

Writing a Review Article: Making Sense of the Jumble

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Medicine has witnessed a tremendous growth in recent times, and there has been a rapid emergence of new scientific evidence. Simultaneously, there has been a leap in the number of scientific journals. While there were about 6000 scientific journals in 1950, these increased to 28100 scholarly peer-reviewed journals in 2012; of these nearly 30% were biomedical journals [1]. With the availability of several sources of scientific information like scientific journals, conference proceedings, open archives, eBooks, and web pages, readers now are overwhelmed with a tsunami of scientific information.

While it would be ideal to go through all the literature dealing with the topic of concern and reach our own conclusions, it is impractical and virtually impossible to do so. Moreover, with large variations in clinical practice, young clinicians are often flummoxed as to which treatment or diagnostic strategy to adopt. It is in situations like these that most clinicians would seek some reliable, state of the art, ready to refer material, and a well-written review article would certainly fit the bill.

A review article is a comprehensive, critical analysis of published (and unpublished) material on a topic. It involves judicious and conscientious organization, integration, and analysis of the available literature relating to the topic of interest, to yield a summary which will help readers find a solution to the query. It helps to translate best evidence into best clinical practice. A review article serves as a useful guide for practicing evidence-based medicine. Review articles provide a broad perspective of the problem at hand. They help to identify gaps, inconsistencies, relations and contradictions in literature related to the topic of review. They apprise the readers of the state of current research while highlighting the avenues for future research. Cutting-edge reviews help clinicians to keep abreast with the latest developments. **Box 1** summarizes the need for a review article [2-9].

NARRATIVE AND SYSTEMATIC REVIEWS

Review articles are classified as Narrative (or descriptive) and Systematic reviews. Typically, most review articles are written as narrative reviews, which are a summary of evidence derived from studies selected and interpreted according to the authors' personal review of literature. By providing comprehensive information on a topic, narrative reviews can help clinicians with even no or little knowledge of statistical methods or experimental

BOX 1 PURPOSE OF A REVIEW ARTICLE

- To aid decision-making in clinical practice eg. Diagnostic approach to primary immunodeficiency disorders [2].
- To decipher vexing problems on daily inpatient rounds eg. Small for gestational age: growth and puberty issues [3].
- To understand a sub-topic or question not part of conventional textbook eg. Massage and touch therapy in neonates: the current evidence [4].
- To summarize the enormous information available in a coherent and concise form eg. Management of chemotherapy-induced nausea and vomiting [5].
- To identify gaps in current research eg. Nutritional status of affluent Indian school children: what and how much do we know? [6]
- To identify relations, contradictions and inconsistencies in literature. eg. Treating hyperglycemia in the critically ill child: is there enough evidence? [7]
- To identify emerging therapies, disease, or diagnostic aid. eg. Propranolol therapy for infantile hemangioma [8].
- To provide a direction for future research. eg. Immune thrombocytopenic purpura: historical perspective, current status, recent advances and future directions [9].

designs to understand the cumulative scientific evidence regarding a clinical problem. Narrative review articles are particularly sought after by young researchers and students as they often provide them with not only a broad perspective of a clinical problem but also with solutions honed by years of clinical experience. However, narrative review articles also draw flak as they are prone to bias. Narrative reviews mostly reflect the authors' viewpoint based on their professional experience; while drafting a narrative review, authors may selectively include articles that support their hypothesis and exclude conflicting studies (selection bias). Synthesis bias can arise on account of the subjective approach of the authors while assimilating and synthesizing information while drafting a narrative review; the conclusion is often influenced by the author's personal opinion. Antman, *et al.* [10] found that narrative reviews often varied from the existing evidence, and were contradictory to other published expert opinions. The authors may limit their search of available literature to electronic databases, and freely available (full text) articles (search bias). Narrative reviews may also be marred by publication bias which may be due to tendency of journals to publish only studies with positive results (file drawer effect) or publish articles in English language. Some journals also give preferential treatment to publications from renowned investigators compared to lesser known researchers despite similar rigor in methodology. Funding agencies like pharmaceutical companies may also influence publication of sponsored research work, *e.g.* the company may not want to publish the results related to adverse effects of a drug marketed by them. Narrative reviews are characterized by the lack of an explicit description of the methods involved in research [10,11], and a lack of quantitative summary of the literature. In

addition, narrative reviews are prone to plagiarism (discussed later).

Systematic reviews provide evidence-based synthesis of primary research studies in order to render an answer to a predefined research question [12,13]. A systematic review uses an explicit process to identify systematically and meticulously all studies pertaining to the specific research question, evaluates the methods of the studies, summarizes the results, presents key findings, discusses the reasons for variation in results between the studies, and analyzes the lacunae in current knowledge. The rigorous methodology of a systematic review helps to minimize the bias and ensures impartiality and reproducibility. Technically, systematic reviews are rated as the highest level of evidence by the US Preventive Services Task Force [13]. The process of a systematic review is laborious and can take years to complete. It is possible that the findings get outdated by the time it gets published with the emergence of new evidence. The Cochrane systematic reviews are, therefore, much sought after as these are dynamic and updated regularly [14]. However, we must remember that systematic reviews can also be biased if the selection or emphasis of certain primary studies is influenced by the personal prejudices of the authors or funding sources. Also, as most of the systematic reviews address only a focused research question, it may not be possible to answer all questions related to that topic in one systematic review.

Table I summarizes the difference between narrative and systematic reviews. In this article, we aim to guide the readers mainly about narrative reviews, and how to make them objective and relevant. The approach to systematic reviews and meta-analyses is vastly different, and beyond the scope of this write-up.

TABLE I SALIENT FEATURES OF TYPES OF REVIEW

	<i>Narrative Review</i>	<i>Systematic Review</i>
Topic/Scope	Usually has a broader scope	Generally more specific and deals with a focussed research question
Appraisal	Qualitative appraisal often influenced by personal views of author	Critical qualitative and quantitative appraisal
Advantages	More popular among practicing physicians and young researchers as they can be understood easily without in depth knowledge of statistical methods and research methodology. They offer solutions to problems in question based on the experience and perspective of experienced authors.	Detailed and rigorous methods with predefined inclusion and exclusion criteria for primary studies. Clearly outlined search strategy. Lesser chances of bias.
Disadvantages	Not very rigorous methodology and results not replicable. More prone to bias.	Labour-intensive. Some knowledge of statistical methods is needed to understand it.

WRITING A NARRATIVE REVIEW

Before Writing a Review Article

Scientific reviews are the most popular form of biomedical publication. Editors may wish to draw the interest of the readers by a review of a contemporary topic, either from the public health or research domain. The review article is also useful to disseminate the journal’s perspective, or to provoke discussion regarding practice guidelines. Due to all the above reasons, most journal editors invite subject experts to write narrative reviews as the experience and stature of the expert increases the authenticity and readability of the article. The main author can be well-assisted by apprentices as co-authors, with mutual benefits, as a review article involves both in-depth knowledge and a painstaking study of the literature. This teamwork thus yields a much-savored product, useful to the biomedical community at large. However, not all review articles are solicited. In case you decide to write a review on a topic, it would be beneficial to get a go ahead from the editor of the journal you choose by sending him a proposal for the review along with your brief curriculum-vitae.

Choosing the Topic

It helps to write a review on a common clinical problem. A topic focused on a functional outcome, also referred to as patient-oriented evidence that matters (POEM), rather than disease-oriented outcome (DOE) would be preferred. For example, readers would be more interested in a review on drug A which improves the symptom score in patients with benign prostate hypertrophy rather than a review on drug B which merely increases urinary flow in benign prostate hypertrophy. Rapidly advancing fields require updated reviews. A new diagnostic test (eg. Line probe assay for diagnosing pulmonary tuberculosis), emerging infections (eg. Zika virus outbreak and its consequences) or new treatment modality (eg. Caspofungin) are much sought after review topics. Any information that standard therapy is harmful is an equally good topic for a review article. It may be preferable to avoid reviews on very broad topics (eg. hypertension in children). A narrative review which describes the etiology, pathogenesis, clinical features and management of a common clinical condition (eg. headache) based on the author’s interpretation and certain selected citations, may draw some favor from the general practitioners, but is not rated high from evidence-based perspective due to methodological flaws. Such broad topics may be better suited for chapters in textbooks. It also is preferable to avoid reviews on rarities or unusual manifestations of a disease, topics with only curiosity value and poor application, and a topic which lacks sufficient supporting evidence. **Box 2** summarizes the

points to consider while choosing a topic for writing a review article. We recommend that before you finalize the topic for a review article, you should get it approved from the journal you are planning to submit it.

Identifying the Research Question

The research question must be framed keeping in mind the contradictions, gaps, and inconsistencies in literature. The readers must be apprised of what is known and what your review aims to investigate. You must be able to formulate a clear, focused and relevant research question. You must be able to identify the five elements of the research question. These include the **P**opulation addressed, **I**ntervention being evaluated, **C**omparator for the said intervention, the **O**utcomes being assessed, and **T**ime frame (**PICOT** format).

Searching the Literature, Assessing the Quality of Literature and Integrating the Outcomes of Studies

Despite the unlimited information available online to both healthcare providers and the care seekers, the real challenge is to sieve through the haystack. Online health information may be surreptitiously advertising in content, providing outdated information, misleading with respect to a drug or product, and/ or, sponsored by an organization with inherent conflict-of-interest. Before citing an online health resource, a formal check-list (**Box 3**) is useful in avoiding later embarrassment.

<p>BOX 2 TOPIC SELECTION FOR A REVIEW ARTICLE</p> <p><i>Topics to consider for a review article</i></p> <ul style="list-style-type: none"> • Specific illness/intervention/drug that concerns many readers • Emerging health problem • New drug/ vaccine/ diagnostic test • Common clinical problems • New guidelines for a condition • Topic addressing patient-oriented outcomes (outcomes of importance to patients like changes in mortality, side-effects of a drug, etc) • Evidence that standard therapy is harmful <p><i>Topics to avoid for writing a review article</i></p> <ul style="list-style-type: none"> • Too broad • Rarities or unusual manifestations of a disease; more suited for writing a case report • Lack of sufficient supportive evidence • Topic not suited to the journal you choose • Topics with only curiosity value but poor application
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BOX 3 CHECK-LIST FOR ASSESSING AN ONLINE HEALTH RESOURCE

- Who is the publisher? A recognized, state-affiliated or international agency has greater authenticity eg. WHO, UNICEF
- What does it say?
 - Is the information plausible?
 - Does it have a reasonable hypothesis?
 - Is the information contemporary?
- What is the level of evidence and grade of recommendation?
- Does there appear to be a conflict-of-interest?
- Does the site appear to advertise or promote any health-related product?

Some of the credible sources of scientific information for a review article include journals indexed in Medline, as most of them undergo a rigorous peer review process, and websites hosted by health organizations/associations of repute like World Health Organization, United Nations Children’s Emergency fund (UNICEF), Centers for Disease Control and Prevention (CDC), *etc.* Review articles based on reliable sources of evidence-based medicine like BMJ Clinical Evidence (<http://clinical.evidence.bmj.com/x/index.html>), National Guideline Clearinghouse (NGC) (<http://www.guideline.gov/>), and U.S. Preventive Services Task Force (<http://www.uspreventiveservicestaskforce.org/>) are given more weight. Websites like UpToDate offer a large variety of paid clinical reviews for practicing clinicians; the funds are used to recruit experts, generally physicians in the field, as authors. The popularity of these is explicable as the topics are patient-oriented, contemporary, and updated [15].

Interpret the evidence: Appraisal of the retrieved literature

After retrieving relevant literature, comes the more daunting task of reading and assimilating it. It is imperative to understand that all information may not be of the same standard or relevance for your narrative review. Some papers may be statistically weak (numbers too few or power too small), others may not have data that can be extrapolated to your scenario geographically or population-wise, and/or, some may have an inferior design (case series or case-control studies).

The most widely accepted hierarchy of evidence is the approach called Evidence-based medicine (EBM) (**Box 4**). Put simply, it implies that the most reliable information is obtained where there is minimum bias or

sampling error. In other words, randomized trials or meta-analyses have been accorded the highest “Levels of evidence”. The latter have undergone many variations since 1979 [16,17]; the type of hierarchical table to be used is governed by the research question, whether it is prognostic, therapeutic, diagnostic or decision-making in nature. For example, in therapeutic studies, the highest level of evidence is attributed to a systematic review (of RCTs), the next is individual RCTs, while case-series and expert opinions are awarded bottom-place.

To enable clinical decision-making (and to enable an opinion in Narrative reviews), a system of graded recommendations has been in vogue since the early 2000s. This also has many modified forms, but largely it takes into account the number of RCTs or Level 1 evidence available, and also the consistency of the evidence. This ensures that all types of information are given appropriate credit [18]. We can thus understand that if the topic of the narrative review is relevant, and, if good evidence is unearthed and interpreted well by the author, the narrative review can be used to impart a strong recommendation or message to the readers. For example, if the review is about “Current status of intravenous glutamine in malnourished children”, and one finds two

BOX 4 LEVELS OF SCIENTIFIC EVIDENCE IN DECREASING ORDER OF MERIT [16]

- IA Evidence from meta-analysis of randomized controlled trials
 - IB Evidence from at least one randomized controlled trial
 - IIA Evidence from at least one controlled study without randomization
 - IIB Evidence from at least one other type of quasi-experimental study
 - III Evidence from non-experimental descriptive studies, such as comparative studies, correlation studies, and case-control studies
 - IV Evidence from expert committee reports or opinions or clinical experience of respected authorities, or both
- Grades of recommendation* [16]
- A Directly based on Level I evidence
 - B Directly based on Level II evidence or extrapolated recommendations from Level I evidence
 - C Directly based on Level III evidence or extrapolated recommendations from Level I or II evidence
 - D Directly based on Level IV evidence or extrapolated recommendations from Level I, II, or III evidence

well-designed double-blinded RCTs along with three case-series from different countries all pointing to a similar result, the author is well-placed to provide a strong recommendation.

Present the Results/ Writing the Review

Since synthesizing literature and analysis of different opinions has a more intangible element to it than writing a standard research paper, beware of writer’s block! It is also true that everyone has their own way of tackling this affliction of creative shutdown; the one way that works is to keep writing!

Before starting to write the main body of a narrative review, the following points need consideration. First, summarize your retrieved literature; editing these later can help you bring out your personal perspective and will minimize the chances of plagiarism. Second, brainstorming sessions with colleagues and co-authors will help raise angles and sub-plots to the main topic. These may drive a secondary literature search, ultimately improving the quality of the paper. It is important at this stage to include everything that you discussed; editing can be done later. Third, do not start writing with the introduction; keep this for the end, as it would provide you with a better ‘bird’s eye view’ of the issue at hand. Fourth, divide your review into sections and subsections; these provide structure and flow and make it understandable. The aim is to organize the review like a story. For example, Devanarayana, *et al.* [19] have authored “Recurrent abdominal pain in children”. The sections and sub-sections used in this article are “Epidemiology, Clinical Profile, Etiology (Organic and Functional), Management (Pharmacological and Non-Pharmacological), Public Health Perspective and Prognosis.” Clinical reviews can follow a similar structure as a practicing clinician can follow such sections with relative ease. Sections should follow each other logically and temporally. Fifth, to highlight and summarize important points in the review, make use of flowcharts, tables and boxes. It is prudent, however, to avoid duplication in text. In the above-mentioned example, a useful box would be ‘Recent radiological investigations for recurrent pediatric abdominal pain’. Tables can depict the comparative results of different studies included in the review. Construct tables with studies in rows, while columns should indicate the proposed characteristics. For example, a review on ‘Portal hypertension and hydatid cysts in children’ could include a table of reported case series, wherein the columns could show ‘Number of cases, Country of Study, Type of portal hypertension (hepatic or post-hepatic), Treatment given, and Mortality.’

Finalizing the Narrative Review

As mentioned earlier, complete the Introduction now; keep in mind the background knowledge on the subject and the lacunae in literature, the target audience, your findings from literature, and your proposed recommendations. About 200-300 words can effectively convey the feel of the coming text. After this, a second and third appraisal of the entire manuscript is valuable for eliminating errors and possible plagiarism. Then, finalize and check all references.

Avoid plagiarism: Plagiarism is the deliberate or inadvertent copying of words, phrases, data, ideas or figures and claiming them as your own. It is the most recognized unethical practice since it violates a basic tenet, i.e., honesty, while science is essentially a search for truth. Avoiding plagiarism should be a key consideration for any biomedical writer as it can be a major source of embarrassment and/or censure/blacklisting for the author and the journal. In review articles, a lot of information, opinions and results are studied, tabulated, and analyzed. There is genuine scope for inadvertent plagiarism creeping into the manuscript; technology has, ironically, been culpable in this regard [20]. The same technology; however, can backfire, and pick up direct plagiarism of text, or indirect re-hashing of ideas (which has been attempted as a cover-up). **Box 5** guides the authors on how to avoid plagiarism.

CONCLUSIONS

A review article is an important source of information for evidence-based medicine. It serves as a ready to use reference for all health professionals. A review must address a clinically relevant issue with significant implications for patient-care. The topic for review should

<p>BOX 5 TIPS TO AVOID PLAGIARISM</p> <ul style="list-style-type: none"> • Read and understand all the subject matter thoroughly; do not rely only on abstracts • If there is the slightest chance that the idea behind your review has been addressed before, it is better to acknowledge the source in advance • Understand, contextualize the information and reproduce • Use references liberally, except when the fact is commonly known to all • Avoid using downloaded or previously printed images or charts • Use appropriate format for references • Use software like iThenticate, Crosscheck, PlagiarismChecker to proofread your manuscript before submission
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be relevant, contemporary, and deal with a focused research question. A good review must be rigorous, up-to-date, and unbiased. The conclusions of the review must be well supported by the analysis of literature and should include: summary of the present problem, clinical practice guideline or recommendation depending on the level of evidence you have unearthed, and/or, directions for future research to fill gaps in existing literature.

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