Reference management: A critical element of scientific writing

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Abstract

With the rapid growth of medical science, the number of scientific writing contributing to medical literature has increased significantly in recent years. Owing to considerable variation of formatting in different citation styles, strict adherence to the accurate referencing manually is labor intensive and challenging. However, the introduction of referencing tools has decreased the complexity to a great extent. These software have advanced overtime to include newer features to support effective reference management. Since scientific writing is an essential component of medical curriculum, it is imperative for medical graduates to understand various referencing systems to effectively make use of these tools in their dissertations and future researches.

Key words: Citation manager, reference management, referencing tools

INTRODUCTION

Scientific writing is an essential component of research. In recent years, the pace of communicating research, in terms of journal articles, books, thesis, and conference papers, has increased exponentially with rapid advancements in medicine and technology. These research outputs are often considered as indicators of academic development and a basis for faculty appraisal as well as students evaluation. The concept of academic writing has long been introduced in the medical curriculum. Thesis/dissertation is an imperative requirement for medical graduation degrees worldwide. Referencing and bibliography are critical elements of any research paper. In this review, an attempt was made to illustrate the essential features, advantages, and limitations of popular referencing tools that would be beneficial for medical students and scholars in their research endeavor and academic development.

PURPOSE OF REFERENCING

Referencing is a scientific approach to delineate a data source by providing a standard set of information, allowing its easy identification, searchability, and retrieval. While referencing includes only the sources of information referred in the research paper, bibliography provides a list of relevant sources, irrespective of whether they were cited or not. In-text citations are used to validate authors’ statements and to establish the relationship between several studies; enabling readers to compare and contrast their results. Among the numerous scholarly referencing styles, Vancouver, APA, and Harvard styles are most commonly used in medical literature. These are based on either author-date format (APA and Harvard styles) or numbered format (Vancouver style). Although various referencing styles differ in their representation, they provide the same information and serve the same purpose.

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REFERENCE MANAGEMENT – PROBLEMS AND SOLUTIONS

The major limitations of referencing are associated with the diversity of reference categories, data fields, and formatting styles. A large array of materials, i.e., journal articles, entire books, book sections, conference proceedings, and papers, dissertations and theses, patents, newspaper articles, legal documents, letters, and other personal communications, unpublished manuscripts, electronic articles, e-books, software, blogs, and web pages are considered as citable data sources, using appropriate format. However, the large number of different data fields for each of these citable materials can often result in erroneous or incomplete referencing. The punctuations, text formatting (italics, boldface, and sentence cases), standard abbreviations of author’s and journal names, reference listing order (alphabetical or numbered in the order of appearance in text), and in-text citation formats are substantially different in various citation styles. Furthermore, the in-text citation numbers are liable to change radically in case of addition or deletion of any cited material. Given the above reasons, it is often challenging to ensure correct referencing and appropriate format.

Several web-based and nonweb-based referencing tools have been developed to address these issues. These tools can help to identify and store the component data fields of a reference, so that different formatting rules can be applied to individual components to comply with various referencing styles. The ideal referencing software should support all popular operating systems, allow organization of references in groups/folders, file attachment and preview, exporting and importing of file formats, integration with popular word processors, database connectivity to facilitate literature search, and customization of reference styles. The oldest referencing software are Thomson Reuters’ Reference Manager and EndNote. Owing to their customizable design, they have been the most widely utilized desktop based referencing software. They incorporate all references and attached files into offline libraries stored in the computer. The entire library or selected references can be exported, imported, and organized effectively. In contrast, web-based tools provide an online user interface to search literature, save references, and attach files. Some referencing systems have both desktop and web components and have special features such as spell check, finding duplicate references, browser integration, capturing references directly from the webpage or PDF files, and customizing output styles. The features of various referencing tools are listed in Table 1.

Table 1: Comparison of popular referencing tools

| Developer | EndNote | Reference manager | Zotero | Mendeley | CiteULike |
|-----------|---------|-------------------|--------|----------|-----------|
| Thomson Reuters | Thomson Reuters | Roy Rosenzweig Center for History and New Media | Elsevier | Overity Limited |
| Installation | Installable PC software. EndNote Web is the web version | Installable PC software | Installable PC software with browser integration (Firefox) | Installable PC software with web component | Web-based, organize citations in online libraries |
| Availability | Commercial | Commercial | Free | Free | None |
| Supported operating systems | Windows, Mac, iOS | Windows | Windows, Mac, Linux | Windows, Mac, Linux, iOS | |
| Word processor integration | Yes | Yes | Yes | Yes | Yes |
| Connectivity to PubMed database | Yes | Yes | Yes | Yes | Yes |
| File attachment, notes, tags/keywords | Yes | Yes | Yes | Yes | Yes |
| Online storage | None | None | Yes | Yes | Yes |
| Reference tool operation overview | Citations can be imported, downloaded or manually created. These are organized in libraries and used for creating bibliographies in appropriate citation styles in word processors | Citations can be imported, downloaded or manually created. These are organized in libraries and used for creating bibliographies in appropriate citation styles in word processors | Citations are imported, downloaded, manually created or captured from website. These are organized and used for creating bibliographies in appropriate citation styles in word processors | Citations are imported, downloaded, manually created or extracted from PDF. These are organized and used for creating bibliographies in appropriate citation styles in word processors | Citations are organized in online libraries in the centrally hosted website. These can be exported to offline reference manager tools on local computers |

PC: Personal computer, iOS: iPhone operating system
LIMITATIONS OF REFERENCE MANAGEMENT TOOLS

Introduction of referencing tools have decreased the manual effort and complexity of reference management beyond doubt. However, it may also weaken the knowledge and understanding about scientific referencing owing to undue dependency on technology. The errors of referencing may be attributed to manual errors while entering citation data. In case of downloaded or captured citations, it depends on the source of the reference. The facilities such as downloading citation from journal websites and medical literature databases and capturing citation from web pages allow direct importation of references in referencing tools. However, it may not always guarantee correct referencing. The categories and data fields of a reference may not be identical and accurate in the various online sources. The referencing may be incomplete due to lack of necessary information fields.\textsuperscript{[6]} In some instances, several data fields (e.g., journal name, year, volume, issue, and page numbers) are stored in a single field. Although these references may appear accurate in default referencing style, they may not provide the correct formatting for various other styles. Although the referencing software and websites provide a wide and diverse variety of citation output styles including the most commonly used and standard styles, often it is imperative to create customized citation styles to meet the requirement for manuscript in various scientific journals. The users of referencing tools should be aware of its adversities resulting from improper application. Simultaneous use of two referencing tools in same word processor file will invariably end up in disorganized and confusing references. Likewise, duplicate references stored in different groups, group sets, or libraries which are easily overlooked, may results in the erroneous reference list and in-text citations.\textsuperscript{[3]} Although some software allow detection of duplicate entries in reference libraries, it is imperative to check the references manually for correctness.

CONCLUSION

The technology advancements in the age of internet have opened up infinite options to manage references effectively. Referencing software also evolved to add newer functions to support exporting, importing, capturing references, file attachment, database search, and creating reference output complying with various referencing styles. Updating knowledge about newer modalities to manage references has become an essential requirement for scientific writing. However, manual verification of references has not lost its relevance. It is prudent to cross-check the software generated reference list and in-text citations to prevent avoidable errors in referencing.

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Conflicts of interest
There are no conflicts of interest.

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