

Writing Narrative Literature Reviews for Peer-reviewed Journals: Secrets of the Trade

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ABSTRACT

objective: *To describe and discuss the process used to write a narrative review of the literature for publication in a peer-reviewed journal. The JSCR wishes to standardize its publication of narrative overviews of the literature to increase their objectivity.*

background: *In the past decade numerous changes in research methodology pertaining to reviews of the literature have occurred. These changes necessitate authors of review articles to be familiar with current standards in the publication process.*

methods: *Narrative overview of the literature synthesizing the findings of literature retrieved from searches of computerized databases, hand searches, and authoritative texts.*

discussion: *An overview of the use of three types of reviews of the literature is presented. Step by step instructions for how to conduct and write a narrative overview utilizing a 'best-evidence synthesis' approach are discussed, starting with appropriate preparatory work and ending with how to create proper illustrations. Several resources for creating reviews of the literature are presented and a narrative overview critical appraisal worksheet is included. A bibliography of other useful reading is presented in an appendix.*

conclusion: *Narrative overviews can be a valuable contribution to the literature if prepared properly. New and experienced authors wishing to write a narrative overview should find this article useful in constructing such a paper and carrying out the research process. It is hoped that this article will stimulate scholarly dialog amongst colleagues about this research design and other complex literature review methods.*

key words: *Review Literature; Authorship; Peer Review, research; Manuscripts; Meta-analysis*

INTRODUCTION

Background

The purpose of this article is to describe and discuss the research design known as a review of the literature and to delin-

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erate how to write a particular variety of this research design, the narrative overview of the literature. Another intention of this article is to provide educational information and assistance for those who have not yet published a literature review and to decrease potential author frustration that can arise during the peer review process. It is important to note that the general classification of 'literature review' has three varieties: narrative review, qualitative systematic review and quantitative systematic review. Each will be addressed in this article. However, the primary focus of this article will be on the writing of a narrative review.

A literature review is a type of research article published in a professional peer-reviewed journal. The purpose of a literature review is to objectively report the current knowledge on a topic and base this summary on previously published research (1). A

Table 1**Sources used for this overview.**

- MEDLINE search 1966-January 2001. Key words: Review of the Literature; Authorship; Meta-analysis; Narrative overview.
- CINAHL search from 1982 to December 2000. Key words: Review of the Literature; Authorship; Meta-analysis; Narrative overview.
- Hand searches of the references of retrieved literature.
- Personal and college libraries searching for texts on research methods and literature reviews.
- Discussions with experts in the field of reviews of the literature.
- Personal experience participating in and writing several reviews of the literature.

literature review provides the reader with a comprehensive overview and helps place that information into perspective (2).

The literature review research design is different from other research designs because rather than patients, data to write the report are collected from the published literature (3, 4). These full length articles provide a new conclusion to the literature, not the brief summary of literature that is given typically in the introduction or discussion sections of other research designs (2, 5). In creating a literature review, the author searches through the literature, retrieves numerous sources of information and synthesizes the findings of all relevant sources into one article (2, 3, 6). Thus, a vast amount of information is brought together and written in a manner in which the reader can clearly understand the topic.

There are several reasons to read reviews of the literature. For the clinician, they can save valuable time when reviewing or searching for information about patient care by condensing a great amount of information into a few pages (1, 6, 7). The clinician can read one paper instead of sifting through the whole of the literature to find the answer to a clinical question; the author of the literature review has already done most of this work for him. Literature reviews also provide information for decision makers and are used by researchers to identify, justify and refine hypotheses and to recognize and avoid pitfalls in previous research (1, 8). Additionally, reviews of the literature provide a basis for validating assumptions (9), provide insight into the dynamics underlying the findings of other studies (10) and may offer more conclusive results than a single primary research study (11). Depending on the variety of literature review, they may provide a very high level of evidence for making clinical practice decisions.

One of the cautions that one must consider with literature reviews is the bias that is often associated with them (10-13). As an author, it is important to attempt to reduce bias as much as possible through appropriate writing and research techniques. An increase in objectivity leads to improved utility and credibility in publications (14). While certain criteria for literature reviews have been published (1), little has been accomplished in terms of standardizing and verifying the validity of the criteria proposed (1, 14). Indeed, many changes have taken place in recent years regarding publication standards for literature reviews (10, 12) and it is important for authors to keep current with these changes. This paper clearly states the minimum acceptable criteria of the *JSCR* as they pertain to narrative overviews of the literature.

METHODS

Information used to write this paper was collected from the sources listed in table 1.

DISCUSSION

Three Varieties of Reviews of the Literature

The three basic types of literature reviews are narrative reviews, qualitative systematic reviews, and quantitative systematic reviews (meta-analyses). The amount of clinical evidence afforded by each of these designs increases as the methods employed to conduct them become more detailed and elaborate. In this section, the emphasis will be placed on narrative reviews, since they are the subject of this article; a brief description of qualitative and quantitative systematic reviews will also be given.

Narrative Literature Review

There are three types of narrative reviews of the literature: editorials, commentaries, and overview articles (4, 15).

Editorials, typically written by the editor of the journal or an invited guest, may be a narrative review if the author retrieves and synthesizes information about a particular topic for the reader. Usually these types of narrative reviews are based upon a short, select and narrowly focused review of only a few papers (15). However, editorials may be no more than the editor's comments regarding a current issue of the journal or a current event in health care. Therefore, editorials do not automatically qualify as narrative reviews.

Commentaries may also be written as a narrative review, however they are typically written with a particular opinion being expressed (4). In these articles research methodology is usually not presented and the author's synthesis of the articles demonstrates bias. Commentaries are usually shorter than a full length

review article and it is expected that the author possesses expertise in the content area of the commentary. In short, a commentary is a biased narrative review that draws upon the wisdom of the commentator. Usually the purpose of a commentary is to provoke scholarly dialog among the readers of the journal.

Narrative overviews, also known as an *unsystematic narrative reviews* (16), are comprehensive narrative syntheses of previously published information. The details of how to prepare this type of article are presented in this paper. This type of literature review reports the author's findings in a condensed format that typically summarizes the contents of each article (1). Some researchers suggest that a proper narrative overview should critique each study included (2, 17), but other authors write that this is not necessarily a property of overviews (1). It is up to the author to determine which of these two paths to take when writing the article.

There are many good reasons to write a quality narrative overview. Narrative overviews are useful educational articles since they pull many pieces of information together into a readable format. They are helpful in presenting a broad perspective on a topic and often describe the history or development of a problem or its management (2, 10). Faculty like to use overviews in the classroom because they are often more up to date than textbooks, provide a single source for students to read from, and expose students to peer reviewed literature. Narrative overviews are also used as educational articles to bring practitioners up to date with certain clinical protocols (7, 11). Some journals, such as the *JSCR*, publish quizzes related to such articles; these quizzes can be submitted to regulating boards for continuing education credit.

Often discussing theory and context, narrative overviews can serve to provoke thought and controversy. For this reason, these reviews may be an excellent venue for presenting philosophical perspectives in a balanced manner. Philosophical articles can be excellent for stimulating scholarly dialog amongst readers. Readers can participate in this process by writing to the letters to the editor section of the journal and present their opinions and critical appraisal. The letters to the editor section can be a dynamic part of a journal; several times in the history of health care tremendous insight into patient management and research design has been presented in this forum (7).

Authors of narrative overviews are often acknowledged experts in the field and have conducted research themselves (6, 7, 15, 18). Editors sometimes solicit narrative overviews from specific authors in order to bring certain issues to light (18). Authors must be careful to avoid a common pitfall of the overview design, which is to present an opinion oriented argument based upon a myriad of references (3), rather than objec-

tive conclusions based upon the literature reviewed. For this reason, some studies have determined that some experts are less likely to adhere to high levels of methodological rigor when writing these papers than non-experts (14). Therefore, whether one is a novice or expert, the critical factor in writing a good narrative review is to use good methods.

Once quite common, overviews are slowly falling into disfavor in some journals due to a lack of systematic methods that should be employed to construct them (11, 19). Rarely have the methods used in creating the paper been divulged to the reader (1, 10, 11), which is a problem identified as early as 1987 (20). Usually the number of sources employed to find the literature are incomplete (4, 10), possibly creating an insignificant knowledge base from which to draw a conclusion. In this rather unsystematic approach, selection of information from primary articles is usually subjective, lacks explicit criteria for inclusion and leads to a biased review (4, 7, 10, 13, 16). The author's interpretation and synthesis of information should take into account major differences between studies, such as if patients samples in one study are completely different than in another (4) or that research designs are not comparable (3, 7). Without identifying these differences, one takes the risk of providing faulty conclusions or incorrect information. All of these potential pitfalls are avoidable if the author is aware of them and takes the appropriate steps to avoid them.

In the past, many reviews of the literature were constructed based upon the personal papers of the author, creating a bias that was slanted to what that author found interesting or controversial (3). When this occurs it is difficult to discern if the author has constructed an objective review of the literature or a lengthy commentary. Biased writers will draw conclusions based more on opinion than data, which is not a truthful representation of the research (13, 16). Often times this faulty synthesis is then repeated by other authors and the mistakes are handed down from one study to the next (1), thus perpetuating the errors. The aforementioned problems related to literature reviews are a potential danger in health care if readers make patient health care decisions based upon faulty reviews (13, 18).

While narrative overviews are great papers to read to keep up to date, receive continuing education credits, or challenge your way of thinking, they are not a form of evidence that should be used frequently when making decisions about how to solve specific clinical patient problems. Narrative overviews are one of the weakest forms of evidence to use for making clinical decisions in regard to patient care (21), primarily because they deal more with broader issues than focused clinical problems. Additionally, there is a higher degree of bias involved in overviews than some other research designs (21, 22).

Nevertheless, narrative overviews constitute an important component in the literature base.

Qualitative Systematic Literature Review

A systematic review is a type of literature review that employs detailed, rigorous and explicit methods (4, 22, 23). A detailed search of the literature based upon a focused question or purpose is the hallmark of a systematic review (4, 22). Since the review is structured around a focused clinical question, it allows the researcher to develop criteria that determine if a research publication should be included or excluded in the final synthesis (22, 23). Step-by-step methodology used in the research is described. Authors of systematic reviews attempt to obtain all original (primary) research studies published on the topic under study by searching in multiple databases, performing hand searches and contacting authors of previously published research. Additionally, authors will attempt to locate articles that may not have been published because the results of the study did not support the research hypothesis (1, 4, 22, 23).

Each paper is reviewed in a systematic and consistent manner, usually by several independent reviewers, and usually rated using a scoring system by the authors (1, 4, 23). Each piece of evidence drawn from a paper for the literature review is extracted in the same fashion to help decrease the bias that occurs when this information extraction is done subjectively, such as in a narrative overview (22). Authors create data, or evidence tables, in order to tease out the differences in the results of different studies (24). These reviews of the literature are called qualitative because the process by which the individual studies are integrated includes a summary and critique of the findings derived from systematic methods, but does not statistically combine the results of all of the studies reviewed (22, 24).

Because of the rigorous methods employed in conducting qualitative systematic reviews, they are a more powerful evidence-based source to garner clinical information than narrative reviews, case reports, case series, and poorly conducted cohort studies (21).

Quantitative Systematic Literature Review (Meta-analyses)

A systematic review that critically evaluates each paper and statistically combines the results of the studies is called a quantitative systematic review of the literature, also known as a meta-analysis (1, 10, 22-24). Introduced in 1976, meta-analyses aim to make an objective science out of research synthesis (10). Meta-analyses employ all of the rigorous methodology of qualitative systematic reviews.

In addition to the inherent strengths of the systematic review process, the major benefit of a meta-analysis is the pooling of

data between studies. In this process, the authors of a meta-analysis will gather the original patient data from each of the studies under review, pool it all together in a database, and perform the appropriate statistics on this larger sample size. This is especially useful when clinical trials exist in the literature but possess low sample sizes that prevent the authors from making conclusions that can be generalized to the population at large (1). This can be particularly powerful if the studies under review are very similar in their construction because several studies can be combined as one larger base of data leading to more powerful conclusions (23).

The pooling of data that can be analyzed statistically, which is the strength of the meta-analysis (25), can also be a drawback because it is difficult to find studies that are similar enough to one another to draw valid comparisons (4, 25, 26). There is disagreement amongst experts about the most appropriate methods to combine the data from studies with different variables (e.g., patient populations, clinical outcome measures, treatments) (25-27).

Meta-analyses are considered to be a very high form of evidence for making clinical decisions because the results of the review are produced from a rigorous critical appraisal and pooling of data from the studies reviewed (11, 12, 16, 26). This leads to a more generalizable conclusion (21).

Levels of Evidence in Publications:
www.cebm.jr2.ox.ac.uk/docs/levels.html

Writing a Narrative Review of the Literature, Step By Step

Preparation

Before involving oneself completely in the research endeavor, it is important to observe a few tips that will sustain the author during the process of the project. These pearls of wisdom, presented in table 2, are gathered from experienced authors and are useful for novice as well as experienced writers.

The first step in writing a narrative overview is to perform a preliminary search of the literature (24). In this endeavor, the author should search the literature to see what other work in the area of interest has already been published (5, 17). This initial work should help the author to refine the topic and objective of the overview being written. For example, if one wishes to publish a review of the literature about the effect of chiropractic adjustments on cervical spine pain, the initial search should reveal if someone has recently published such a study. In addition, this initial work will also give the author a preview of the number of articles available on the topic. If an article is already published on the very same topic that the author wishes to write

Table 2**Words of wisdom for authors writing narrative overviews.**

Interesting Topic	Select a topic that you are very interested in, lest you do a lot of work and then lose momentum to finish the project. There are many half-finished papers collecting dust on shelves because authors lost the drive and interest to complete the task. Select an enticing and engaging topic that will keep you fascinated throughout the process.
Doable Project	Select a topic with a feasible focus. A narrative review on ‘headaches’ is an impossible task, whereas ‘chiropractic management of muscle tension headaches’ can be a manageable narrative review. Keep the focus clear and defined and you will be able to complete the paper.
Get Help	Get help early and often. Call upon people around you who have writing experience, such as colleagues or faculty who have published narrative reviews. Consider asking them for their opinions before you begin the paper and then ask them to review drafts of your paper before submitting it. Some journal editors can direct you to others that may be of assistance and may be able to help you themselves when time permits.

about, then it may be better to select a slightly different topic or to slightly modify the focus of the objective. On the other hand, if there has never been a review published about the topic, then this helps to establish the need for this particular contribution (5, 17). Once armed with a refined topic, it is time to proceed with the next steps.

General guidelines

The text that follows delineates what is acceptable in the *JSCR* and would probably be acceptable in many other journals. These recommendations follow the approach put forth by Robert Slavin, which is called a “best-evidence synthesis” (10). However, there are no rigid published guidelines designating exactly what should or should not be included in a quality narrative overview (10). A successful narrative review should do the following: present information that is written using the required elements for a narrative review, be well structured, synthesize the available evidence pertaining to the topic, and convey a clear message.

An objective and scientific approach on behalf of the author should be conveyed and the paper should follow the formatting guidelines published in the *Uniform Requirements for Manuscripts Submitted to Biomedical Journals*. These guidelines describe in detail what is necessary in order to prepare a manuscript for submission to a peer reviewed journal. Preparing a manuscript using these guidelines is essential to insure that manuscripts are uniform in nature, as objective as possible, and can be processed by editors in an expeditious manner, thus providing the author with a better chance for earlier acceptance (28, 29). The *Uniform Requirements* can be found on the Internet at <http://www.icmje.org/index.html>.

**Uniform Requirements for Manuscripts:
www.icmje.org/index.html**

The presentation of a narrative review should be as objective as possible. It is essential that prospective authors remember that the intention of a narrative review is to describe and synthesize the available literature on a topic, providing a conclusion from this evidence (18). The necessary elements of a narrative review are similar to those required of any form of scholarly article (Table 3). A detailed rating scale for narrative reviews of the literature is also included in this article as Appendix A.

Title

The title of the article should be interesting and clearly describe the topic being reviewed (30). It is also helpful to readers if the

Table 3**Components of a narrative overview in order of appearance in the manuscript.**

1. Title
2. Structured abstract
3. Introduction
4. Methods
5. Discussion
6. Conclusion
7. Acknowledgements (if applicable)
8. References
9. Tables
10. Figures
11. Figure captions

words “literature review” or “review of the literature” appear somewhere in the title to make it clear to readers what research design is being used. The reader instantly knows what the major topic is and that previous publications about the topic are being synthesized. A good example of a title is *Injuries Associated with Soccer: A Review of Epidemiology and Etiology*. A bad example of a literature review title might be *The Epidemiology of Soccer Injuries*. This title would infer that a population based study was performed to determine the kinds and frequency of soccer injuries, which would be misleading to the reader.

Abstract

The abstract is a structured summary of the article that offers the reader a brief presentation of the review and relates the most important information (11). The abstract and the title are entered into computer databases and indexing systems, and are essentials for those conducting literature searches. A well written abstract allows people searching the literature to find the

Table 4
Standard subsections of the narrative overview structured abstract.

Subsection	Description
Objective	<ul style="list-style-type: none"> Clearly state the purpose of the paper.
Background	<ul style="list-style-type: none"> Describe what prompted this review or why it is being written. Briefly present a context for the overview.
Methods:	<ul style="list-style-type: none"> Briefly describe the methods used to conduct the overview.
Discussion:	<ul style="list-style-type: none"> Describe what information the overview presents to the reader.
Conclusion	<ul style="list-style-type: none"> Summarize what the overview contributes to the literature. State what new conclusion is drawn as a result of the synthesis of the literature reviewed.
Key words	<ul style="list-style-type: none"> Use terms found in the Index Medicus database, which are called medical subheadings (MeSH)(9). MeSH can be found at the PubMed home page (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi). List additional words that may be unique to the topic or to the profession.

information in their search and discern whether or not they should retrieve the paper (29, 30).

Abstracts should be written in a structured format (31). Structured abstracts are required in order to assure that all necessary information for an abstract is reported for the reader. In the past, narrative abstracts were often used by journals, but authors sometimes did not adequately report the necessary elements of the study in the abstract. Thus, most journals adopted the structured abstract format over ten years ago (30, 31). Subsections for abstracts of narrative overviews of the literature published in the *JSCR* consist of the following, further described in table 4: objective, background, methods, discussion; conclusion, key words (28).

Medical Subheadings:
www.ncbi.nlm.nih.gov/entrez/query.fcgi

Introduction

Early in the introduction, the author should clearly state the research purpose or focus. Clearly stated aims tell the reader that the study was planned out in advance, usually resulting in a well outlined study that presents useful information (3, 18, 24).

Next, the author must make a case for the need or importance of the study. This is essential in order to relate the importance of this research to the reader. This usually requires that the author has already reviewed the literature pertaining to the topic and has discovered a deficiency of a well written review of the literature in the area. Authors can use the results of their preparatory literature search discussed previously as well as further reading unveiled during the course of conducting the formal literature review, described later, for this purpose. This information should be written in the introduction to state why the study is important and place it in context with other published information (10, 24).

The author should also define any unusual terms or words that are essential to understanding the information in the paper (10). For example, if the paper is about isometric low back extension endurance tests, it would be paramount that the author clearly define what these tests are and what they do.

Methods

The methods section of the article should describe step by step how the study was performed (11, 14, 18, 24).

Sources of information: The most efficient way to begin a literature search is to use electronic databases. There are many different databases available for searching and it is important that the appropriate databases are searched, depending on the objective and topic of the paper (9). Unfortunately, many people

Table 5

Databases to consider when performing a literature search

Name of Database	How to Access	Internet Site	Pay Site?
MEDLINE	Internet Grateful Med or Pub Med on-line software Emphasis: medicine, nursing, dentistry, veterinary medicine, and preclinical sciences. Also includes citations for chiropractic, complementary medicine, and allied health.	http://www.nlm.nih.gov	No
HEALTHSTAR	Internet Grateful Med or Pub Med on-line software Emphasis: Clinical (emphasizes the evaluation of patient outcomes and the effectiveness of procedures, programs, products, services and processes) and non-clinical (emphasizes health care administration, and planning) aspects of health care delivery. Contains relevant bibliographic records from MEDLINE (1975 to present) and three other selected sources.	http://www.nlm.nih.gov	No
MANTIS	Online search software or CD-ROM Emphasis: Health promotion, prevention, and conservative alternative therapies, including: acupuncture, allopathic medicine, chiropractic, herbal medicine, homeopathy, naturopathy, osteopathic medicine, physical therapy, traditional Chinese medicine.	http://www.healthindex.com	Yes
ERIC (Educational Resources Information Center)	Online search software Emphasis: Contains more than one million abstracts of education-related documents and journal articles, including health sciences.	http://www.ericir.syr.edu/Eric	No
AMED (Allied and Complementary Medicine Database)	Online search software, CD-ROM, disc, print Emphasis: Unique bibliographic database produced by the Health Care Information Service of the British Library. Journals related to complementary medicine, physiotherapy, occupational therapy, rehabilitation, podiatry, palliative care.	http://www.portico.bl.uk/services/stb/amed.html	Yes
CINAHL (Cumulative Index to Nursing and Allied Health Literature)	Online search software Emphasis: Citations for nursing, allied health, complementary medicine, including chiropractic.	http://www.cinahl.com	Yes
EMBASE/Excerpta Medica	Online search software, CD-ROM print Emphasis: Diverse database including: biomedical sciences, human medicine, health policy and management, occupational and environmental health, alternative and complementary medicine, nursing.	http://www.elsevier.nl/homepage/sah/spd/embase/menu.htm	Yes
SPORT Discus	Online software vendors Emphasis: Sports medicine, physical education, physical fitness, sport law, administration, training, sport science, kinesiology, coaching, physical therapy, recreation.	http://www.sportdiscus.com	Yes
Current Contents	Online search software Emphasis: Clinical medicine; life sciences; agriculture; biology and environmental sciences; arts and humanities; physical, chemical and earth sciences; engineering, computing and technology; social and behavioral sciences.	http://connect.isihost.com/cochome.html	Yes
Cochrane Database of Systematic Reviews	Online search software Emphasis: High quality evidence to inform people providing and receiving care, and those people responsible for research, teaching, funding and administration at all levels.	http://hiru.mcmaster.ca/cochrane	Yes
DARE (Database of Abstracts and Reviews of Effectiveness)	Online search software Emphasis: Database of abstracts of systematic reviews assessed for effectiveness.	http://nhscrd.york.ac.uk/darehp.htm	No

Table 6**Sample literature search tracking sheet**

Date of Search	Database	Years Searched	Search Terms	Strings of Terms	# Hits
1/12/99	HEALTHSTAR	1975-12/1998	Health promotion	None used	11330
1/12/99	HEALTHSTAR	1975-12/1998	Health promotion; chiropractic	Health promotion and chiropractic	6
1/12/99	MEDLINE	1966-12/1998	Preventive medicine, chiropractic	Preventive medicine and chiropractic	0

think that only searching MEDLINE is adequate, but it is not (4). This is especially true in when writing on topics pertaining to chiropractic and allied health disciplines because many journals from these professions are listed, or indexed, in databases other than MEDLINE. For example, the *JSCR* is not indexed in MEDLINE, but is indexed in eight other databases. It is usually necessary to search at least two databases appropriate for the area of study in order to provide a reasonable breadth and depth on a topic. Searches through the references of articles that are retrieved, authoritative texts, personal contacts with experts, and reviews of unpublished primary research may also be warranted and important to include (17). The breadth and depth of searching is dependent on the topic and objective. Summarily, the author should look in all the locations that are appropriate for finding the information they need.

Examples of common databases used in the health sciences and their areas of focus are listed in table 5. Some of these databases are free of charge while others are not. If an author wishes to avoid paying to perform searches in some of these databases, they are often available in health science libraries for students and alumni to use at no cost. Consult a local chiropractic or other health science library to find out which databases they carry and also to inquire about search fees (17). Authoritative texts may also be found at college libraries or even in your own personal library. At college libraries there are usually computerized databases that catalog all of the books in the library's holdings. These too can be searched using search terms (24).

It is crucial to divulge the databases that were searched in the article (3, 7, 13). This means that it is important for the author to keep track of the databases searched and the terms used, in order to report them to the readers. Some authors also like to keep track of how many 'hits' or article citations that are found with each search. A sample tracking sheet is provided in table 6. Minimum requirements for narrative reviews published in the *JSCR* are that authors should state the database searched, a start-

ing year, and the ending year and month of the search. The following example is adequate, "MEDLINE was searched using the terms 'low back pain' and 'manipulation' from 1966 through June, 2000." Stating, "We searched MEDLINE from 1980 to the present." is grossly insufficient because the reader is not told what the word "present" actually means. Months can slip away between the day of the search and publication, so it must be defined.

Search terms & delimiting: Setting the specific parameters for the literature search is necessary in order to make the project feasible since it is not reasonable to review every single paper that has even the most minute relation to the topic of study (17, 24). The boundaries set in this step must be comprehensive enough to insure that the author may retrieve all relevant studies, but narrow enough to focus the effort (13, 17).

To do this, one should take the primary concepts or themes of the topic under study and turn them into single words, which can be used as search terms. In addition, insure that the search terms used are recognized by the vocabulary of the computer database. This is usually easy to do since most computerized indices have a key word search function within them that will find synonyms in its database for the word that you enter. Most journals use the MeSH vocabulary system adopted by the National Library of Medicine (9). These key words will be the ones that you will also list in the key terms section of the abstract (17).

It is not necessary to search databases using solely key words of the database. Most databases will allow you to search using additional words that you find appropriate. This is sometimes helpful in finding more articles since the databases usually search through title, abstract and key words of the articles indexed. If the right terms are not used during the literature search, then chances are high that some important studies will be missed. General terms, such as 'pain' may result in so many articles to search through that the authors miss studies. Likewise, highly focused words may narrow the search down

too far, revealing no research. Just as with reporting the databases used, each search term used to conduct the search ought to be divulged to the reader (3). How terms are connected together would also be useful to know.

When writing papers using terms unique to a profession, it is important to recognize that the term may have a different meaning in various database. For example, the term “subluxation” in the medical literature has a distinctly different meaning than in the chiropractic literature. The spelling of words should also be considered, based upon the database being searched. Exemplary is that in the *Index to Chiropractic Literature* database, a search using the spelling “technique” will provide different results than a search with “technic”. This occurs because the chiropractic profession historically used the latter term to describe different chiropractic adjusting procedures and the indexing system continues to use this term. This is also an excellent example of why it is important to verify the key words vocabulary of each database. Therefore, to properly delimit a literature search, authors need to select key words, including MeSH, keep track of the terms and search strings used, and report this information to the reader when writing the paper.

Selection criteria employed: It is important to briefly describe what selection criteria were used to include or exclude a study from the review (7, 10, 11, 18). This helps keep the paper focused and helps to insure that papers are included because of their relevance to the topic rather than how much the author agrees or disagrees with the study (13, 18). Exclusion criteria should be identified that the authors used to eliminate studies from consideration that were not pertinent to the focused purpose of the study. Reasons for exclusion may be old data (early research) or inappropriate topics (17). For example, researchers studying the use of isometric muscle endurance of the lumbar spine would exclude papers found that discuss standard orthopedic muscle testing of the low back because it is not the type of muscle testing being reviewed.

Inclusion criteria should tell the reader what factors the authors considered in order to include a paper in the review. This should include articles published in various languages, and other factors pertinent to the purpose of the paper. Be careful not to place too many limiting exclusion criteria or have inclusion criteria that are too wide; papers outside the domain of the purpose of the study may be included inadvertently or inappropriately if this occurs.

Summarily, when writing the methods section, the author should ask him or herself, “Can the reader replicate the search that was done based upon what I have written in the methods section?” If the answer is “Yes” then this section has been adequately written.

Discussion

Synthesis: The part of conducting a narrative overview that takes the most mental energy is synthesizing all of the information retrieved in the literature search into comprehensive paragraphs. Since this is the primary use of reviews of the literature it is imperative that this section be written as clearly and as objectively as possible (18). It is here that readers should find the information that they want in one location (10).

How to structure this section and summarize the information into a comprehensible synthesis depends on what is being reviewed. If an author is writing a review pertaining to the current best approaches in assessing and managing patients with a particular disorder, it may be a good idea to write the synthesis in the order that the clinical encounter normally takes place (e.g., history, examination, special studies, management). As another example, for this paper we synthesized the literature in the order that we felt readers would find it most useful when they decided to write their own overview. There is no single way to write this section. Therefore it requires the author to think clearly about what is being conveyed according to the objective of the overview (18).

Before attempting to write the synthesis authors should read through each of the papers that will be included in the overview and take notes on each one. Most authors prefer to use a word processing system for taking notes because it is simple to add new information. Once all of the notes are complete, authors can then easily organize common themes together. Other authors prefer to take notes on index cards since they can be shuffled around and notes can be taken regardless of whether or not the author is near a computer.

It is recommended that notes include the following: the purpose of the study reviewed, a synopsis of the content, the research design or methods used in the study, a brief review of the findings (9, 17). If an author plans to objectively evaluate, or critically appraise, each article, then it is also a good idea to take notes for this part as well. Regardless of the technique that you use it is essential to always write the complete reference down for each set of information that you extract from a study. It is horrifying to find out late in the writing process that a reference for a bunch of information was lost and have to spend hours trying to find it (17).

Tables of information may make it easier for some authors to organize their thoughts when constructing the synthesis (17, 24). Tables are easy to make and categorize information by topic. For example, the references for each paper reviewed can be written down one side of the paper and categories of information extracted from each paper can be written along the top. This is best done using a computer, as it allows for easy

Table 7**Example of a part of an evidence table.**

Reference	Sample	Test	Design	Results	Comments
Biering-Sorensen, 1984	Denmark;30-60yo, 449men,479women	Sorensen's method	Postal survey 12 months after exam	Prognostic for 1st time LBP in men; women had insig. Opposite trend	Some women omitted from analysis
Gibbons et al., 1997	Finland, 35-63yo, 43men who had no LBP	modified Sorensen's	Compared static back endurance time between group with no LBP to group with incidence of LBP in preceding 12 mo.	Men who reported LBP had slightly shorter times; they did not come close to stat. significance. No association between static back endurance and future LBP	Difference in groups may suggest either a difference in condition of subjects, or a research error

arrangement or additions of information. An example of part of a table is presented in table 7. If papers under review contain a lot of data that the author feels would be beneficial to include in the manuscript, then data can be collected using a table and easily be placed in the final paper.

When writing the synthesis for the manuscript, the author integrates the findings elicited from the note taking or table making process. It is important for authors to keep the reading audience in mind when writing this section; the audience is less familiar with the topic under review, necessitating a clear, clinically relevant and easy to read synthesis.

Major areas of agreement and disagreement in the literature should be discussed (10). The discussion should tie the study into the current body of literature, provide its clinical significance, and make logical interpretations from the literature reviewed (1, 18, 24). If there is no discussion of the relevance of the overview to other work in the field, it may signal that the author has not thoroughly investigated the topic. Since the synthesis is the crux of the overview design it is important to insure that a meaningful integration is accomplished.

The author's interpretation of the literature should also be provided (1); it is for this reason that it is helpful if the author has some content expertise in the area under study (18). Often times it is appropriate for the author to offer some critical appraisal of the papers reviewed in the discussion (9, 11, 17). As mentioned earlier, this is an area of overviews that some authorities feel may or may not be necessary in an overview. One of the reasons for this disagreement is that the appraisal process can be extremely subjective without the use of explicit critical appraisal criteria. Since the narrative overview already

includes the biases of the author, there is a limit to how much more bias may actually enhance the credibility of the overview (13).

It is helpful if the author uses check sheets or guides when critically appraising the articles. These check sheets are available from a wide variety of sources. Some of these critical appraisal aids focus on specific research designs while others are made for assessment of articles in general. In addition to many worksheets available in the references used for this paper, a small sample of additional sources for critical appraisal check sheets are identified in table 8. When performing critical appraisal, it is best to use a check sheet that is specific to the research design being appraised. For example, Appendix A in this article is a check sheet for a narrative overview of the literature. A case report or clinical trial should be reviewed using a completely different check sheet.

Limitations to the overview: Authors should address weak points of their own study and mention areas for improvement (1, 3). No paper is perfect. If limitations are not included in an honest fashion, it warns the reader that the paper may contain more bias than is acceptable for an overview. The inability to discuss the merits and demerits of a paper may demonstrate that the author has strayed from the focus of their purpose.

Because authors are deeply involved in the creation of the literature review and the writing process, it is not always easy to recognize the paper's limitations. One method that is helpful in writing this section is to write it as the study evolves. Every time the author recognizes an area that could be improved in the study, he or she can simply write those thoughts down at the time. If the weakness can be corrected during the research

Table 8**Examples of critical appraisal check sheets.**

Reference	Topic	Internet address
Centre for Evidence Based Medicine	Articles on therapy, systematic reviews, diagnosis, prognosis, harm/etiology, economic analysis	http://cebm.jr2.ox.ac.uk/docs/levels.html
Critical Appraisal Skills Programme	Randomized controlled trials, economic analyses, qualitative research	http://www.phru.org/casp/appraisa1.htm
Greenhalgh T. How to read a paper: Papers that summarise other papers (systematic reviews and meta-analyses). <i>BMJ</i> 1997;315:672-675.	Systematic reviews	http://www.bmj.com
Oxman AD. Systematic reviews: Checklists for Review Articles. <i>BMJ</i> 1994; 648-651.	Systematic reviews	http://www.bmj.com
Jackson GB. Methods for integrative reviews. <i>Review of Education Research</i> 1980;50:438-460.	Integrative reviews of the literature	NA

process then the writing related to it can be deleted. For limitations that are inherent to the design of the paper or ones that are not correctable, then this text can remain for the final paper.

Another method that most experienced authors use is to have trusted colleagues review the paper before it is submitted to a journal. It is important to select colleagues who have expertise in the topic under study as well as those who have writing experience. These peers will usually be able to see areas of weakness not immediately apparent to the author and they can provide suggestions for improvement. These suggestions can then be incorporated into the paper and help provide comments for the discussion. Be sure to select assistants who will be honest in their feedback, will provide the comments in a timely manner, and who will respect the confidentiality of your work. In receiving feedback from peers, it is important for the author not to take the criticism personally, but to see it as a method for improving the paper.

Conclusion

The conclusion should provide a tie in to the purpose, the major conclusions drawn from the overview, and directions for future research.

A clear and concise summary of the major findings of the overview should be provided (10). This is not merely a rehash

of the entire paper, but a statement about what is now known as a result of the publication of the overview that was not known or observed before. The conclusion should be drawn from and supported by the papers reviewed (1, 10, 14, 18); the absence of systematic methods should temper the conclusion (3). Specific implications to the practice environment should also be mentioned (3). Authors who derive conclusions that are irrelevant to the initial purpose have lost the focus of the review and may inadvertently infuse bias into the study. If any major conclusion is not supported by the literature synthesis, then it is a faulty conclusion and your suspicion about the validity of the paper should be heightened. Therefore, conclusions that are made must be supported by the literature reviewed.

Specific directives for new research initiatives should be proposed. After reviewing the literature on a topic the author possesses a vantage point that may provide valuable guidance for future research endeavors. Suggestions for new areas of inquiry and specific study designs are an important outcome of a thorough review; it is often from these recommendations that researchers begin new studies.

Acknowledgements

It may be appropriate to acknowledge the work of a colleague who has assisted the author in the preparation of the manu-

script, such as a proofreader or a person who has provided ideas for the manuscript. These people can be acknowledged briefly in this section. People mentioned in this section must give consent for their name to appear in print, which can be obtained by asking them to sign a brief statement that they know that their name will be listed in the acknowledgements section of the article (28). For more information on the protocol for writing acknowledgements, see the *Uniform Requirements*.

References

References are an absolute necessity for any research paper, but especially for a review of the literature. It is extremely important that authors cite each of the studies reviewed in order to demonstrate exactly what research was appraised (11). All of the papers included in the review should be referenced. Authors should also cite all supporting research used to write the report. References used to support the work should come from peer-reviewed journals, texts, government documents or conference proceedings (17). For the majority of literature reviews, the use of magazines is not appropriate because these periodicals are not peer reviewed and the articles in them are not written with the same scientific rigor as peer reviewed journal articles.

References should be formatted appropriately. Instructions for how to write out the references appropriately for a given journal are usually found in the journal's instructions for authors or in the *Uniform Requirements*. Proper formatting of references is essential, as it costs time and money on behalf of journal staff members to send this information back to authors for correction (32). All the information needed to correctly list a reference can usually be found with the abstract when conducting a literature search, or on the pages of the actual journal article.

Tables

Tables are lists of information that aid in visually presenting information in an appealing manner rather than listing information as text in a paragraph. Such a table in an overview may be the extraction table used during the synthesis. Tables should be simple and self-contained, needing no further explanation. If authors wish to use previously published tables, the publishing company of the original material must grant permission and it is the authors' responsibility to receive this permission. Appropriate formatting for tables can be found in the *Uniform Requirements* (29).

Figures

Figures or illustrations are a necessity to make articles interesting to read. Since an overview is a review of text, it is especially useful to use pictures and tables in order to keep the paper

interesting to read. Most people do not like to read an article that is nothing but text from the beginning of the title to the last letter of the references. Pictures can also help make the paper easier for readers to understand. If authors wish to use previously published photographs or illustrations, permission must be granted by the publishing company of the material and it is the author's responsibility to receive this permission.

Complete requirements for preparing illustrations or photographs for submission are detailed in the *Uniform Requirements*. Captions for each figure used in the manuscript should be provided. Authors should not expect that editors will write the figure captions (29). Some journals accept electronic images. Be sure to scan images at a sufficient resolution to enable quality printing in the journal. Find out from the journal which formats are accepted, such as tiff or jpg files, and whether the journal accepts PC or Mac formatting. For example, the *JSCR* only accepts PC formatting.

CONCLUSION

Narrative overviews can be a valuable contribution to the literature if they are prepared properly in an effort to minimize the author's biases. Further reading on reviews of the literature is available in a suggested bibliography located in Appendix B of this article. Authors wishing to submit narrative overviews to the *JSCR* should find this article useful in constructing such a paper and carrying out the research process. Given the controversy surrounding the review of the literature research design, it is our aspiration that this article will facilitate some scholarly dialog in the pursuit of creating more valid reviews of the literature and striking a balance between a the unsystematic overview and the complex meta-analysis.

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Appendix A

Narrative Overview Rating Scale

Green BN, Johnson CD, Adams A. *Writing Narrative Literature Reviews for Peer-reviewed Journals: Secrets of the Trade. J Sports Chiropr Rehabil* 2001;15(1).

Circle the number that you feel is appropriate for the paper that you are reading:

1 = Absent

2 = Present but not complete

3 = Present and complete

Initial Impression

1 2 3 Does the review appear to be relevant to an issue of interest (18, 30)?

Abstract

1 2 3 Is the specific purpose of the review stated (3, 15)?

1 2 3 Is context for the overview provided?

1 2 3 Is the type of research design stated?

1 2 3 Are the search methods clearly summarized?

1 2 3 Are the important findings clearly discussed?

1 2 3 Are the major conclusions and recommendations clearly outlined?

Introduction

1 2 3 Is the specific purpose of the review clearly stated based upon a brief review of the literature (1, 3, 18, 24)?

1 2 3 Is the need/importance and context of this study established (2, 11, 24)?

1 2 3 Are novel terms defined (10, 29)?

Methods

1 2 3 Were the electronic databases used to conduct the literature searches identified (MEDLINE, CINAHL, etc.) (3, 13, 17)?

1 2 3 Were the search years stated?

1 2 3 Were the search terms stated (3)?

1 2 3 Were standard terms used as search terms, including Medical Subject Headings (17)?

1 2 3 Were the guidelines for including and excluding articles in the literature review clearly identified (10, 18, 22)?

Discussion

1 2 3 Were the results summarized in a comprehensible manner (3, 10)?

1 2 3 Was the critical appraisal of each study the same and reproducible (11, 13, 22)?

1 2 3 Was the quality of the included articles assessed objectively (3, 11, 13)?

1 2 3 Was the variation in the findings of the studies critically analyzed (1, 10, 13, 22)?

1 2 3 Were the meaning of the results addressed (3)?

1 2 3 Do the authors tie in the results of the study with previous research in a meaningful manner (1, 3, 10)?

1 2 3 Were the weak points and untoward events that occurred during the course of the study addressed by the authors (1, 3)?

Conclusions

1 2 3 Was a clear summary of pertinent findings provided (10)?

1 2 3 Were the authors' conclusions supported by the evidence provided (1, 3, 13, 18)?

1 2 3 Were specific directives for new research initiatives proposed?

1 2 3 Specific implications to the practice environment are addressed (3).

References

1 2 3 Are references relevant, current and appropriate in number (11)?

1 2 3 Are all papers reviewed cited in the references (1)?

Overall Impressions

1 2 3 Do the merits of this review of the literature outweigh the flaws?

1 2 3 Were the authors unbiased in their approach to the review (11, 18)?

1 2 3 Will the results of the paper help me in my philosophical or evidence based approach to patient care (18, 22)?

Comments & Notes:

Appendix B

Additional Suggested Readings on Literature Reviews

Compiled by Alan Adams, DC, MS, MSED

Books

- Chalmers I, Altman DG. Systematic reviews. London: BMJ Publishing Group; 1995.
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Journal Articles

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