence with multiple assertions, the author should group the appropriate reference(s) after each assertion rather than lumping them all together at the end of the sentence. We would also recommend that when an author quotes figures not found in the original source but calculated from its data, or if the author interprets data differently from the source author, readers be so informed.

Although errors of citation or quotation are occasionally spotted by reviewers or editors, such corrections are rare. Citations could theoretically be checked as part of the copy reading process, but few journals can afford this luxury. Quotations could not possibly be checked. Accurate citations and quotations from cited references are a responsibility of authors. Both deLacey, *et al,*[3] and we have shown that this responsibility is all too often neglected.

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