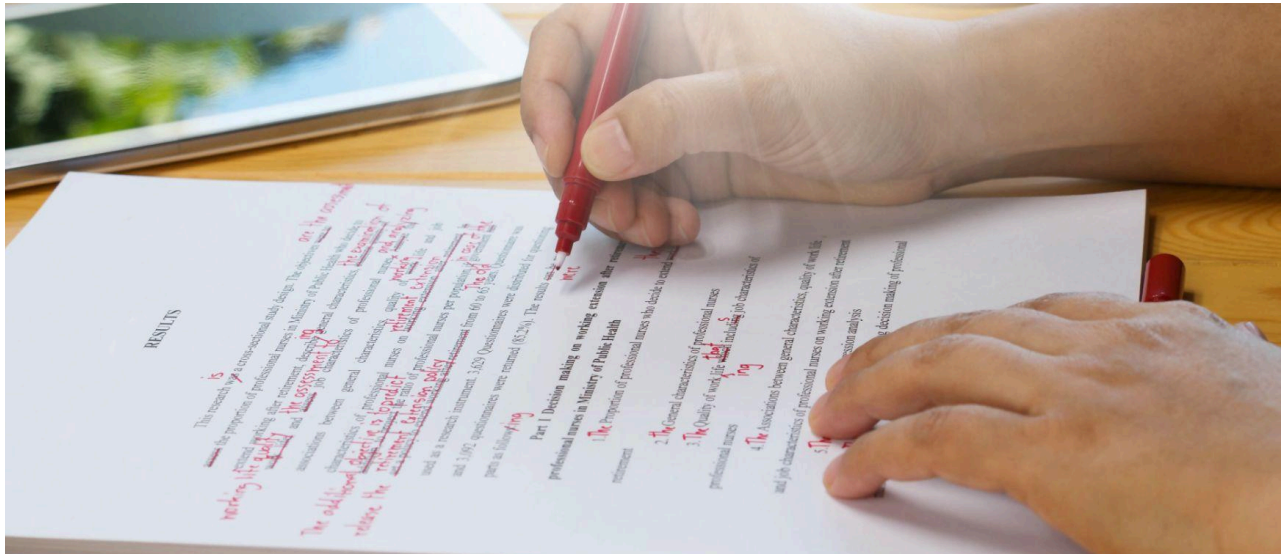


# A Comprehensive Guide to Medical Editing



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Every day, medical editors are shaping and producing documents that convey critical scientific information, leading to better outcomes and healthier lives.

In many industries, medical editors are coordinating and managing the flow of documents through multiple reviews and individuals, with the aim of creating useful, readable materials that improve health communication.

Whether they are polishing the prose of individual authors or investigators, working at the helm of a medical journal, serving academic institutions, or creating accurate regulatory documents for pharmaceutical companies, excellent medical editors are in demand.

This guide provides information and resources on the growing field of medical editing: the education, skills, and abilities needed; the stages of editing; and the tools and resources needed to begin or advance a career.

# What Is Medical Editing?



*Good medical editors devote their energy to ensuring that all written materials are prepared with accuracy, clarity, and consistency of expression.*

Medical editing involves the careful coordination and quality control of print and digital documents that are related to medical science and health care. Medical editors wear many hats and devote their energy to ensuring that all materials are prepared with accuracy, clarity, and consistency of expression.

They are guardians of scientific rigor who play a critical role in protecting the integrity of science and health information.

In a rapidly changing world, medical editors need to devote considerable attention to innovations in medicine, technology, and health care. They need to have impeccable editorial and analytic skills, as well as an understanding of the principles of scientific inquiry.

They are also skilled at shepherding documents through multiple stages of review by experts and other professionals, often serving as a final set of eyes on important scientific and medical documents.

## Responsibilities

Medical editors are involved in creating documents in many different formats, including traditional print publications, electronic publications, multimedia presentations, videos, podcasts, website content, and social media content.

They are often the ones who work with subject matter experts (SMEs) to create documents that describe research results, product use, and other medical information. They are also responsible for ensuring that documents comply with regulatory, publication, or other guidelines in terms of content, format, and structure.

Medical editors work in many types of industries, including health care, regulatory/pharmaceutical/device, publishing, research, and academia.

In many settings, medical editors are crucial members of the medical communication team and perform multiple quality-assurance tasks.

## How Do I Become a Medical Editor?

*Not every medical editor has a specific degree or certification related to the field, but in this competitive field, those who have such credentials can demonstrate their skills and knowledge.*



There are many different paths to becoming a medical editor. Some editors work as freelance contractors, while others are hired by organizations.

Medical editors need to have a deep passion for science and writing. They also must understand medical concepts and be able to interpret and explain the meaning of data to various audiences.

An advanced degree is not required to become a medical editor, but some have earned medical or science degrees. Others have experience in academic settings or as bench scientists, pharmacists, physicians, or other health care professionals. Sometimes an editor will have a master's or doctorate in communications or English.

There are also several certificates and certifications, including the [AMWA Certificate in Medical Editing](#), that are useful in demonstrating knowledge and proficiency.

[Learn More About the AMWA Certificate in Medical Editing](#)

### Assess Skills and Abilities

Medical editors arrive in the field from various disciplines and backgrounds. People with medical or science backgrounds commonly benefit from refreshers in writing and editing mechanics,

whereas people with editorial experience may need to focus on medical terminology and statistics.

Before applying for a program or position, aspiring medical editors should take an inventory of their skills, both quantitatively and qualitatively.

The following are some areas that all medical communicators, writers and editors alike, need to master:

- Grammar and usage
- Medical terminology
- Professional ethics
- Punctuation
- Sentence and paragraph structure
- Statistics
- Tables, graphs, visual abstracts, and other illustrative materials

The AMWA [Essential Skills Certificate Program](#) addresses all of these topics.

An Essential Skills certificate will help determine whether you have the skills to become a good scientific/medical editor. It's important to be realistic about your skill level, including how well you can create clarity in a document.

## Gain Experience in Editorial and/or Scientific Settings

Most medical editors have experience in editorial settings, scientific positions, or both. In these professional settings, they learn the ins and outs of the editorial process, the flow of documents and information, and the organizational culture that is key to working successfully.

The experience required varies depending on the hiring organization and the job responsibilities. Some people gain experience by volunteering to edit grants, publications, or other documents for a nonprofit organization. Some get a foot in the door by volunteering to edit a paper for an organization with a job opening in order to demonstrate their skills. Some employers may make exceptions for candidates with limited formal experience when they prove they can do the job.

No matter what your entry point is, it is important to choose a focus.

## Choose a Focus

A wide range of companies and organizations employ medical editors, and the field is generally divided into different specialties, each requiring specific editing skills or knowledge of medical terminology and practices.

- Continuing education for health care professionals
- Grant proposals
- Health communication
- Marketing/Advertising/Public relations
- Medical journalism
- Non-peer-reviewed publications for professional audiences
- Patient education
- Peer-reviewed journals
- Regulatory writing
- Sales training (biotech or pharmaceutical industry)
- Scientific publications

## Get Appropriate Training and/or Certification

Different organizations require editors with different skills. Most academic institutions require highly skilled substantive editors with analytical skills for work in scientific publications. Scientific/medical journals and publishing companies may hire editors with fundamental or copyediting skills or editors with experience in journal or book management. Pharmaceutical companies, device manufacturers, and medical communication agencies may hire editors with various skill levels, depending on the specific job responsibilities.

Several resources are available for assessing and acquiring the skills needed to become a medical editor.

AMWA has several such resources, including the [Essential Skills modules](#) that cover the basics of medical communication. These types of training opportunities can help sharpen writing and editing skills, enhance knowledge of medical terminology and statistics, and reinforce an understanding of medical ethics and practices.

In this day and age, training options abound. Aspiring medical editors and those already working in the field can explore online or in-person courses, check out self-paced virtual options, or attend conferences and events that offer educational opportunities.

## Certification for Medical Editors

Many of the skills needed to succeed as a medical editor overlap with those of [medical writers](#).

The following are a few examples of applicable programs:

- The [AMWA Certificate in Medical Editing](#) is designed for beginning to mid-level medical communicators who want to enhance and fine-tune their medical editing skills.
- [AMWA's Essential Skills Certificate](#) gives medical communicators at all levels of experience the opportunity to enhance their skills and knowledge. This self-paced course is designed to teach skills needed for scientific/medical editing.
- AMWA members can find additional resources on the various aspects of medical communication in the [AMWA Member Resource Library](#).
- Many universities offer classes and certificate programs in medical writing and editing.
- The Council of Science Editors (CSE) offers a [short course for manuscript editors](#).
- With two years of editing experience, people can take the exam offered by the [Board of Editors in the Life Sciences](#), which enhances credibility.
- [AMWA's Medical Writer Certified \(MWC®\) credential](#) is a rigorous, exam-based professional certification that includes questions on medical writing and editing.

## What Skills and Abilities Do I Need?



*Medical editors should have leadership skills and be excellent communicators, and they must pay close attention to the ethics and best practices in their field.*

As previously mentioned, the skills required of medical editors often overlap with those of [medical writers](#). Medical editors are often in positions where they are leading teams and coordinating multiple stakeholders.

## Applicable Medical Writing Skills

Medical editors are often the final stop in a long process of document development. They need to make sure that every document is prepared with accuracy, consistency, and clarity. At a minimum, they need to master all the essential skills for medical communicators.

## Organization and Management

In addition to possessing impeccable editorial skills, medical editors are often called upon to lead projects and shepherd documents through many stages of review. A 2017 study [identified a set of key competencies for scientific editors](#). In short, medical editors should demonstrate knowledge of the field and be skilled at synthesizing information and views from a variety of sources. They should have leadership skills and be excellent communicators, and they must pay close attention to the ethics and best practices in their field.

## Professional Ethics

Ethics are important in any profession, and much is at stake in medical communication. Medical communicators adhere to a specific [set of ethical principles](#) that are designed to promote the accurate and balanced presentation of scientific and medical information. In general, medical communicators should

- Act professionally
- Apply objectivity and fair balance
- Expand knowledge and skills
- Honor agreements
- Meet the highest professional standards
- Observe statutes and guidance from regulatory authorities
- Renounce unethical practices
- Respect confidentiality

[AMWA's Code of Ethics](#) provides a model for ethical decision-making that is applicable to medical editors.

## Building a Professional Presence/Reputation

One of the most important elements of success in medical editing is establishing a presence online and in professional communities. Forming these types of connections often leads to opportunities in this quickly growing field.



Medical editors can advance their careers and enhance their knowledge by

- **Joining relevant groups and professional associations.** Scientific and medical editors join various organizations, including [AMWA](#); the [Board of Editors in the Life Sciences \(BELS\)](#), which requires an examination first; and the [Council of Science Editors \(CSE\)](#). To determine which organization might be right for your career, peruse the association's annual meeting programs for the past 5 years.
- **Networking online and in person at conferences.** Some experts say that 70% to 80% of people found their current positions through networking. Medical communicators are using [LinkedIn](#), [Facebook](#), [Twitter](#), [community boards](#), and [conferences](#) to stay connected.
- **Creating online portfolios.** Prospective clients and employers appreciate being able to see an online portfolio. A portfolio should include examples of the type of editing you want to do. For example, if you are applying for a job as a substantive manuscript editor, include examples of that type of work (be sure to ask the author's permission). If you are too new to have a portfolio, volunteer to edit a paper for the company advertising the job or for another organization.

## Stages of Editing a Document

*AMWA's Medical Editing Checklist is a free tool that editors can use to make sure that every document is clear, concise, and accurate.*



There are several ways of framing the stages of editing a document, and many editors perform microediting, macroediting, and proofreading in their roles. Note: These stages are not the same as job titles, which we will cover in more detail later.

- **Microediting** (sometimes called copyediting) generally focuses on improving grammar, syntax, tone, and clarity. In microediting, the language of the document is examined to determine whether it supports the author's intention.

- **Macroediting** is the process of looking at the big picture, or the architecture and organization of a scientific document. In macroediting, gaps in logic or information are identified.
- **Proofreading** gives the editor a final chance to make the document as error-free as possible.

AMWA's [Medical Editing Checklist](#) is a free tool that editors can use to make sure that every document is clear, concise, and accurate.

Most senior-level editors combine these functions as they edit. Entry-level editors may start by mainly microediting, or copyediting; then as they learn, they may begin to work more at the macroediting level. Proofreading is generally done by reading text word-by-word and line-by-line, or by reading the work aloud to detect and correct errors.

## Editing Roles

In general, individuals performing these roles in academic settings will have the following skills.

### *Copyeditor*

- Knows rules of punctuation, capitalization, grammar, word usage, syntax, spelling, and word choice
- Understands medical terminology and units of measurements
- Uses correct and appropriate abbreviations
- Formats text, tables, and figures
- Makes terms and data consistent
- Edits sentences for coherence and clarity
- Verifies correct callouts of figures, tables, and references
- Correctly formats reference citations

### General Editor

- Possesses all the knowledge and skills involved in copyediting (as listed above)
- Ensures that editing is performed according to instructions provided by journals, publishers, and clients
- Appropriately uses reference sources such as scientific style, usage, and statistics books; online libraries (eg, PubMed, Scopus); and scientific content databases (eg, HUGO Gene Nomenclature Committee, ClinicalTrials.gov)
- Can apply the style of the American Medical Association (AMA), the *Chicago Manual of Style* (CMS), the American Psychological Association (APA), and others as required
- Understands and appropriately applies elements of design and page layout to ensure correct format and the most easily interpreted presentation of data in figures/tables and text (eg, typeface, spacing, fonts, size relationships, color, focal points)
- Ensures consistency of data throughout the text, tables, and figures
- Knows appropriate guidelines, including IMRAD, for organizing various types of biomedical documents
- Understands ethical concerns in biomedical communications, including the [ICMJE](#) guidelines for authorship and rules governing institutional review board and animal care committee requirements in biomedical communications
- Edits for coherence among a document's sections
- Understands the editorial process for medical and scientific journals and the peer-review process
- Explains editorial changes to physician- and scientist-authors

### Substantive Editor

- Masters all copyediting and general editing skills (as listed above)
- Ensures accuracy, clarity, and consistency of all components of a manuscript, including internal consistency of data
- Edits complex scientific and medical material into accurate, concise, consistent text for scientific/academic audiences
- Determines correct organizational structure for each manuscript and ensures that all text is appropriate for that structure

- Edits and rewrites text as needed
- Understands requirements for various types of scientific manuscripts, including the IMRAD system, and edits to ensure correct organizational structure and components for various types of articles such as review articles (eg, meta-analysis, systematic review); reports of observational studies (eg, cohort, cross-sectional, and case-control studies); and prospective studies (eg, clinical trials)
- Performs logic-based editing for consistency and flow
- Completes various checklists and guidelines documents required for manuscript review and submission (eg, CONSORT for controlled randomized trials)
- Understands complex academic scientific text, often written by nonnative English language speakers, and can distill this material into clear, scientific text that conveys the author's intended meaning, meets readers' needs, maintains factual accuracy, and follows complicated publication standards
- Verifies mathematical calculations for accuracy
- Ensures that basic statistical methods are appropriate (eg, use of mean vs median) and that results are reported completely
- Understands the appropriate type of figure or table to use for the type of information to be displayed (eg, scatterplot vs histogram)
- Uses biologic and scientific nomenclature correctly
- Suggests eliminating content that is inappropriate for the study question, moving material of secondary importance to a supplement, and adding material needed for ease of comprehension
- Understands ethical and legal considerations in scientific publication (authorship responsibility, duplicate publication, scientific misconduct, conflict of interest, copyright law, confidentiality, intellectual property)
- Relates conclusions to the data and discussion presented
- Has an exceptional command of the English language and exceptional working knowledge of editorial and scientific references, including the *American Medical Association Manual of Style, How to Report Statistics in Medicine*, and grammar and usage texts such as *Garner's Modern American Usage*.

## *Analytical Editor*

- Masters all skills included in copyediting, general editing, and substantive editing (as listed above)
- Understands the scientific importance of the research question and provides critical appraisal (documenting research designs and activities, statistical presentations, evaluating general research methods)
- Is familiar with research methodology, statistics, and evidence-based medicine concepts
- Documents research design and statistical presentations
- Evaluates general research methods
- Evaluates the focus and emphasis of the manuscript in light of the intended audience
- Rewrites and reorganizes text to bring logic to the entire manuscript or queries for missing information (eg, figure legends, statistical descriptions)
- Eliminates content that is inappropriate for the study question, moves material of secondary importance to a supplement, and adds material needed for ease of comprehension
- Uses independent judgment to determine whether reporting of data is complete (interprets data) and whether visuals accurately convey data
- Ensures that conclusions are drawn from study results

## *Other Types of Editors*

There are multiple titles for medical or scientific editors, and even positions with the same title can have different job responsibilities. The following are the most common titles that apply to medical or scientific editors at journals or book publishers.

### *1. Content Editor*

A content editor is a web-based editor who makes sure that content published on the internet conforms to high standards. Content editors examine spelling, grammar, organization, word choice, and accuracy. They also ensure that the content will be found by visitors by performing keyword searches, using search engine optimization (SEO), and performing other tasks that are part of the digital publishing landscape.

## *2. Manuscript Editor or Author's Editor*

A manuscript editor works with authors of scientific papers that have been accepted by a journal. Manuscript editors help authors achieve consistency and clarity while adhering to the publication's style guidelines.

## *3. Copy Editor*

A copy editor is responsible for making sure no errors escape detection. Copy editors shape the manuscript at the micro level. They perform line editing, checking every word of a document for grammar and spelling errors, inconsistencies, tone, and style. They often query authors to clarify or fact-check information that appears in manuscripts.

## *4. Assistant Editor, Deputy Editor, Associate Editor*

The job responsibilities for these positions depend on the structure of a publication or organization. Usually, people in these positions report to an editor, a managing editor, or an editor-in-chief.

## *5. Editor-in-Chief*

Sometimes the editors-in-chief of journals are [active scientific researchers](#) who are not involved in the journals' day-to-day editorial tasks. However, editors-in-chief often are responsible for choosing peer reviewers and making final decisions regarding publication. Some editors-in-chief oversee more than one journal.

## *6. Managing Editor*

Managing editors oversee the management of and communication among all the parties involved in a publication. They often perform administrative and supervisory tasks and may do some general editing.

## *7. Production Editor*

A production editor is a logistical whiz who shepherds articles through a journal or book production process — handling scheduling, revisions, and corrections, communicating with contractors, and overseeing any other process that happens between a manuscript's acceptance and its publication.

## *8. Developmental Editor*

The duties of developmental editors may overlap with other responsibilities, but such editors are often involved in shaping the macro (big-picture) aspects of a manuscript: the message, the logic

of the argument, the flow of sections, the sources, and scientific accuracy. At some publishing houses, they may be responsible for choosing books to publish and work throughout the publishing process to see the book through to final publication.

### 9. Proofreader

A proofreader is often responsible for the microediting of documents, checking punctuation, capitalization, grammar, word usage and word choice, syntax, and spelling. Proofreaders will ensure that a document meets all the requirements spelled out in a style sheet or style guide. The responsibilities of a proofreader tend to be more limited than those of a copy editor.

## Career Paths



*For a senior-level position whose responsibilities include substantive editing, candidates often need at least 5 years of experience and sharp analytical skills.*

The career paths of medical editors are often as varied as the individuals and their organizations. Some medical editors come from medical fields, others come from nonmedical editorial positions, and some have gained experience as [medical writers](#).

For an entry-level position, medical editors generally are required to pass an examination or show samples of their editing. Editors in higher-level positions will generally have a portfolio of manuscripts that they have edited (whose authors and institutions have been de-identified); they may also be asked to complete a sample edit. Some candidates may benefit from studying the [AMA Manual of Style](#) or other scientific style manuals before applying for a position.

People seeking an entry-level position should look for job titles that include the word “editor” and make sure that the position offers opportunities for advancement.

For a senior-level position whose responsibilities include substantive editing, candidates often need at least 5 years of experience and sharp analytical skills. Working for an organization with an editorial department that provides training is often preferable to working in a lone editor position in a department.

# Medical Documents

The expertise of medical writers and editors is in demand throughout the medical community. The following are examples of the types of materials that often require a medical editor.

- [Abstracts](#) for medical journals and medical conferences
- Advertisements for pharmaceuticals, devices, and other products
- [Advisory board summaries](#)
- Continuing medical education materials
- [Decision aids for patients](#)
- Grant proposals
- Health care policy documents
- Health education materials
- Magazine and newspaper articles
- Marketing materials
- Medical and health care books
- Medical and scientific journal articles
- Poster presentations for medical conferences
- Regulatory documents, including FDA submissions
- [Sales training](#) manuals
- Slide presentations for medical conferences
- White papers

## Who Hires Medical Editors?

Some medical communicators work for academic or corporate entities. Others choose to work as [freelancers who run their own businesses](#). This path often suits people who have gained experience in professional settings.

## What Companies Hire Editors?

The following are some of the places to find medical editing opportunities:

- Academic health care institutions
- Academic research organizations
- Contract research organizations



- Individual authors or investigators
- Medical communication agencies
- Medical device manufacturers
- Pharmaceutical companies
- Publishing companies
- Scientific and medical journals
- Universities and colleges

## Educational Requirements

Most entry-level scientific and medical editing positions require a bachelor's degree in science, English, literature, journalism/communications, or writing.

Senior-level positions will often require a PhD in science, English, literature, or writing with experience as a scientific/medical editor, or a master's degree in science, English, or literature with at least 5 years of experience as a scientific/medical editor.

Some senior-level editors earn a bachelor's degree in science, English, or literature and have at least 10 years of experience as a scientific or medical manuscript editor.

### Salary and compensation

Medical editing is a valued profession with competitive salaries and benefits. [AMWA's 2019 Medical Communication Compensation Report](#) shows an average mid-level salary of \$80,560 for full-time employed medical editors. In addition, most of these professionals receive health benefits, retirement savings, disability, life and/or disability insurance, and pre-tax spending programs. Sixty percent receive an annual bonus.

The median gross income for full-time freelance medical communicators is slightly less, at \$77,500. Freelancers are also responsible for paying for their own benefits.

## Tools of the Trade

Medical editors need to take advantage of multiple resources and tools to stay competitive and to advance in the field. Many online resources offer free trials that can help you determine whether these tools will work for you.

## AMWA Resources

AMWA offers many opportunities to support new medical editors and a wealth of professional development resources to help throughout an evolving career. The following are some examples.

- AMWA Online Learning activity: [A Career in Medical Communication: Steps to Success](#)
- [Join AMWA](#)
- [AMWA Career Services: Jobs Online, Freelance Directory](#)
- [AMWA Online Learning](#)
- Live [webinars](#)
- [AMWA Essential Skills Certificate Program](#)

Other resources include websites and books on medical editing.

## Online Editing Resources

Many helpful resources exist for medical editors, including assistance for non-native English speakers. Some are free, while others require a subscription.

- [AMWA's Medical Editing Checklist](#) helps medical communicators polish and perfect documents.
- [Acrolinx](#) offers a multilingual editing tool.
- [AuthorAid](#) provides a variety of links and materials for English as a Second Language (ESL) authors and writers, including online courses.
- [Bartleby Research](#) offers several writing and editing tools.
- [Dave's ESL Café](#) has links and materials for ESL, including grammar lessons and quizzes.
- [Editor's Toolkit](#) provides a tool for editing in Microsoft Word.
- [Equator Network](#) offers tools and guides for medical communicators.
- [Grammar Girl](#) provides tips and fun blogs, not necessarily targeted to medical communicators.
- [Grammarly](#) is a source for free and paid grammar checks.
- [Grammar, Punctuation, and Capitalization: A Handbook for Technical Writers and Editors](#) is an online guide published by NASA.
- [Perfectit Pro](#) is a paid proofreading software, rated highly by several AMWA members.
- [OneLook Dictionary Search](#) is a searchable database of dictionaries.

- [Online Medical Dictionary](#) is a useful resource for medical terminology.
- [Purdue Online Writing Lab \(OWL\)](#) provides writing and editing tools and resources.
- [Refdesk.com](#) is a fact-checking site with links to a variety of reference sites.
- [Stylewriter](#) provides copyediting software.
- [White Smoke](#) is a pay site used for translating for nonnative English speakers.
- [WordRates](#) offers automatic editing of Word and Outlook documents.
- [Writing Centers Online](#) has links to academic writing center websites.

## Books for Medical Editors

- *AMA Manual of Style: A Guide for Authors and Editors*, Oxford University Press. (Be sure to take the quizzes.)
- [AMWA Essential Skills](#) Self-Study Workbooks:
  - Basic Grammar and Usage
  - Elements of Medical Terminology
  - Punctuation for Clarity and Style
  - Sentence Structure and Patterns
  - Statistics for Medical Writers and Editors
  - Tables and Graphs
- *The Careful Writer: A Modern Guide to English Usage*, by Theodore M. Bernstein
- *The Chicago Guide to Grammar, Usage, and Punctuation*, by Bryan A. Garner
- *The Chicago Manual of Style: The Essential Guide for Writers, Editors, and Publishers*, University of Chicago Press (great companion to scientific style guides; more in-depth treatment of grammar and punctuation)
- *Copy-Editing: The Cambridge Handbook for Editors, Authors, and Publishers*, by Judith Butcher
- *The Copyeditor's Handbook. A Guide for Book Publishing and Corporate Communications*, by Amy Einsohn
- *Dorland's Illustrated Medical Dictionary* (also [online version](#))
- *The Elements of Style*, by William Strunk, Jr., E.B. White, and R. Angell
- *Garner's Modern English Usage*, by Bryan A. Garner
- *Good Style: Writing for Science and Technology*, by John Kirkman
- *The Hodges Harbrace Handbook*, by Cheryl Glenn and Loretta Gray

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- *Line by Line: How to Edit Your Own Writing*, by Claire Kehnwald Cook (lots of good advice)
- *Merriam-Webster's Collegiate Dictionary* (and other Webster dictionaries)
- *Scientific Style and Format (The CSE Manual for Authors, Editors, and Publishers)*, Council of Science Editors (great companion to the AMA Style Guide)
- *The Sense of Style*, by Steven Pinker
- *Words Into Type*, by Marjorie E. Skillin and Robert M. Gay

## Make Valuable Connections

If you are considering a career as a medical editor, you will have an opportunity to make a valuable contribution to the world of science and medicine.

Exemplary medical editors are lifelong learners committed to understanding the best practices in the field, sharing exciting innovations in health care, and creating readable, helpful documents that advance and improve health and well-being.

The most valuable resources for medical editors are the human beings who are already working in this growing field.

Professional associations like [AMWA](#) can provide opportunities to connect with these experienced professionals and obtain training and education. They also offer opportunities to network and collaborate with peers, colleagues, and potential employers.



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