

# What's in a Title?

## A Descriptive Study of Article Titles in Peer-Reviewed Medical Journals

**Richard A Goodman,**  
**Stephen B Thacker, and**  
**Paul Z Siegel**

### Abstract

**Objectives.** Titles of journal articles should effectively convey to readers, editors, and reviewers basic topics of the articles and, within topics, specific aspects. To increase our understanding of the current practices of authors and editors in the use of titles, we analyzed article titles from a sample of general medical journals and queried editors in the United States and England.

**Design and Outcome Measures.** We examined the titles of articles published as original contributions in four peer-reviewed medical journals during July-December 1995. Using an explicit typology developed for this study, we classified each title according to elements present: methods, dataset, results, conclusions, or topic only. We also queried editors of selected journals about policies regarding titles published in their journals.

**Results.** Of the 420 titles we reviewed,

168 (40%) were classified as "Topic only" because they reflected the subject of the paper but did not include information in other categories or appeared too ambiguous to classify. The second most common classification was "Methods" (33%); "Results" accounted for nearly one fifth (18%) of the titles, and only two (1%) of the titles presented a conclusion. The ambiguity of some titles precluded determination of whether they described studies or review articles. Of the journals we queried, only one had a published policy regarding titles, and that policy addressed only the length of the title.

**Conclusions.** Most titles lack information about study design, methods, and results. We recommend that research be conducted on the interests of authors, readers, and editors regarding the content of titles.

### Introduction

The purpose of the title of an article in a biomedical journal should be to convey effectively the topic of the report and the design of the reported investigation while attracting the attention of and informing

the primary target audience, editors, and reviewers. Substantive treatment of titles in the biomedical literature is limited,<sup>1,2</sup> and titles are addressed only incidentally in a perspective on communication through research papers.<sup>3</sup> In 1994 the editors of one journal suggested that the three key sections of an article were the abstract, tables and figures, and methods section; the title was not addressed even superficially.<sup>4</sup> Only recently have monographs about writing scientific papers begun to stress the importance of titles. These sources<sup>5-8</sup> provide helpful suggestions based on expert opinion but lack an evidence base.

We studied the practices of authors and editors in the use of titles. To assess practices, we analyzed a sample of titles of papers in selected general biomedical journals, in part to determine whether the titles included information about methods, results, and conclusions. In addition, to assess editorial policies, we queried editors of a different set of journals about their policies regarding titles of articles.

### Methods and Data

Our study examined the titles of articles in four peer-reviewed medical journals published in the United States and England: the *British Medical Journal* (BMJ), *Journal of the American Medical Association* (JAMA), *Lancet*, and *New England Journal of Medicine* (NEJM). These journals were selected to ensure that a broad range of subject matter would be represented in articles for readers interested in basic and clinical biomedical research and in public health. We restricted our study to articles that were published during July-December 1995 and that could be considered original contributions ("papers" in BMJ, "original contributions" in JAMA, "articles" in *Lancet*, and "original articles" in NEJM); articles labeled as brief reports in these sections were excluded.

RICHARD A GOODMAN is an epidemiologist at the Centers for Disease Control and Prevention (CDC) and is completing work on a JD degree at Emory University's School of Law. He is a physician board-certified in internal medicine and preventive medicine. He served as editor-in-chief of CDC's Morbidity and Mortality Weekly Report (MMWR) in 1988-1998, is the author or coauthor of over 80 scientific publications, trains public-health practitioners in scientific writing, and is coauthor of a book on golf.

STEPHEN B THACKER is director of CDC's Epidemiology Program Office, where he leads programs in the training of epidemiologists, program managers, and preventive-medicine residents in the United States and internationally. He is a physician board-certified in family medicine and preventive medicine, has a master's degree in epidemiology, and is an assistant surgeon general in the US Public Health Service. He has overall responsibility for CDC's MMWR, has served as an editor of *Epidemiologic Reviews* since 1990, and has published over 150 scientific articles.

PAUL Z SIEGEL, director of the Field Epidemiology Activity at CDC's National Center for Chronic Disease Prevention and Health Promotion, is board-certified in preventive medicine and holds an MPH degree in epidemiology. A Fulbright Teaching Fellow to the Russian Federation in 1999, he has conducted training in scientific writing for public-health practitioners and epidemiologists since 1987.

Correspondence may be directed to Goodman at rag4@cdc.gov.

To characterize the titles, each of us reviewed and classified each title with an explicit typology we developed for this study. The typology comprised the following categories:

**Topic only (T):** Title noted a subject but did not include information on other categories listed below, or it seemed ambiguous.

**Methods/design (M):** Title specified the topic and an approach to study design, data management, or analysis (such as case-control, cohort, effectiveness, efficacy, frequency, incidence, mortality, prevalence, surveillance, survival, trend, or validity study; meta-analysis; randomized clinical trial; or sensitivity-specificity or cost-effectiveness analysis); or title indicated an investigation of an epidemic or outbreak; or title provided an incomplete description of a method (such as assessment, evaluation, population sample, or comparison).

**Dataset (D):** Title indicated the topic and name or acronym of a specific study (such as “the PRIME-MD 1000 Study”<sup>9</sup>).

**Results (R):** Title contained the topic and quantitative information (a specific value), semiquantitative or ordinal information (such as increased, decreased, high, or low), or some other specification of a relation (such as association, change, correlation, determinants, effect, evidence, impact, influence, outcomes, predictors, relation, remission, risk, variability, or variation) regarding what the authors found.

**Conclusions (C):** Title included the topic and an unequivocal statement based on the analysis of the reported evidence.

We used those criteria to classify each title independently; the three of us then discussed each title to establish agreement on a classification.

We queried editors of selected peer-reviewed journals (*American Journal of Epidemiology*, *American Journal of Public Health*, *Annals of Internal Medicine*, *BMJ*, *JAMA*, *Lancet*, *NEJM*, *Obstetrics & Gynecology*, and *Public Health Reports*) about their policies regarding titles of articles. Specifically we asked whether their journals had stated policies regarding titles, including policies about length, structure, and content; what they

**Table 1**  
**Number and Distribution of Titles by Category in Articles Published during July - December 1995**

Title emphasis*	BMJ	JAMA	Lancet	NEJM	Total
	n (%)	n (%)	n (%)	n (%)	n (%)
Topic only (T)	47 (35)	27 (37)	45 (1)	49 (48)	168 (40)
Methods (M)	53 (40)	24 (33)	32 (29)	31 (30)	140 (33)
Dataset (D)	0	3 (4)	4 (4)	0	7 (2)
Results (R)	21 (16)	12 (16)	22 (20)	22 (21)	77 (18)
Conclusions (C)	0	1 (2)	1 (1)	0	2 (1)
MR*	9 (7)	3 (4)	5 (5)	1 (1)	18 (4)
MD*	2 (1)	1 (2)	1 (1)	0	4 (1)
DR*	0	2 (3)	1 (1)	0	3 (1)
DMR*	1 (1)	0	0	0	1 (0)
<b>Total</b>	<b>133</b>	<b>73</b>	<b>111</b>	<b>103</b>	<b>420</b>

\*MR, methods and results; MD, methods and dataset; DR, dataset and results; DMR, dataset, methods, and results.

believed to be the primary purpose of a title; whether they change titles of accepted articles and, if so, according to what criteria and how often; and whether they have ever evaluated titles of published articles.

## Results

### Analysis of titles

Of the 420 titles we reviewed, 168 (40%) were classified as “Topic only” because they reflected the subject of the paper but did not include information in other categories or appeared too ambiguous to classify (Table 1). The second most common classification was “Methods” (33%); “Results” accounted for nearly one fifth (18%) of the titles; “Dataset” for seven (2%); and only two (1%) presented a conclusion. The rest of the titles were combinations of two or more types.

Table 2 provides examples of titles<sup>10-15</sup> corresponding to some of the basic categories; it also includes comments about ambiguities and other potential problems with syntax and grammar. This sample includes some titles that fit clearly within the categories and others that could confuse readers. For example, the title “Increasing prescription of drugs for secondary prevention after myocardial infarction”<sup>10</sup> is sufficiently

ambiguous that, except for its inclusion as an original article, the type of publication is not readily apparent.

### Assessment of journal or editor policies

Of the journals we asked, only one had a published policy regarding titles, and that policy addressed only the length and style of the title (manuscript titles should contain no more than 100 characters, counting letters and spaces, and abbreviations or commercial names should not be used).<sup>16</sup> Examples of implicit policies—known among editors but unpublished for authors—dealt with exclusion of declaratory titles, limitations on length (titles are not to exceed three lines), the need for titles to stipulate the use of nonhuman subjects, the reflection of the randomized clinical trial as a method, the exclusion of particular phrases (such as “the use of”) and conclusions, and inclusion of the study topic and method by using the colon as a punctuation convention. Editors emphasized that primary purposes of the title are to provide a clear message of the contents to assist audiences with searches, to help readers make rapid decisions about what they might expect to find as a basis for deciding what they will read, and to attract the attention of audiences and encourage them to read the article. One

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**Table 2**  
Examples of Titles Corresponding to  
Categories of Emphasis

## Topic only

“Increasing prescription of drugs for secondary prevention after myocardial infarction”<sup>10</sup>

Comment: This title is ambiguous and could reflect an intervention intended to increase prescriptions, a study reporting a result, a review paper, or a commentary or editorial. It also illustrates pitfalls of gerunds and the ambiguity engendered by gerunds.

“Slowing of wound healing by psychological stress”<sup>11</sup>

Comment: This title conveys the ambiguity of the noun-gerund trap and precludes determination of whether the article reports a study or is a review paper or something else.

## Dataset

“Health-related quality of life in primary care patients with mental disorders: results from the PRIME-MD 1000 study”<sup>9</sup>

Comment: This title gives no information on methods or results. The name of the data source might provide a clue to the methods but might not be widely recognized by the journal's readers.

## Methods

“Meta-analysis of the effects of soy protein intake on serum lipids”<sup>12</sup>

Comment: This title provides the method but does not indicate what types of studies (such as randomized controlled trials or cohort studies) are reviewed. No results or conclusions are indicated.

## Results

“Association of *Helicobacter pylori* and *Chlamydia pneumoniae* infections with coronary heart disease and cardiovascular risk factors”<sup>13</sup>

Comment: This title illustrates the ambiguity produced by using “association” without any indication of its direction (positive or negative).

## Methods and Results

“Reanalysis and results after 12 years of follow-up in a randomized clinical trial comparing total mastectomy with lumpectomy with or without irradiation in the treatment of breast cancer”<sup>14</sup>

Comment: An awkwardness in this title might reflect, in part, its extraordinary length (a “miniabstract”).

## Conclusion

“HDL cholesterol predicts coronary heart disease mortality in older persons”<sup>15</sup>

Comment: This could be the title of a commentary, a report of an intervention trial, a report of an observational study, or a review article or meta-analysis. “Older persons” is ambiguous and could include any age cutoff after adolescence.

the use of colons in titles. Only one journal evaluated titles periodically.

**Discussion**

In addition to the root topic of a paper, the key information elements that could be used by authors and editors to reflect the full contents of a manuscript concisely in a brief title are the methods, results, and conclusions. However, we found that most titles lack information about study design, methods, and results. Specifically, 40% of the titles in our study included no information beyond the topic of the article. This pattern calls into question the effectiveness of current author and editorial practices regarding two primary purposes of titles: the role of titles in informing readers about the contents and merits of articles, and the ability of titles to attract potential readers (“marquee appeal”).

The purpose and utility of the title can vary in relation to each of four perspectives: that of the author, the editor, the peer reviewer, and the reader. For the author, the title should not only reflect accurately and succinctly the substance of the paper, but also attract the interest and attention of the editor, the reviewers, and ultimately the readers. The title forms the basis of the initial impressions of the editor (and, by extension, reviewers) and can influence decisions about whether to consider the paper further. For the reader, arguably the most important of the author's targets once the paper has been accepted, the title is the critical element in the first stage of deciding what to read—a decision the reader makes while reviewing journals' tables of contents, searching databases, and scanning bibliographies. With ready access to sophisticated electronic abstracting services, however, titles have become less critical for this purpose.

Since 1995 the editors of *BMJ* have included information about study methods in the title more frequently; authors of articles submitted to *BMJ*, when invited to revise their material, are asked to include information on the design of the study in the title.<sup>17</sup> Some examples of titles that do so are “Effectiveness of a regional trauma system in reducing mortality from major trauma: before and after study”,<sup>18</sup> “Substance

journal indicated that the title should contain key words because it does not print key words separately.

Each journal reported changing titles, although the frequency, timing, and criteria for doing so varied considerably. The likelihood that titles would be modified ranged from rarely to frequently (but unquantified); the proportion was as high as an estimated 50%. Depending on the journal, titles can

be changed during the review process and before acceptance (when reviewers' comments are provided to authors) or during the revision process. Reasons and criteria for changing titles varied and included the need to improve clarity, to emphasize methods and the topic rather than the results, to shorten and more accurately reflect the paper's contents, and to make more informative. The editor of one journal reported encouraging

use in remand prisoners: a consecutive case study",<sup>19</sup> and "Atopic dermatitis and birth factors: historical follow up by record linkage".<sup>20</sup> That practice of the *BMJ* editors can be viewed as a service to make the characteristics of articles more visible and as a means of helping readers to judge at a glance their level of interest. The relatively new policy represents the exception, however; most of the journals included in our study had not developed internal policies or published guidelines regarding titles.

At least four potential explanations can be offered to account for the lack of specific information about methods or results in titles. First, limits in title length preclude anything but a thumbnail description of the topic. Second, the root topic is considered to be of such fundamental importance that information about methods and results is not warranted. Third, authors might believe information about methods and results will reduce the interest level of readers. Fourth, authors and editors simply overlook the possibility of, or have a personal preference about, including methods and results in the title. Among titles that we examined and that contained information about study methods, common terms included "cohort", "double-blind trial", "prospective", "case-control", and "randomized"—study designs that are commonly perceived as being of high quality or "powerful". None of the titles contained explicit references to less powerful designs, such as "convenience sample" or "case series". One possible conclusion from this information is that the authors (or editors) responsible for these titles might not have put effort into title development. Alternatively, they might have avoided (or been biased against) an explicit mention of less powerful study designs in order to retain an article's marquee appeal, possibly even at the expense of reducing important information for the reader.

Given the absence of basic policies guiding authors in the development of titles, pertinent research should address reasons for including in an article's title information about a study's methods and results; the value of brevity, completeness, and reader appeal of article titles; and the attitudes and practices of journal readers

(such as the characteristics of titles used by readers to make decisions). Investigation of those subjects can foster discussion among authors, editors, and readers. These discussions might help to build consensus as to the purposes of titles and to develop clear policies and practices to better serve the needs of editors, authors, and readers.

In this study, the high proportion of titles that reflected only the topics might have prevented potential readers of such papers from grasping new, different, or special information in the articles. We recommend that a title include not only the topic, but also study design and methods and, when space allows, results and conclusions. For example, the following two titles were among the few in the sample of journals we reviewed that included not only the topic, but also the methods and results:

- "Prospective seroepidemiological evidence that human papillomavirus type 16 infection is a risk factor for oesophageal squamous cell carcinoma"<sup>21</sup>
- "Improved survival in homozygous sickle cell disease: lessons from a cohort study"<sup>22</sup>

Finally, journal editors should consider developing and publishing guidelines for titles that meet the needs of authors, editors, and readers. The guidelines can be incrementally refined by incorporating results of evidence-based research produced by studies like those we have recommended. Groups that represent the interests of authors, editors, journals, and readers (such as the Council of Science Editors, the World Association of Medical Editors, and the International Committee of Medical Journal Editors) could assist in the development of such guidelines, including support of such essential research activities. 

### References

1. International Committee of Medical Journal Editors. Uniform requirements for manuscripts submitted to biomedical journals. [www.icmje.org](http://www.icmje.org) (accessed 11 February 2001).
2. Goodman NW. Survey of active verbs in the titles of clinical trial reports. *BMJ* 2000;320:914-5.
3. Horton R. The unstable medical research paper. *J Clin Epidemiol* 1997;50:981-6.
4. Northridge ME, Susser M. Annotation: seven fatal flaws in submitted manuscripts. *Am J Public Health*

1994;84:718-9.

5. Huth EJ. Writing and publishing in medicine. 3rd edition. Baltimore (MD): Williams & Wilkins, 1999.
6. Huth EJ. Article title. In: Medical Style & Format. Philadelphia (PA): ISI Press, 1987;20-1.
7. Day RA. How to write & publish a scientific paper. 5th edition. Phoenix: Oryx Press, 1998.
8. Zeiger M. Essentials of writing biomedical research papers. 2nd edition. New York: McGraw-Hill, 2000.
9. Spitzer RL, Kroenke K, Linzer M, and others. Health-related quality of life in primary care patients with mental disorders: results from the PRIME-MD 1000 Study. *JAMA* 1995;274:1511-7.
10. Smith J, Channer KS. Increasing prescription of drugs for secondary prevention after myocardial infarction. *BMJ* 1995;311:917-8.
11. Kiecolt-Glaser JK, Marucha PT, Malarkey WB, and others. Slowing of wound healing by psychological stress. *Lancet* 1995;346:1194-6.
12. Anderson JW, Johnstone BM, Cook-Newell ME. Meta-analysis of the effects of soy protein intake on serum lipids. *N Engl J Med* 1995;333:276-82.
13. Patel P, Mendall MA, Carrington D, and others. Association of *Helicobacter pylori* and *Chlamydia pneumoniae* infections with coronary heart disease and cardiovascular risk factors. *BMJ* 1995;311:711-4.
14. Fisher B, and others. Reanalysis and results after 12 years of follow-up in a randomized clinical trial comparing total mastectomy with lumpectomy with or without irradiation in the treatment of breast cancer. *N Engl J Med* 1995;333:1456-61.
15. Corti M-C, Guralnik JM, Salive ME. HDL cholesterol predicts coronary heart disease mortality in older persons. *JAMA* 1995;274:539-44.
16. Instructions for authors. *Obstet Gynecol* 1997;90(1).
17. Personal communication, Fiona Godlee, January 1998.
18. Nicholl J, Turner J. Effectiveness of a regional trauma system in reducing mortality from major trauma: before and after study. *BMJ* 1997;315:1349-54.
19. Mason D, Birmingham L, Grubin D. Substance use in remand prisoners: a consecutive case study. *BMJ* 1997;315:18-20.
20. Olesen AB, Ellingsen AR, Olesen H, and others. Atopic dermatitis and birth factors: historical follow up by record linkage. *BMJ* 1997;314:1003-8.
21. Dillner J, Knekt P, Schiller JT, Hakulinen T. Prospective seroepidemiological evidence that human papillomavirus type 16 infection is a risk factor for oesophageal squamous cell carcinoma. *BMJ* 1995;311: 1346.
22. Lee A, Thomas P, Cupidore L, and others. Improved survival in homozygous sickle cell disease: lessons from a cohort study. *BMJ* 1995;311:1600-2.