Expanded guidelines on citing electronic references. View examples for online journals.

3.15 Electronic References. Electronic references have become considerably more common since the publication of the ninth edition of this manual. Internet references, rather than being something that only authors, editors, publishers, and librarians fretted about, were the subject of a front-page article in the *Wall Street Journal*.[10] Guidelines for handling electronic references are now readily available. Although the American Psychological Association[12,13] was among the first to propose such guidelines, those of the National Library of Medicine (NLM)[14] are more widely used for medical research.

Print and electronic references differ in several ways. Below are some issues to consider.

- Web sites may be evanescent, vanishing much faster than books go out of print. To address this phenomenon, the NLM ''strongly recommend[s] that the user produce a print or other copy when possible for future reference.''[6(piii)] Some journals recommend this to authors in their instructions.[15] Dellavalle et al[16] suggest that ''the best current solution to improve access to Internet references is to require capture and submission of all Internet information at the time of manuscript consideration.'' In preparing a reference list, authors should check to make sure any URLs (uniform resource locators) they cite are still valid; editors should check these again. Since typographical errors render URLs invalid, validation may be required several times in the publication process. Although it is desirable to have functional links, it is to be expected that, over time, some links may break as sites cease to exist, much as books may go out of print. Any updating of URLs in an effort to ''fix'' a link should be done with care, ensuring that the material that was cited originally still exists on the revised link.
- Some publishers are using other less-transient identifiers instead of, or in addition to, URLs. Among these are the digital object identifier (DOI) and the PubMed identification number (PMID). The DOI may be used to identify not just individual journal articles, but any piece of content (eg, a single figure) within an article; DOIs may also be assigned to books and many other forms of intellectual content.

The DOI has 2 elements, separated by a forward slash: the prefix and the suffix. The prefix is assigned by a DOI registration agency (an organization may have multiple prefixes) and the suffix, which follows the prefix and a forward slash, identifies the particular item. All DOIs begin with 10. For example, in the DOI in example 6 below (10.1038/nature02312), ''10.1038'' is the prefix and ''nature02312'' is the suffix. (Note: Some publishers use other identifiers as a part of the suffix.) The DOIs can be any length and, once assigned, are not changed. To find an article using the DOI, a reader can enter the DOI in the search box on the DOI Web site (http://dx.doi.org/) or in some journal search engines.[17] As close as possible to publication, it is advisable to check all DOIs to make sure that they resolve.

The PMID is assigned to the journal articles cited in a journal indexed by PubMed and is a part of the PubMed citation. To find an article, a reader can enter

the PMID in the ‘‘search’’ box on the PubMed Web site (http://www.ncbi.nlm .nih.gov/PubMed/). Some journals publish the DOI with the article (see example 6 in 3.15.1, Online Journals); the PMID is usually not published but exists as a behind-the-scenes identifier.

- Web sites may be updated much more frequently than published books or journals; thus, it is critical to provide the date that the author accessed the site and, if possible, the date on which the information was updated.
- Some journals and books may be available in print and online, but these versions may not be identical: the differences may be as minor as the online correction of a typographical error discovered in the print journal, which is not formally corrected and is impossible to track (see 6.2.7, Editorial Assessment and Processing, Editorial Processing, Corrections), or as major as 2 versions of the same article, or situations in which additional material (eg, tables or figures) is available only online. Books are often adapted for the Web to enhance interactivity for readers and add features. Because of these possible differences between various versions, it is critical that authors cite the version consulted. *Note:* The cited version may not be the version of record (ie, the version that the publisher considers authoritative).

3.15.1 Online Journals. The basic format for reference to an article in an online journal is as follows:

> Author(s). Title. *Journal Name* [using National Library of Medicine abbreviations—see 14.10, Abbreviations, Names of Journals]. Year;vol(issue No.):inclusive pages. URL [provide the URL in this field; no need to use ‘‘URL:’’ preceding it]. Published [date]. Updated [date]. Accessed [date].

Note: Use the URL that will take the reader most directly to the article, not a long search string and not a short, more general URL (one to the publisher’s home page, for example); if a URL is provided, as close as possible to publication verify that the link still works. Patrias[11] notes that NLM recommends using the location displayed in the Web browser as the URL. For a journal article, the accessed date will often be the only date available. This is especially important for journals that provide no ‘‘versioning’’ (eg, date posted, date updated or revised).

> 1. Duchin JS. Can preparedness for biological terrorism save us from pertussis? Arch Pediatr Adolesc Med. 2004;158(2):106-107. http://archpedi. ama-assn.org/cgi/content/full/158/2/106. Accessed June 1, 2004.

Many journals, such as *Archives of Pediatrics & Adolescent Medicine* in the example above, have parallel print and online publication, and the page numbers of the print article are included in the online citation. In this example, the date the article was posted (ie, published) was not provided and there were no updates, so only the date the article was accessed is listed. The inclusion of the URL and the date accessed, which differentiates this from the citation of the identical article in print, indicates that the online version of the article was seen and hence is appropriately cited.

In the example below, however, the article is *only* available online and has no page numbers.

> 2. Gore D, Haji SA, Balashanmugam A, et al. Light and electron microscopy of macular corneal dystrophy: a case study. *Digit J Ophthalmol*. 2004;10. http://www.djo.harvard.edu/site.php?url=/physicians/oa/671. Accessed December 6, 2005.

Other online-only articles without page numbers may be noted by other identifiers, eg, by e-page numbers (examples 3 and 4) or by article number (example 5).

> 3. Laupland KB, Davies HD, Low DE, Schwartz B, Green K; Ontario Group A Streptococcal Study Group. Invasive group A streptococcal disease in children and association with varicella-zoster virus infection. *Pediatrics*. 2000;105(5):e60. http://pediatrics.aappublications.org/cgi/content/full/105/5/e60. Accessed April 30, 2004.
> 4. e-Health Ethics Initiative. e-Health Code of Ethics. *J Med Internet Res.* 2000; 2(2):e9. http://www.jmir.org/2000/2/e9. Published May 24, 2000. Accessed April 29, 2004.

Examples 5 and 6 provide the DOI rather than a URL. In this case, it is not necessary to also provide the URL. When the DOI is provided, it is preferable to cite it rather than the URL. *Note:* The DOI is provided immediately after ‘‘doi:’’ and is set closed up to it, per convention. No accessed date is required for the DOI, making it the last item in the reference.

> 5. Smeeth L, Iliffe S. Community screening for visual impairment in the elderly. *Cochrane Database Syst Rev*. 2002;(2):CD001054. doi:10.1002/14651858.CD1001054.
> 6. Kitajima TS, Kawashima SA, Watanabe Y. The conserved kinetochore protein shugoshin protects centromeric cohesion during meiosis. *Nature*. 2004;427(6974):510-517. doi:10.1038/nature02312.

In some cases, different versions of the same article are published in print and online. The *BMJ*’s ELPS (electronic long, print short) is one example.[18] The print journal article (short version) is also made available online. Note: The version consulted is the version that should be cited. If the author consulted the article in the print journal, the reference would be cited like any other print journal article (see 3.11, References to Print Journals).

> 7. Deeks JJ, Smith LA, Bradley MD. Efficacy, tolerability, and upper gastro-intestinal safety of celecoxib for treatment of osteoarthritis and rheumatoid arthritis: systematic review of randomised controlled trials. BMJ. 2002; 325(7365):619-623.

If the author consulted the same article online, the reference would be formatted as

follows:

> 8. Deeks JJ, Smith LA, Bradley MD. Efficacy, tolerability, and upper gastrointestinal safety of celecoxib for treatment of osteoarthritis and rheumatoid arthritis: systematic review of randomised controlled trials [abridged]. *BMJ*. 2002;325(7365):619-623. http://bmj.bmjjournals.com/cgi/content/abridged/325/7365/619. Published September 21, 2002. Accessed October 21, 2002.

If the author consulted the long version of this article, available only online, the reference would be formatted as follows:

> 9. Deeks JJ, Smith LA, Bradley MD. Efficacy, tolerability, and upper gastrointestinal safety of celecoxib for treatment of osteoarthritis and rheumatoid arthritis: systematic review of randomised controlled trials. *BMJ*. 2002; 325(7365):619. http://bmj.bmjjournals.com/cgi/content/full/325/7365/619. Published September 21, 2002. Accessed October 11, 2002.

Note that the online citation of the long version (example 9) differs from that of the short version (example 8) in that it does not provide inclusive page numbers but gives only the first page in the print journal. Many online journals, however, do use inclusive page numbers.

In the example below, the online article includes a video. This is mentioned in an editor's note in the print journal; in the online journal, a link to the video appears in the table of contents and as a link within the article. The citation to the print article appears as follows:

> 10. Bertocci GE, Pierce MC, Deemer E, Aguel F. Computer simulation of stair falls to investigate scenarios in child abuse. *Arch Pediatr Adolesc Med*. 2001; 155(9):1008-1014.

The citation to the online article, containing the video, would be as follows:

> 11. Bertocci GE, Pierce MC, Deemer E, Aguel F. Computer simulation of stair falls to investigate scenarios in child abuse. *Arch Pediatr Adolesc Med*. 2001; 155(9):1008-1014. http://archpedi.ama-assn.org/cgi/content/full/155/9/1008. Accessed February 27, 2004.

A citation to only the video in the online version would be as follows:

> 12. Bertocci GE, Pierce MC, Deemer E, Aguel F. Computer simulation of stair falls to investigate scenarios in child abuse [video]. *Arch Pediatr Adolesc Med.* 2001;155(9):1008-1014. http://archpedi.ama-assn.org/cgi/content/full/155/9/1008/DCI. Accessed February 27, 2004.

In the following example, the online article contains 3 tables not included in the print

version. These are cited in the print article as eTable 1, eTable 2, and eTable 3; in the online journal, these appear as links within the article; and on the PDF they appear as pages e1 to e7.

> 13. DeWitt DE, Hirsch IB. Outpatient insulin therapy in type 1 and type 2 diabetes mellitus: scientific review. *JAMA*. 2003;289(17):2254-2264, e1-e7. http://jama.ama-assn.org/cgi/content/full/289/17/2254. Accessed December 6, 2005.

If an article is published online ahead of print publication, it may appear in 1 of 3 ways: (1) posted without editing; (2) edited and posted as it will appear in print, only ahead of the print publication (with or without print pagination); or (3) edited and posted as part of a specific issue of the journal. The first is found more often in the physical sciences (eg, physics preprint servers) than in medicine. Examples of the second (example 14) and third (example 15) are given below:

> 14. van der Hoek L, Pyrc K, Jebbink MF, et al. Identification of a new human coronavirus [published online ahead of print March 21, 2004]. *Nat Med*. doi:10.1038.nm1024.

In example 14, the article has not yet been paginated in the print journal and the DOI serves as the unique identifier for the article until publication. Once the article has been published in print, the full citation is provided to facilitate linking (see example 15).

> 15. van der Hoek L, Pyrc K, Jebbink MF, et al. Identification of a new human coronavirus [published online ahead of print March 21, 2004]. *Nat Med*. 2004;10(4):368-373. doi:10.1038.nm1024.

Example 16 is for an article not yet published in print and example 17 is for the reference once it has been published in print. Note: The title, byline, or other components may have changed slightly between online-only and print publication.

> 16. Cannon CP, Braunwald E, McCabe CH, et al; Pravastatin or Atorvastatin Evaluation and Infection Therapy—Thrombolysis in Myocardial Infarction 22 Investigators. Comparison of intensive and moderate lipid lowering with statins after acute coronary syndromes [published online ahead of print March 8, 2004]. *N Engl J Med*. doi:10.1056/NEJMoa040583.

> 17. Cannon CP, Braunwald E, McCabe CH, et al; Pravastatin or Atorvastatin Evaluation and Infection Therapy—Thrombolysis in Myocardial Infarction 22 Investigators. Intensive vs moderate lipid lowering with statins after acute coronary syndromes [published online ahead of print March 8, 2004]. *N Engl J Med*. 2004;350(15):1495-1504. doi:10.1056/NEJMoa040583.

Some journals allow the reader to submit an immediate online response to articles (eg, *BMJ*'s Rapid Responses and *Pediatrics*' Post-publication Peer Reviews [P3R]).

Examples of these are below:

18. Deutsch J. Less is better [Rapid Response]. *BMJ*. http://bmj.bmjjournals .com/cgi/eletters/328/7438/0-g#51798. Published February 27, 2004. Accessed April 30, 2004.

19. Molloy EJ, Nigro K, Sandhaus L, Watson RWG, Walsh MC. Labor and stress at delivery are confounders in the evaluation of neonatal sepsis [Postpublication Peer Review]. *Pediatrics*. 2004;113(5):1173. http://pediatrics .aappublications.org/cgi/eletters/113/1173. Published May 28, 2004. Accessed June 2, 2004.

Updated and expanded chapter on ethical and legal considerations. Read excerpts from the sections on authorship, scientific misconduct, conflicts of interest, intellectual property, editorial freedom and integrity, and advertisements, advertorials, sponsorship, supplements, reprints, and e-prints.

5.1.1 Authorship: Definition, Criteria, Contributions, and Requirements. Authorship offers significant professional and personal rewards, but these rewards are accompanied by substantial responsibility. During the 1980s, biomedical editors began requiring contributors to meet specific criteria for authorship. These criteria were first developed for medical journals under the initiative of Edward J. Huth, MD,[3] then editor of the *Annals of Internal Medicine*, who cited Hewitt's[2] work during discussions at the 1984 meeting of the International Committee of Medical Journal Editors (ICMJE). The ICMJE guidelines were first published in 1985[4] and are now part of the Uniform Requirements for Manuscripts Submitted to Biomedical Journals[5] (see also 2.0, Manuscript Preparation). These guidelines are reviewed, revised, and updated regularly, and numerous biomedical journals use them as the foundation for policies and procedures on authorship.

5.4 Scientific Misconduct. In scientific publication, the phrase *scientific misconduct* (specifically termed *research misconduct* by US government regulations and commonly known as *fraud*) has both ethical and legal connotations for authors and editors. A few studies (with limited methodologies) have estimated the prevalence of scientists who have participated in scientific misconduct to range from 1% to 2%.[2-4] In a 2002 survey[5] of a random sample of scientists funded by the US National Institutes of Health, 3247 participating scientists reported engaging in a number of unethical behaviors, including falsifying research data (0.3%), using another's ideas without permission or credit (1.4%), and inadequate record keeping related to research projects (27.5%). Although inadequate record keeping is not a form of misconduct in itself, it could permit misconduct to occur and make investigations of misconduct difficult to conduct. Legal determinations of scientific misconduct in biomedical publication are uncommon, although, when discovered, such misconduct results in serious questions about the validity of scientific research and the credibility of authors

and journals. Proven cases of misconduct in the published literature as well as allegations and concerns that do not result in an official finding of misconduct raise important ethical questions and impose duties on authors and editors to protect and correct the literature.

Over the years, various definitions of scientific misconduct have been suggested by US government agencies and academic institutions, especially after highly publicized incidents of fraudulent research in the United States in the mid-1970s and early 1980s.[6-8] In 1989, the US Public Health Service released the following definition of scientific misconduct: ''fabrication, falsification, plagiarism, or other practices that seriously deviate from those that are commonly accepted within the scientific community for proposing, conducting, or reporting research.''[9] This definition was considered a practical tool for recognizing and dealing with allegations of scientific misconduct during the manuscript submission, review, and publication processes.[10] However, controversy grew over various interpretations of the definition (eg, how narrow or broad should the definition be? does the definition address intent or levels of seriousness of offense? can the definition stand up in court? can the definition serve multiple sciences?).

In the wake of this controversy, the US Public Health Service appointed a Commission on Research Integrity in 1993. One of the charges of the commission was to develop a better definition of scientific misconduct. In 1995, the commission released a detailed report that included a recommendation that the definition be amended to include offenses that constitute research misconduct: misappropriation, interference, and misrepresentation.[11] This definition replaced the word *plagiarism* with the broader term *misappropriation*; replaced the words *fabrication* and *falsification* with the term *misrepresentation*; and added the term *interference* to address instances ''in which a person's research is seriously compromised by the intentional and unauthorized taking, sequestering, or damaging of property he or she used in the conduct of research.''[11] In this context, *property* included apparatus, reagents, biologic materials, writings, data, and software.

The commission's definition was not adopted by the US Public Health Service for many reasons, including protests from scientists and some science groups to which the government responded that it wanted a definition that would work for all governmental departments (eg, both the US Public Health Service and the National Science Foundation, which at the time had different definitions).[10,12] In 1996, the National Science and Technology Council, a unit within the Office of Science and Technology Policy responsible for coordinating policy among multiple government research agencies, drafted a common definition, which, after review and comment, was approved and released in 2000.[13] This definition no longer contained a category of misconduct in the original 1989 definition: ''other practices that seriously deviate from those that are commonly accepted within the scientific community for proposing, conducting, or reporting research.''

The revised common definition was reviewed again in 2004 and reissued without substantial change in 2005 by the US Department of Health and Human Services (DHHS) (although there were other changes to correct errors and improve clarity in the overall policy).[14]

The current common definition of research misconduct from the DHHS follows[14]:

Research misconduct is defined as fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results.

Fabrication is making up data or results and recording or reporting them.

Falsification is manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.

Plagiarism is the appropriation of another person's ideas, processes, results, or words without giving appropriate credit.

Research misconduct does not include honest error or differences of opinion. A finding of research misconduct requires that:

- there be a significant departure from accepted practices of the relevant research community; and
- the misconduct be committed intentionally, or knowingly, or recklessly; and
- the allegation be proven by a preponderance of evidence.

None of the definitions of scientific misconduct include honest error or differences in interpretation. Nor do they include or pertain to violations of human or animal experimentation requirements (5.8, Protecting Research Participants' and Patients' Rights in Scientific Publication), financial mismanagement/misconduct, or other acts covered by existing laws, such as sexual harassment, copyright, confidentiality, libel (see 5.6.3, Intellectual Property: Ownership, Access, Rights, and Management, Copyright: Definition, History, and Current Law; 5.7, Confidentiality; and 5.9, Defamation, Libel), or other concerns, such as authorship disputes, duplicate publication, self-plagiarism without indication of one's previous work, or conflicts of interest.[4-6] (See 5.1, Authorship Responsibility; 5.3, Duplicate Publication; and 5.5, Conflicts of Interest.)

The DHHS common definition of research misconduct is intended to apply to US government–funded research, and academic and research institutions that accept government funding must comply with the definition and associated regulations. However, this definition and associated regulations have become de facto rules for US academic and other research institutions and are applied to any work done by their employees or under their aegis regardless of the source of funding. These institutions often have other rules that cover ''other practices that seriously deviate from those that are commonly accepted within the scientific community for proposing, conducting, or reporting research.''[9]

5.5 Conflicts of Interest. A conflict of interest occurs when an individual's objectivity is potentially, but not necessarily, compromised by a desire for prominence, professional

advancement, financial gain, or a successful outcome. Conflicts of interest that arise from personal or financial relationships, academic competition, and intellectual passion are not uncommon in science. In biomedical publication, a conflict of interest may exist when an author (or the author's institution, employer, or funder) has financial or other relationships that could influence (or bias) the author's decisions, work, or manuscript.[2-4] However, much concern has been directed toward the financial interests of researchers and authors, perhaps because such interests are the easiest to measure, and because of the complex relationships between them and the funders of their work.[5-11] In addition, concerns have increased about author biases associated with financial ties to industry[6] and pressures from commercial funders that result in delayed or suppressed publication.[5,10]

Journal editors strive to ensure that information published in their journals is as balanced, objective, and evidence-based as possible. Because of the difficulty in distinguishing the difference between an actual conflict of interest and a perceived conflict,[12] many biomedical journals require authors to disclose all relevant, potential conflicts of interest.[2-4] Financial interests may include but are not limited to employment, consultancies, stock ownership, honoraria, expert testimony, royalties, patents (filed, pending, or registered), grants, and material or financial support from industry, government, or private agencies. Nonfinancial interests include personal or professional relationships, affiliations, knowledge, or beliefs that might affect objectivity.

Many potential biases may be detected during the editorial assessment and peer review of a manuscript (eg, problems with a study's methods and analysis, inappropriate interpretation of results, unbalanced selection or citation of the literature, unjustified emphasis or overly enthusiastic language, and conclusions that go beyond a study's results) or are obvious from the author's affiliation or area of expertise. However, financially motivated biases are less easily detected. Therefore, in the 1980s biomedical journals began to require authors to disclose any financial interests in the subject of their manuscript.[13,14] During the next 20 years, authors typically included information about financial support from grant and funding agencies in their submitted manuscripts, primarily because the funding agencies require them to do so, but it was less common for authors to disclose other financial interests, unless such information had been specifically requested.

Until recently, many journals did not have conflict of interest policies. A 1997 study of 1396 high-impact biomedical and science journals identified only 181 journals (13%) with conflict of interest policies; those journals with policies were overrepresented by medical journals.[15] A study conducted in 2005 of the 7 highest-impact, peer-reviewed journals in 12 different scientific disciplines showed a higher prevalence of journals that reported having conflict of interest policies (80%), although only 33% made these policies publicly available (eg, in their instructions for authors). All of the top-ranked general medical and multidisciplinary science journals had such policies, but journals in other scientific disciplines were less likely to have such policies and/or to publish them in their instructions for authors.[16]

Many biomedical journals, including *JAMA* and the *Archives* Journals, require disclosure of financial interest from everyone involved in the editorial process: authors, reviewers, editorial board members, and editors. The International Committee of Medical Journal Editors (ICMJE),[2] the Council of Science Editors (CSE),[17] and the

World Association of Medical Editors (WAME)[18] support this policy. Many journals also require individuals (such as editorial and publishing employees and full-time and part-time editors) who have access to material during the review and publication processes to comply with policies on conflicts of interest. The CSE has a framework (recommendations and a list of questions) to help journals develop and review current policies on conflicts of interest.[19]

Different journals and publishers have various conflict of interest policies and procedures (eg, some request disclosures, some require disclosures, and some exclude authors, reviewers, and editors with conflicts of interest from participation in the publication process).[16] Journals also define *relevant* conflicts of interest in different terms; they may have a broad interpretation of conflicts of interest to include financial and nonfinancial conflicts or may focus only on financial interests, and for financial interests, they may define relevance in terms of monetary amounts or lengths of time. The following discussion addresses policies in general as recommended by the ICMJE,[2] CSE,[17] and WAME[18] and provides specific examples of policies, procedures, and terms as used by *JAMA* and the *Archives* Journals.

5.6 Intellectual Property: Ownership, Access, Rights, and Management. *Intellectual property* is a legal term for that which results from the creative efforts of the mind (intellectual) and that which can be owned, possessed, and subject to competing claims (property).[2] Three legal doctrines governing intellectual property are relevant for authors, editors, and publishers in biomedical publishing: copyright (the law protecting authorship and publication), patent (the law protecting invention and technology), and trademark (the law protecting words and symbols used to identify goods and services in the marketplace).[1] This section focuses primarily on intellectual property and copyright law.

5.6.2 Open-Access Publication and Scientific Journals. The open-access movement began in the late 1990s following the proliferation of online journals available via the Internet (versions of print journals and journals published only online), the inability of declining library budgets to keep pace with increases in the numbers of journals and rising subscription prices, and demands to reduce the information gap between developed and developing countries.[22-25] Broadly defined, *open access* is the free and unrestricted online availability of content. (In the context of biomedical publication, this refers primarily to research articles.) Strictly applied, open-access publishing means that users can freely read, download, copy, distribute, print, search, or link to full text of articles provided that authors are properly acknowledged and cited.[26] There are 2 types of open access: self-archiving and open-access publishing.

Self-archiving is the deposition of content in an open archive, sometimes before formal publication. Archives may be subject based, such as the physics preprint ArXiv, which was launched in 1991, or PubMedCentral, which focuses on biomedical and life sciences. In addition, a growing number of institutions, such as universities, have archives or institutional repositories. The Massachusetts Institute of Technology's DSpace and the University of California's eScholarship Repository are among

the first and best-known examples of such archiving initiatives. Concerns have been expressed that self-archiving may pose problems for version and quality control (eg, users may not understand the difference between an article that has not undergone peer review, revision, and editing and one that has undergone such measures to improve quality) and that usage of self-archived versions of articles will result in declining use of published versions of articles and journals, or even the demise of journals.[27-29]

In *open-access publishing*, all or part of a journal is freely open to unrestricted use. The funding model for open-access publishing requires author, institution, or funding agency payments, and/or a subsidy from the owner or publisher, and/or external grants. This is commonly referred to as an ''author pays'' publishing model (or ''funder pays'' in the event the research funder sets aside monies explicitly for such use). This financial model differs from the traditional journal publishing model, in which publication and sustainability of the publishing enterprise are based on revenue from paid subscriptions, advertising, licensing, royalties, reprints, and other forms of revenue.

Although a few journals were published in an open-access model before the 1990s, the majority began publication under that model after the year 2000, when BioMed Central launched a series of open-access journals that were peer reviewed but did not undergo editorial revision and editing.[23] In 2006, BioMed Central journals' article processing fees charged to authors ranged from $615 to $1775 per published article.[30] In addition, individual organizations, such as universities, may purchase a membership at a significantly greater collective fee, allowing their author-employees or affiliated authors to publish in BioMed Central journals without having to pay the initial author publication fees.

In 2003, the Public Library of Science (PLoS) launched its first in a series of open-access journals with an initial $9 million grant from the Moore Foundation.[31] The PLoS journals are peer reviewed and do provide editorial revision and editing. In addition to grants, journal operations are funded by an author-pays model: in 2003 the author fee was $1500 to publish an article; in 2006 the fee was raised to $2500. Other journals experimenting with author-pay models had publication or processing fees that ranged from $500 to $3500 in 2006, with most ranging from $2000 to $3000.[29] According to the Lund University Directory of Open Access Journals, in 2006 there were 2345 strictly interpreted open-access, peer-reviewed scientific and scholarly journals; 326 of these were health science journals, including 206 in medicine.[32]

Supporters of complete open-access publishing cite the benefits of widespread dissemination of research: universal access, enhanced global collaboration, improved visibility of researchers' work, and the belief that open-access articles will be cited more frequently than restricted-access articles.[26,31,33-35] Opponents express concern about the quality of literature published in a system that may favor those who pay, fairness of the author-pays model for researchers with limited funds (eg, those in developing countries or who lack access to funding from government agencies or industry), and the risks to the financial stability of journals with business models based on more diversified, traditional sources of revenue and to their owners.[27-29]

Coupled with the open-access movement in 2005, funding agencies (eg, NIH and the Wellcome Trust) began requesting or requiring funded investigators to

permit articles describing results of their funded research to be posted on publicly accessible archives (such as PubMedCentral) in 2005.[34,35] Negotiations between these agencies and publishers resulted in another form of open access: delayed open access. In this model, which has been in wide use by scientific and biomedical publishers (especially those owned by not-for-profit professional societies) for several years, content is made freely available after a defined interval of time, such as 6 months, 1 year, or 2 years. The interval, which may be influenced by the frequency of journal publication, is intended to protect subscription, licensing, advertising, and other traditional forms of journal revenue.

A number of journals are experimenting with types of open access (eg, permitting self-archiving on authors' individual or institutional archives, open access for only some content, delayed open access, open access if author pays publication or processing fees, or giving authors a choice of free delayed access or immediate access if they choose to pay a publication fee). Open-access publishing models are evolving, and debate continues over which models might be sustainable in the long term. Each model has advantages and disadvantages. A combination of models may be the most appropriate for journals seeking to balance the advantages of open access with the financial requirements of sustainable publication and ongoing maintenance of a journal's Web site.

In addition, journals are developing and experimenting with different publication licenses in lieu of standard copyright transfers to permit various access and usage rights. According to the Association of Learned and Professional Scholarly Publishers (ALPSP), 61% of surveyed publishers required authors to transfer copyright for publication in 2005 (down from 81% in 2003); 17% required a publication license from authors; 21% initially requested copyright transfer but accepted a license; and 3% did not require any formal agreement.[36] (See also 5.6.5, Copyright Assignment or License.)

5.10 Editorial Freedom and Integrity. *Editorial freedom* implies a range of independence, from complete absence of external restraint and coercion to merely a sense of not being unduly hampered or frustrated.[2] *Integrity* is the state of honesty, credibility, incorruptibility, and accountability.[2] A biomedical journal has editorial integrity if it adheres to these values, but different journals have different levels of editorial freedom. The First Amendment of the US Constitution affirms several freedoms, including the freedom of the press.[3] Thus, communication through the US press or other media is a right that should not be interfered with by the government, other institutions, or individuals.[4] Many countries guarantee similar freedoms of the press.[5] Freedom of the press is a foundation for editorial independence, ''which is the distinct right of the editor to publish any material that passes defined criteria for quality and that fits within the mission of the publication, without suffering undue interference from others.''[6]

A journal's editorial independence must be balanced against the need for appropriate authority, responsibility, and accountability as well as trust between the editor and the journal's many stakeholders: readers, authors, reviewers, publishers, owners, subscribers, advertisers, and others[6] (see also 5.11, Editorial Responsibilities,

Roles, Procedures, and Policies). The level of editorial freedom differs among different biomedical journals, from maximum independence for those peer-reviewed journals in which the editor has complete authority and responsibility for the journal, its content (including all editorial and advertising content), reuse of its content, and use of the journal name/logo, to no independence for those journals that are not peer reviewed and in which all authority and responsibility rests completely with others (eg, publishers or owners). Journals that are published primarily to serve business, political, or other concerns of their owners are known as ''house organs.''[2] For some biomedical journals and editors, the level of editorial freedom may be best described as somewhere between complete editorial independence and no independence. Furthermore, editorial freedom may be assumed to exist by an editor, and the journal's readers, until and unless a major conflict occurs. A 1999 survey of the editors of 33 peer-reviewed medical journals owned by professional societies (10 journals represented in the International Committee of Medical Journal Editors and a random sample of 23 specialty journals with high impact factors) found that 23 (70%) of the 33 editors reported that they had complete editorial freedom, and the remainder reported that they had a high level of freedom.[7] However, many of these editors reported having received at least some pressure in recent years over editorial content from the professional society's leadership (42%), senior staff (30%), or rank-and-file members (39%).[7]

There are numerous examples of editors and journals battling incursions from interpersonal, social, political, and economic forces. Editors have been dismissed from their posts and journals have ceased publication after a mere ''stroke of the editorial pen.''[8] In one case, the *Irish Medical Journal* was voted out of existence in 1987 after the editor published an editorial against physician strikes that angered some influential members of the Irish Medical Organisation.[8,9]

During the last 10 years, editors of several leading general medical journals have been unwillingly removed from their positions after publishing articles that were considered inappropriate by various external forces (eg, owners, publishers) and for having disagreements with owners or publishers about the editor's level of autonomy and authority over the journal's content and the journal's name and brand (eg, logo).[10-26] In each of these cases, long-term struggles between the editors and the owners of the journals resulted in loss of trust between the parties, and because of a lack of effective protective oversight and governance and apparent lack of an effective system for conflict resolution, precipitate decisions to remove the editors resulted in widespread criticism of the owners and threats to the integrity and continued existence of the journals. (See 5.10.1, Maintaining Editorial Freedom: Cases of Editorial Interference and the Rationale for Mission, Trust, and Effective Oversight and Governance.)

An earlier example of a medical editor credited for his struggles to maintain editorial freedom is Hugh Clegg, editor of the *BMJ* from 1944 to 1965. In 1956, Clegg wrote an unsigned editorial entitled ''The Gold-headed Cane,'' in which he castigated the president of the Royal College of Physicians for taking office for the seventh successive year. He also admonished the college for its failure to recognize the modern welfare state and its lack of attention to postgraduate medical education.[4,27] With much difficulty, Clegg kept his editorial position and freedom and purposely

published a reply from the president that rebutted all of Clegg's criticisms. Clegg believed that medical editors are the protectors of the conscience of the profession, and he is well known for his assertion that editors who maintain this ideal will often find themselves in trouble. This trouble may come in the form of incursions into editorial freedom, which editors must be able to defend.

Editors of biomedical journals that have editorial freedom must have complete authority for determining all editorial content of their publications.[6,28-33] (Note: Unless otherwise dictated by a journal's specific mission, this may not be the case for journals that are house organs or that have minimal editorial freedom.) While many stakeholders may offer useful input and advice, editorial decisions must be free from restraint or interference from the publication's owner, publisher, advertisers, sponsors, subscribers, authors, editorial board or publication committee members, reviewers, and readers. Owners, publishers, boards, and publication committees may have the right to select, hire, evaluate, and dismiss the editor, but they should not interfere with day-to-day editorial decisions and policies.[6,15,29,30,33]

Without a clear delineation of editorial freedom and the authority to maintain it, an editor might not be able to ensure the integrity of the publication. Thus, owners, publishers, and editors must have a clear and mutually understood definition of the editor's level of editorial freedom, authority, responsibility, and accountability.[6,30] Editors of journals with complete editorial freedom should not comply with external pressure from any party—including owners, publishers, advertisers, sponsors, authors, reviewers, and readers—that may compromise their autonomy or their journal's integrity.[29,30] Examples of such inappropriate pressures include, but are not limited to, the following:

- Pressure from an owner or a politically powerful or motivated individual or group on the editor to avoid publishing certain types of articles or to publish a specific article
- Pressure or requirement of an editor by a publisher or owner to modify or suppress specific content before publication
- Demand from an owner or publisher to censor or remove published content deemed controversial or contrary to the owner's position or that of an another organization or entity allied with owner
- Demand from an owner or publisher or external person or organization to have access to confidential editorial or peer review records (see also 5.7.1, Confidentiality, Confidentiality During Editorial Evaluation and Peer Review and After Publication)
- Demand from an author or group of authors to bypass the journal's standard editorial and peer review processes and publish their manuscript without review or revision (eg, a society demanding acceptance and publication without review or revision of its meeting abstracts, proceedings, or papers)
- Attempt by an author or peer reviewer to have an editorial decision reversed by threatening the journal's editor or owner
- The use or repurposing of the journal's content or name by the publisher without the editor's consent or in a manner that could harm the journal's integrity
- Request by an advertiser to insert an advertisement next to an article about or related to the advertised product or a threat to withdraw advertising support because of publication of a specific article (see also 5.12, Advertisements, Advertorials,

and Sponsored Supplements)

- An advertiser or publisher's attempt to publish an advertisement or sponsored content disguised as editorial content (advertorial) (see also 5.12, Advertisements, Advertorials, Sponsorship, Supplements, Reprints, and E-prints)
- A publisher demanding information about accepted or pending editorial content in advance of publication to sell that information to advertisers/sponsors or for other commercial purposes
- A sponsor attempting to exert influence over editorial decisions or selecting specific content for publication (eg, sponsored supplements) (see also 5.12, Advertisements, Advertorials, Sponsorship, Supplements, Reprints, and E-prints)
- A publisher demanding publication of an advertisement that the editor deems inappropriate (see 5.12, Advertisements, Advertorials, Sponsorship, Supplements, Reprints, and E-prints)
- Request from a company to an editor to purchase reprints of an article under consideration but not yet accepted for publication
- Demands by a commercial entity or governmental agency to publish or censor specific content
- Compliance with governmental or other external policy to not consider manuscripts from authors based on their nationality, ethnicity, race, political beliefs, or religion (see 5.11, Editorial Responsibilities, Roles, Procedures, and Policies)
- Pressure from a news organization or journalist to publish information about a journal article before the news embargo is lifted (see also 5.13.3, Release of Information to the Public and Journal/Author Relations With the News Media, Embargo)

Editors may need to educate and remind the journal's various stakeholders about the fundamentals of editorial freedom and its direct relation to the publication's integrity.

5.11 Editorial Responsibilities, Roles, Procedures, and Policies. Coupled with the autonomy and authority that come with editorial freedom are responsibility and accountability (see also 5.10, Editorial Freedom and Integrity).[2-5] Editors are responsible for determining the journal's content, ensuring the quality of the journal, directing editorial staff and board members, developing and maintaining procedures, and creating and enforcing policies that allow the publication to meet its mission and goals effectively, efficiently, and ethically and in a fiscally responsible manner.[2-7] This section focuses primarily on decision-making editors (ie, editors in chief and other editors, such as deputy, associate, assistant, contributing, section, and guest editors) who make decisions to review, reject, request revision of, and accept content for publication.

5.12 Advertisements, Advertorials, Sponsorship, Supplements, Reprints, and E-prints. Commercial activities, such as advertising, sponsorship, reprints, and e-prints provide a major source of revenue for many scientific publications. With this revenue, publications can offset some of the costs of journal operations, production,

and distribution; may be able to set lower subscription rates than would otherwise be possible; and can serve as a source of income for the journal's owner. Thus, editors and readers often consider advertising an unfortunate necessity. A cynic might say that generating revenue is the ultimate goal of advertisers, publishers, and editors—advertisers want to sell more products, publishers want to increase journal revenue, and editors want their journals to remain financially viable and sustainable. However, editors have a larger ethical responsibility to their readers, who must be able to rely on the editor to ensure that the journal's integrity remains intact and that the information contained in the publication is valid and objective. This includes ensuring that advertising does not influence editorial decisions or content and having policies and procedures in place that prevent such influence.

Thus, editors should have ultimate responsibility for all content published in their journals, including advertisements and sponsored content (see also 5.10, Editorial Freedom and Integrity, and 5.11, Editorial Responsibilities, Roles, Procedures, and Policies). The International Committee of Medical Journal Editors (ICMJE) recommends that editors ''have full and final authority for approving advertisements and enforcing advertising policy.''[2] The American Society of Magazine Editors (ASME) recommends that ''every effort must be made to show all advertising pages, sections and their placement to the editor far enough in advance to allow for necessary changes'' and to permit the editor to monitor compliance with advertising guidelines.[3] However, some editors may not be able to review and approve specific ads because of limited resources (personnel and time). Nevertheless, all editors should be involved in the development, enforcement, and evaluation of formal advertising policies for print and online versions of their journals. For example, principles for advertising in print and online are developed jointly by editorial and publishing staff for *JAMA* and the *Archives* Journals.[4] These principles are used by both publishing and editorial staff to determine the suitability of advertising. Although editorial and publishing staff regularly review and discuss these policies and their applicability in specific situations, the *JAMA* and *Archives* Journals editor in chief has final authority over all advertisements.

According to the ICMJE, advertising must not be allowed to influence editorial decisions.[2] All editorial decisions must be based solely on the quality and suitability of the editorial content and should not be influenced by potential revenue, or loss of revenue, from advertising, sponsorship, sales of reprints/e-prints, or related commercial activities, or the influence of ad sales and marketing representatives. This policy is also supported by the World Association of Medical Editors[5] and the UK Committee on Publication Ethics.[6] Complete separation of the roles and functions that determine editorial decisions and advertising sales is critical. Thus, editorial staff must not be involved in the promotion or sale of any advertisements, and the publishing staff who sell ads and sponsorship (including reprints) should not be permitted access to editorial content until it is published. Editors should have policies and procedures in place to address reader and online user complaints, assessment of such complaints, and appropriate remedy or action. The ICMJE recommends that editors consider publishing letters that raise important concerns about advertising content, in the same way that they publish critical letters about articles,[2] including asking the advertiser to submit a reply.

Many new entries. View 5 samples.

11.1 Correct and Preferred Usage of Common Words and Phrases

cadaver, donor: When describing the source of human organs and tissues used for transplantation, avoid *cadaver* (or *dead body*). Correct usage is *deceased donor* (or *recovered from deceased organ and tissue donors*).

When referring to a deceased person whose body is to be used for anatomical dissection, *cadaver* is correct (*cadaveric* as adjective).

chief complaint, chief concern: *Chief complaint* has been traditionally used by physicians when taking a patient's history. However, *chief concern* may be a better description because *complaint* may be construed as pejorative and confrontational.

glycated hemoglobin, glycosylated hemoglobin: The preferred term is *glycated hemoglobin*. *Glycohemoglobin* is also acceptable[13] (David E. Bruns, MD, e-mail communication, May 17, 2006). See also 15.10.2, Nomenclature, Molecular Medicine, Molecular Terms: Considerations and Examples.

impaired, intoxicated: These related terms are used in the United States to define impairment in driving performance attributable to the use of alcohol or other drugs. For instance, in some jurisdictions, a blood or breath ethanol concentration of 0.08 g/dL is considered to be legal evidence of impairment for driving. By extension, some injury prevention researchers have considered this concentration of alcohol to be scientific evidence of impairment in other potentially hazardous activities. However, cognitive and other functions may be impaired at even lower concentrations of alcohol, particularly if other psychoactive drugs, including prescription drugs, have been taken. No specific blood or breath concentration of alcohol may be considered to be scientific evidence of intoxication or impairment for all persons in all settings and activities. Authors should explain, justify, and define the use of these terms, preferably in the ''Methods'' section of the manuscript.

survivor, victim: In scientific publications, use of the word *victim*—when describing persons who survive physical, domestic, sexual, or psychological violence or a natural disaster—should be avoided. Similarly, avoid labeling (and thus equating) people with a disability or disease as victims (eg, AIDS victim, stroke victim; see 11.10.4, Inclusive Language, Disabilities).

Victim may imply a state of helplessness.[16] Characterizing a person who has experienced abuse or other violence as a victim perpetuates the stereotype of a passive person who cannot recover from the effects of the malady. In such cases *survivor* may be more appropriate (eg, rape survivor, tsunami survivor, survivor of torture).

If a person who experienced such trauma has died, referring to him or her as *victim* may be appropriate (victim of a land mine explosion). *Victim* may also be

used in the vernacular (victim of his own success).

Completely updated and expanded Nomenclature section. Read the introduction to this chapter.

15 Nomenclature

This chapter is devoted to nomenclature: systematically formulated names for specific entities.

Biological nomenclature dates back at least to the 18th century. Since the mid-20th century, many biomedical disciplines have established committees to develop and promulgate official systems of nomenclature.

Accelerating knowledge, particularly from molecular biology, necessitated the official biomedical nomenclature systems, sometimes with dramatic results. For instance, a single coagulation factor had been referred to by 14 different names.[4] An investigator deemed the official coagulation nomenclature ''one of the most significant, even if only semantic, recent advances in the field.''[5(p16)] The results, probably true in other disciplines as well, were that an ''impenetrable confusion was cleared away, apparent disagreements were often shown to be conflicts of terminology, not of fact, and a much freer exchange of information was made possible.''[5(p16)]

In microbiology, with publication of the approved list of bacterial names in 1980, the number of names of bacteria decreased by an order of magnitude, from around 30 000 to around 2000[6,7] (now nearly 7500[8]). The CD (clusters of differentiation) nomenclature is thought to have prevented mistakes in laboratory and clinical research.[9]

Those are some indications of the compelling need for systematic nomenclature, which requires the ongoing work of international groups. The development of nomenclature, however, faces challenges besides multiplicity of names. There is tradition—''the ruins of previous systems''[10(p7)]—which investigators are often reluctant to give up. When disciplines converge—for instance, when the genetics of a physiologic system are delineated—preexisting systems of nomenclature may operate in parallel, and names proliferate.[11] For instance, concerning the homologous human HLA and mouse H-2 tissue antigen systems, it has been observed:

> The situation is perhaps similar to what one might have encountered in the field of immunoglobulins had researchers working with immunoglobulins in different species not realized relatively early that the classes of heavy chains and light chains they were working with were homologous and been willing to adopt a common nomenclature. We might then have separate names in each species for IgM, IgG, IgA, kappa, lambda, and so on.[12(p578)]

A system of nomenclature may face the test of sheer numbers. The count of assigned gene symbols has increased from several hundred[13,14] to more than 23 000,[15] with more than 25 000 human genes anticipated.[16,17] The system was devised with a foresight that has allowed transition from typescript to print to online database.[18-20]

Another challenge is to remain flexible. Those who deal with nomenclature accept it as a construct[21-24] and have noted the need to reflect new knowledge.[22,25] Biomedical classification is arbitrary and ''artificial,'' created by humans.[26,27] Nomenclature needs to ''evolve with new technology rather than be restrictive as sometimes occurs when historical . . . systems are applied.''[28(p12)]

Such flexibility, however, places a burden on clinicians, who must replace familiar names with new ones.[29] Often, ''colorful or descriptive names,''[9(p1245)] which are more easily retained,[30] give way to more efficient terms, such as the alphanumeric epithets of many systems.

Nomenclature systems may differ markedly in approach. Stability is an overriding principle of the codes of taxonomic nomenclature, which avoid name changes.[31] For instance, the bacteriologic code has a provision that a name may be rejected ''whose application is likely to lead to accidents endangering health or life or both or of serious economic consequences.''[32(p43)] For example, the name *Yersinia pseudotuberculosis* subsp *pestis* for the plague bacillus was rejected and the name *Yersinia pestis* retained[32,33] because of concerns about public health hazards (owing to confusion of the name of the plague bacillus with that of the less virulent *Yersinia pseudotuberculosis*[34,35]). In contrast, currency is an overriding principle of the official human gene nomenclature, with genes renamed to reflect new knowledge. (Of the approximately 260 gene symbols in the first Catalog of Gene Markers following introduction of the current system of gene nomenclature, more than half have been renamed.[14,36]) Yet the principles of stability and currency are not mutually exclusive; for instance, the bacteriologic code requires name changes necessitated by revisions of taxonomy, and the human gene nomenclature acknowledges former names and aliases.

Nomenclature is ''the means of channelling the outputs of systematic research for general consumption''[37] and aims for international scope (''. . . Science should unite Nations . . . '' ''[38[p10]]). Giangrande[39(p710)] writes that international nomenclature efforts in coagulation ''provide[d] an outstanding early example of international collaboration to resolve a scientific problem. This sort of co-operation is now commonplace, but was certainly not typical in [the post–World War II] period.'' To facilitate worldwide access to the latest terms, large computerized databases have been created. But computerized databases require consistent use of nomenclature.[11] Unique identifiers provide a home base for terms in large databases but are not practical for referring to entities throughout published articles and textbooks[40]—hence, names.

Our purpose in the nomenclature chapter is to explain not how names should be devised (although we cite the sources of such rules) but rather which names should be used and how they should be styled. Official systems of nomenclature are not universally observed to the letter (literally or figuratively), but style that is consistent with official guidelines and within publications reduces ambiguity. Editors have the task of mediating between official systems and authors' actual usage. To that end, the goals of this chapter are to present style for terms and to explain terms in hopes that they are more easily dealt with.

In medical nomenclature the stylistic trend has been toward typographic simplicity, driven by computers. Terms lose hyphens, superscripts, subscripts, and spaces. However, such features have not been eliminated completely, either within or

beyond these pages. In 1950 standardized terms in pulmonary-respiratory medicine and physiology were put forth, and typographic features impossible on a typewriter were expressly retained, seen as indispensable components of a systematic and enlightening nomenclature.[25] Computers are increasingly capable of generating unusual characters, and typographic simplification and electronic sophistication may cross paths before medical nomenclature loses its last defining flourishes.

An umbrella resource for biomedical terminology is the Unified Medical Language System (UMLS), a project of the National Library of Medicine. The UMLS is intended to provide integrated terminology (including synonyms and relationships among terms) for use in electronic applications, ie, computer systems.[41,42] A major component of the UMLS is the Metathesaurus, a comprehensive repository of biomedical terms and their relationships. The Metathesaurus is accessible online at the UMLS Knowledge Source Server, http://umlsks.nlm.nih.gov. (Complimentary registration is required.) That site offers concept and term searches that can be useful to medical authors and editors seeking explanations of particular terms, including their relationships to other terms (eg, human gene, protein, condition, and animal counterparts).[42]

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