AMA Manual of Style

A Guide for Authors and Editors

11th Edition

JAMA Network™

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JAMA Network Editors

Stacy L. Christiansen, MA

Cheryl Iverson, MA

Annette Flanagin, RN, MA

Edward H. Livingston, MD

Lauren Fischer, BA, BS

Connie Manno, ELS

Brenda Gregoline, ELS

Tracy Frey, BA

Phil B. Fontanarosa, MD, MBA

Roxanne K. Young, ELS

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Foreword

Identifying the benchmark, the "gold standard," in any discipline, is difficult. There are often numerous reference books and well-recognized and validated measures of diseases and disorders, but that single best resource can be elusive. However, the *AMA Manual of Style*, since its inaugural version in 1962, and with this 11th edition, is truly the standard, and in the words of one colleague, "the bible of medical publishing." Written by the editorial staff at *JAMA* and the JAMA Network—including physicians, manuscript editing managers, and current and former managing editors—it is the single most comprehensive text focused solely on medical publishing.

In 2018 I traveled to a meeting held at a start-up that was involved in health and wellness marketing. What did I see—5 copies of the *AMA Manual of Style*. When I asked why so many copies, the response was, "They are always in use; it has everything related to medical publishing. What more could we need?"

Dangling participles, malapropisms, misuse of hyphens and commas, and capitalization errors: I commit each of these sins daily. Is it *two* or *2, affect* or *effect, which* or *that*? Are book titles set in roman or italic type? How do you capitalize and punctuate *email*? When is causal language appropriate to be used in a research report? Do I use an SI unit or a conventional unit? What is the best way to display data? How do I handle an author dispute or determine if permission to republish part of a figure is needed? Was the correct statistical analysis used for a specific study? These puzzling questions come up every day in medical publishing and manuscript editing. The *AMA Manual of Style* answers these questions and thousands more.

Communication of medical information has changed radically over the past decade. The emergence of the internet and digital publishing changed forever how information is communicated. Reliance on a print copy of a journal is no more. The content of many journals is now "pushed" to many audiences via the internet, social media, news media, and email (or e-mail, which is it? see chapter 8.3). Transmission of information, which used to be confined to the printed word, now includes online synopses of articles, podcasts, videos, visual abstracts, and content translated into other languages. In the chapters on Manuscript Preparation; References; Editorial Assessment and Processing; Editing, Proofreading, Tagging, and Display; and the Glossary of Publishing Terms many of these new forms of communication are discussed.

The book is comprehensive. Since the publication of the last edition, old issues, including conflict of interest and scientific misconduct, have reemerged with additional and important concerns. New and evolving issues, such as open access, preprint servers, team science, open peer review, data sharing, and new rules for protecting participants' rights in research have come to the fore. These and related issues are discussed in depth in the chapter Ethical and Legal Considerations

and are also addressed in the chapters on Manuscript Preparation and Editorial Assessment and Processing.

For an author, editor, or publisher working in the field of medical publishing, the 23 chapters in this volume should help answer questions that arise in daily work as well as those that occur infrequently. There is guidance on citing sources; data displays (graphical and tabular); grammar, punctuation, plurals, and capitalization; correct and preferred usage; abbreviations; nomenclature (from genetics to organisms to oncology); copyright, licensing, and permissions; units of measure; numbers, study design, and statistics; equations; and electronic editing and proofreading. The book concludes with a list of other resources that may be helpful to authors and editors.

During my tenure I have had the good fortune of working with some great writers—Don Berwick, Tony Fauci, Phil Fontanarosa, Larry Gostin, Mary McDermott, Abraham Verghese, and Jody Zylke. For them I suspect writing comes naturally; they are simply gifted communicators. But for most people, writing—particularly medical writing—is a learned skill. There are many nuances, including high-level organizational structure, reporting standards, and correct usage of medical terminology, as well as paragraph transitions, syntax, word choice, verb tense, and punctuation use. For the vast majority of authors and editors of scientific communication, this edition of the *AMA Manual of Style* will be of great assistance.

It has been my privilege to work with the authors of this book. They have taught me much about medical editing and publishing. In the field of medical journalism and communication, the *AMA Manual of Style* is indispensable. It should be on the shelf of every editor and publisher and available to authors worldwide.

Howard Bauchner, MD
Editor in Chief
JAMA and the JAMA Network

Preface

Opening any new book can be cause for excitement. But for an editor, opening a new edition of a style manual has an added frisson. What is new? Have gaps been filled? Have policies that may have seemed outdated or stodgy been freshened?

These questions can only be answered by frequent use, but to provide a quick overview here is a short list of what you will find in this 11th edition of the *AMA Manual of Style*.

- The hyphen has been removed from *email*, although it is retained for other *e*-combinations (eg, e-cigarette).
- Both *internet* and *website* are lowercased (and the former *Web site* is now one word).
- The mandate for a single corresponding author has been relaxed. Two corresponding authors may be listed if justified, with one author designated as the primary point of contact responsible for all communication about the manuscript and article. This person will be listed first in the Corresponding Author section of the published article.
- Because it has become increasingly common for authors to request "co–first authorship" or "co–senior authorship," such designations will now be allowed, but one person's name will need to go first in the byline.
- The death dagger in the byline for a deceased author has been discontinued. If it is desired to note the death of an author, this may be done in the Acknowledgment section.
- Location of the publisher for books and reports is no longer required in references.
- Location of the manufacturer of drugs and equipment and devices is no longer required in text.
- A DOI (digital object identifier) should be included for journal references if available.
- Because the ability to easily and accurately copy and paste DOIs is important, a period should not be included after the DOI; the risk of the period becoming a part of the DOI itself is too great and could create problems with linking.
- When a URL is included for references, it should be preceded by the date the reference was published and/or last updated and accessed. This would make the URL the last item in the reference citation and, as with DOIs, it should not be followed by a period to avoid confusion with linking.
- Guidance on citing preprints, databases, data repositories, podcasts, apps and interactive games, and popular social media (eg, Facebook, blogs, YouTube, and Twitter) has been added to the References chapter.

- In tables and figures, sentence-style capitalization will be used in all elements except the title (eg, axis labels, column headings). This makes long phrases easier to read.
- In the chapter on Tables, Figures, and Multimedia, new examples of the following types of figures have been added: hybrid graph (2 techniques are overlaid), flowchart for a clinical trial in which participants were allocated vs randomized, funnel plot, genetic heat map, network map, gel electrophoresis images, magnetic resonance images, radiographs, ultrasonographic images. Color has been added throughout the chapter where appropriate.
- Guidance on publishing statements about data sharing has been added.
- Additional detail about public access, open access, article processing charges (APCs), open access journals, and updates on copyright, licensing, and Creative Commons (CC) licenses have been added.
- A new correction option allows retraction and replacement of an article in cases in which pervasive, but inadvertent, error(s) resulted in incorrect data throughout an article and a significant change in the findings, yet the underlying science is still reliable and important.
- Hyphens are not used in some combinations of words that are commonly read together; for example, *open access journals, health care system*.
- The singular *they* is permitted when rewriting a sentence as plural would be awkward or unclear.
- The terms *first world/third world* and *developed/developing* are not recommended as descriptors when comparing countries or regions.
- Labeling people with their socioeconomic status (eg, *the poor* or *the unemployed*) should be avoided in favor of language such as *individuals with low income* or *no income*.
- New terms related to addiction have been added: avoid *addict, alcoholic*; favor *person with opiate addiction, a person with alcohol use disorder.*
- Other new terms have been added to Correct and Preferred Usage, with clarification on use or when to avoid use, eg, *nauseous, nauseated; foreign-born; elicit, illicit, solicit; alternative, alternate; cerebrovascular accident, stroke, stroke syndrome; life expectancy, life span; substance use, substance abuse*.
- A new section on spelling and spacing variations has been added to Correct and Preferred Usage (eg, *ante mortem/antemortem, post mortem/postmortem, heart beat/heartbeat*). And yes, we still prefer *health care* over either *healthcare* or *health-care*.
- Some standards on grammar in social media have been added to the Grammar chapter to ensure clarity.
- In author bylines, all fellowship designations (eg, FRCP, FRCPC) and honorary degrees will no longer be included. Degrees below the master's level (eg, BS, BA) will only be included if they are the highest degree held.

- The Manuscript Preparation chapter adds guidance on the inclusion of figures or tables in the structured abstract, ancillary educational and promotional material (eg, audio, video, quizzes), and online-only supplements (text, tables, or figures).
- Use of aliases/nicknames for genes and proteins is strongly discouraged, although it may be necessary to dual report for aliases well-entrenched in use: *ERBB2* (previously *HER2/neu)*.
- Following the recommendation of the Human Genome Variation Society, the terms *mutation* and *polymorphism* should be avoided, preferring instead the terms *sequence variant, sequence variation, alteration,* or *allelic variant*. Related to this recommendation, SNV (single-nucleotide variation) is now preferred to SNP (single-nucleotide polymorphism). To aid in readers' understanding during this transition, at first mention SNV may be used, with SNP in parentheses: SNV (formerly SNP).
- The difference between *genome* and *genome assembly* is elucidated, as well as the importance of the GenBank identifier.
- In the discussion of human chromosomes, the movement from the study of structural variation from the perspective of direct visualization of bands, using staining techniques, to sophisticated fluorescent technologies to probe for structural variations is emphasized.
- Material on plant genetics (specifically corn, rice, and soybeans) has been added.
- Guidance on *Salmonella* nomenclature has been updated. Traditional binomial species designations are no longer applied to serotypes; now *Salmonella* Typhi, not *Salmonella typhi*.
- Currencies have been updated, including African denominations such as the Ethiopian birr, the Ghanaian cedi, the Malawian kwacha, the Nigerian naira, the Ugandan shilling, and the Zimbabwe dollar.
- Per SI convention, we no longer close up degree symbols in temperature with degrees Celsius and degrees Fahrenheit, but use a space after the number: a temperature of 37.5 °C (not 37.5°C).
- The SI conversion table has been updated, and it no longer includes laboratory reference values because of differences among laboratories worldwide.
- The chapter on indexing has been dropped.
- The abbreviation CI (for confidence interval) will no longer require expansion.
- Many new terms have been added to the Glossary of Publishing Terms, eg, cloud, Creative Commons, open access, hybrid open access, IP (International Protocol) address, JATS (Journal Article Tag Suite), JSON (JavaScript Object Notation), LaTeX, NISO (National Information Standards Organization), Unicode.
- A new section on Guidelines (eg, COPE, EQUATOR Network, ICMJE, WAME) has been added to the Resources chapter.
- A list of specific study types and definitions, with links to reporting guidelines, has been added to the chapter on article types.

- There is an expanded definition of *bias*, with many examples of types of bias, in the Study Design and Statistics chapter.
- The distinction between *multivariable* and *multivariate* is clarified.
- In displaying forms of statistical analysis, terms should not be shown as subscripts (eg, $P_{\text{interaction}}<.001$). Instead, use $P<.001$ for interaction.
- The Mathematical Composition chapter includes more examples of complicated forms of fences in equations.
- Use a thin space (a space usually ⅕ or ⅙ the width of an em dash: Unicode value is 2009) before and after mathematical symbols when they are used as verbs, conjunctions, or operators: ±. =, <, >, ≥, ≤, +, −, ≈.
- XML (discussion and tagging examples) rules for naming and defining parts of a document and their relationship to each other has been added, as well as a discussion of JATS tagging.
- The basic workflow of a manuscript has been updated to show single-source workflow. In this process, content remains in the original document format (eg, Word) and is stored with the XML file and related content (eg, supplemental files, multimedia). Because XML is the basis of this workflow and content, any changes required (before, during, or even after publication) must be made in the source document and new XML generated.

There may be long stretches between editions of a style manual, but an online version of the manual provides the opportunity to not only correct errors but also to provide updates and new policies. These are published on the Updates page of the online manual, which is freely available to everyone: https://www.amamanualofstyle.com/page/updates. Regular communication via Twitter (@AMAManual) and posts to our blog (http://amastyleinsider.com/) provide additional enhancements.

We have continued to work with a committee, dividing the work at the outset, doing independent research and writing, obtaining critiques from outside peer reviewers, and providing critiques on all of each other's material. Often, several cycles of writing, reviewing, and rewriting were necessary. As with the last edition, each chapter is attributed to a principal author. Others who added strength to the work are listed in the Acknowledgments section. And special thanks is due to Laura King, MA, MFA, ELS, who copyedited the entire book.

We welcome your comments on the manual, whether they are suggestions for improvements, alerts to possible corrections, or questions. Write to stylemanual@jamanetwork.org.

Cheryl Iverson, MA
Stacy L. Christiansen, MA
Co-chairs, *AMA Manual of Style* Committee

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Karen Adams-Taylor, MS
JAMA Network

David Antos
JAMA Network

Deanna Bellandi, MPH
JAMA Network

Robin L. Bennett, MS
CGC Division of Medical Genetics, University of Washington, Seattle

Sara Billings, MPH
JAMA Network

Karen Boyd
formerly with JAMA Network

Neil M. Bressler, MD
JAMA Ophthalmology and Retina Division, Johns Hopkins Medicine, Baltimore, Maryland

Kevin Brown, BA
JAMA Network

Karen Bucher, MA
JAMA Network

Diane L. Cannon
formerly with JAMA Network

Cheong-Hee Chang, PhD
Department of Microbiology and Immunology, University of Michigan, Ann Arbor

Miriam Y. Cintron, BA
JAMA

Michael T. Clarke, MA
Clarke & Esposito, Washington, DC

Helene M. Cole, MD
formerly with *JAMA*

Gregory Curfman, MD
JAMA

Gabriel Dietz, MA
JAMA Network

Mary L. (Nora) Disis, MD
JAMA Oncology and University of Washington, Seattle

Jennifer Eberhart
Radiology, Oak Brook, Illinois

Amanda Ehrhardt, MA
JAMA Network

Garth D. Ehrlich, PhD
Center for Advanced Microbial Processing, Drexel University College of Medicine, Philadelphia, Pennsylvania

Emmanuel A. Fadeyi, MD
Wake Forest Baptist Medical Center, Winston-Salem, North Carolina

Ferric C. Fang, MD
University of Washington, Seattle

W. Gregory Feero, MD, PhD
JAMA and Maine-Dartmouth Residency, Augusta, Maine

Nicole FioRito, BA
JAMA

Barbara Gastel, MD, MPH
Texas A&M University, College Station

Paul Gee, BA
JAMA Network

Julie T. Gerke, ELS
IQVIA, Parsippany, New Jersey

Carissa A. Gilman, MA
American Cancer Society, Atlanta, Georgia

Richard M. Glass, MD
formerly with *JAMA*

Donald C. Goff, MD
JAMA and Department of Psychiatry, NYU Langone Medical Center, New York, New York

Lawrence O. Gostin, JD
O'Neill Institute for National and Global Health Law, Georgetown University Law Center, Washington, DC

Timothy Gray, PhD
JAMA Network

David Green, MD, PhD
Feinberg School of Medicine of Northwestern University, Chicago, Illinois

Heather Green, BA
JAMA Network

Emily A. Greenhow, BA
JAMA

Philip Greenland, MD
JAMA and Northwestern University, Chicago, Illinois

Irina Grigorova, PhD
Department of Microbiology and Immunology, University of Michigan, Ann Arbor

Sasha Grossman, BA
JAMA Network

Lila Haile, BA
Medical Council of Canada, Ottawa
formerly with *JAMA*

Stephan Heckers, MD, MSc
Department of Psychiatry and Behavioral Sciences, Vanderbilt University, Nashville, Tennessee
formerly with *JAMA Psychiatry*

James G. Hodge Jr, JD, LLM
Sandra Day O'Connor College of Law, Arizona State University, Phoenix

Joy K. Jaeger, BA
JAMA

Erin Kato, BA
JAMA Network

Lou S. Knecht, MLS
formerly Deputy Chief, Bibliographic Services Division, National Library of Medicine, Bethesda, Maryland

Hope J. Lafferty, AM, ELS
Hope J. Lafferty Communications, Marfa, Texas

Thomas A. Lang, MA
Tom Lang Communications and Training International, Kirkland, Washington

Trevor Lane, MA, DPhil
Edanz Group, Fukuoka, Japan

Frances E. Likis, DrPH, NP, CNM
Journal of Midwifery & Women's Health, Nashville, Tennessee

Iris Y. Lo, BA
JAMA Network

Rochelle Lodder, ELS
formerly with JAMA Network

Preeti Malani, MD, MSJ
JAMA and Department of Internal Medicine, University of Michigan, Ann Arbor

Ana Marušić, MD, PhD
University of Split School of Medicine, Split, Croatia and
Journal of Global Health

John J. McFadden, MA
JAMA Network

Chris Meyer
JAMA Network

Joseph Clayton Mills, MA
Neuroscience Publications, Barrow Neurological Institute, Phoenix, Arizona

Monica Mungle, BA
JAMA Network

Christopher C. Muth, MD
JAMA

George T. O'Connor, MD, MS
JAMA and Boston University School of Medicine, Boston, Massachusetts

Sean O'Donnell
JAMA Network

Peter J. Olson, ELS
Sheridan Journal Services, Waterbury, Vermont

Juliet A. Orellana, MA, MLIS
JAMA Network

Debra Parrish, JD
Parrish Law Offices, Pittsburgh, Pennsylvania

Boris C. Pasche, MD, PhD
Wake Forest Baptist Medical Center, Winston-Salem, North Carolina

Kim S. Penelton-Campbell, BS
JAMA

Eric D. Peterson, MD, MPH
JAMA and Duke University School of Medicine, Durham, North Carolina

Malini Raghavan, PhD
Department of Microbiology and Immunology, University of Michigan, Ann Arbor

Rita F. Redberg, MD, MSc
JAMA Internal Medicine and Women's Cardiovascular Services, University of California, San Francisco

Frederick P. Rivara, MD, MPH
JAMA Network Open and University of Washington, Seattle

June K. Robinson, MD
Department of Dermatology, Northwestern University Feinberg School of Medicine, Chicago, Illinois
formerly with *JAMA Dermatology*

Roger N. Rosenberg, MD
Department of Neurology, University of Texas Southwestern, Dallas
formerly with *JAMA Neurology*

Paul Ruich, BA
JAMA Network

Jeffrey L. Saver, MD
JAMA and Geffen School of Medicine at UCLA, Los Angeles, California

Valerie Schneider, PhD
National Center for Biotechnology Information, Bethesda, Maryland

David Schriger, MD, MPH
JAMA and Department of Emergency Medicine, University of California, Los Angeles

Lisa M. Schwartz, MD, MS
Center for Medicine and Media and The Dartmouth Institute for Health Policy and Clinical Practice, Lebanon, New Hampshire

Jamie Scott, BA
JAMA Network

Philip Sefton, MS, ELS
JAMA

Stephanie C. Shubat, MS
USAN Program, American Medical Association, Chicago, Illinois

Kirby Snell, MFA
JAMA Network

Nicole Netter Snoblin
NextWord Communications, Lake Forest, Illinois

David Song
JAMA Network

Shannon Sparenga, MS
JAMA Network

Beverly L. Stewart, MSJ
JAMA

Joseph P. Thornton, JD
JAMA Network and American Medical Association

Elizabeth Wager, PhD
Sideview, Princes Risborough, England

Elizabeth H. Zak, PhD
American Medical Association, Chicago, Illinois

Sam Wilder, MFA
formerly with JAMA Network

Sara Zimmerman
JAMA Network

Steven Woloshin, MD, MS Center for Medicine and Media and The Dartmouth Institute for Health Policy and Clinical Practice, Lebanon, New Hampshire

Jody W. Zylke, MD
JAMA

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In Memoriam: Paul Frank (1960-2015)

In tribute to a member of this committee, a caring and devoted colleague.

With our thanks for 30 years of contributions to medical journal writing, editing, technology, and publishing.

Contents

1.0 Types of Articles

1.0 Types of Articles. Effective communication of scientific information requires consideration of the content, intended message, audience, and article format. To facilitate effective communication, editors of biomedical journals and other scientific publications use various article types, formats, and sections. However, most articles in scientific journals usually can be classified into 1 of the following general categories: Research Reports, Reviews, Other Substantive Articles (ie, nonresearch, nonreview), Opinion Articles, Correspondence, and Other Articles). For example, in the JAMA Network journals, major articles are classified into 3 main categories: research, clinical review and education, and opinion. These journals also use the following categories online to help users search by article type: research, review, opinion, case report, news, and humanities.

Editors and journals should provide clear and consistent guidance to authors about article types and requirements for each, such as in the instructions for authors. For example, JAMA Network Instructions for Authors include a section on Categories of Articles, which provides detailed information about the description and requirements for each type of article published in the journal.[1]

1.1 Research Reports. Articles that report the results of original research investigations are perhaps the most important types of articles published by scientific journals. These articles advance scientific knowledge and, in medical journals, help inform clinical practice and advance patient care. Journals often categorize reports that present data from scientific research as Original Investigations (or Original Articles, Research Reports, or a similar designation) to emphasize the new findings these articles communicate.

Subcategories of Research articles may have specific designations based on other criteria. For instance, the JAMA Network journals may use designations based on (1) the nature of the findings, such as Preliminary Communication to indicate articles that report preliminary findings and signal the need for further investigation; (2) the topic of the research, such as Caring for the Critically Ill Patient to identify research in a specific clinical or scientific area, or Less Is More, to identify studies

on how overuse of medical care may result in harm and how less intervention may lead to better health; or (3) article length, such as Brief Report to designate short reports of original studies or novel reports that involve small studies, or Research Letters to designate focused concise reports published as Correspondence.

Research reports may involve a wide range of study designs and methods, including randomized clinical trials, other intervention studies, cohort studies, case-control studies, epidemiologic investigations, surveys, meta-analyses, cost-effectiveness analyses, decision analyses, screening studies, diagnostic test evaluations, prognostic models, genetic and genomic studies, laboratory investigations, case series, case reports, and other designs. Data and information included in research reports must be original and should be as timely and current as possible. See **Box 1.1-1** for a list of common study types, descriptions, and requirements as used by the JAMA Network journals.

Research reports in biomedical journals generally follow a similar format that consists of the following sections: Title, Abstract, Introduction, Methods, Results, and Discussion, along with References, Tables and Figures, Article Information, Acknowledgments, online-only Supplemental content, and perhaps Multimedia content (see 2.5, Abstract, and 2.8, Parts of a Manuscript, Headings, Subheadings, and Side Headings, for guidance in preparing these sections). Some journals encourage use of reporting guidelines for research articles.[2] For example, guidelines for reporting clinical trials (Consolidated Standards of Reporting Trials [CONSORT]), observational studies (Strengthening the Reporting of Observational Studies in Epidemiology [STROBE[), or meta-analyses (Preferred Reporting Items for Systematic Reviews and Meta-Analyses [PRISMA]) or for other types of studies help ensure that key details related to the specific study design, methods, and results are included in the article. Box 1.1-1 also includes reporting guidelines for each of the study types listed.

1.2 Reviews. Review articles identify, synthesize, and summarize the available evidence and information about a specific topic. In biomedical journals, clinically based reviews have practical importance because practitioners may use these articles as guides for staying current with clinical information and helping inform decisions that involve clinical diagnosis and treatment. Depending on the journal, reviews can range from a rigorous, in-depth, systematic assessment of the literature to a less formal review based on a combination of selective evidence and expert opinion, similar to chapters in some textbooks. Journals generally have 2 types of reviews based on the scope of the review and level of analysis of the evidence and supporting literature.[1]

1.2.1 Systematic Reviews. Systematic reviews are critical assessments of the literature and data sources that pertain to clinical topics and often include information about the etiology, epidemiology, diagnosis, prognosis, therapy, or prevention of a disease or condition. These reviews involve a complete and up-to-date systematic search of the literature using multiple databases, covering many years, and grading the quality of the available evidence. Many journals encourage authors of systematic reviews to follow recommended reporting guidelines.[2] Systematic reviews without meta-analysis are generally published as Reviews. Systematic reviews that include meta-analysis of the available evidence and provide novel