



Information sources for medical writers¹

by Alison Dev

In this article, I will first look at the different resources available to us, and their advantages and disadvantages. I will then focus on literature searching and internet searching. Lastly, I will discuss some internet resources for medical writers.

Our first question is: what are information sources? There are four main sources that we are most likely to use:

- Books
- Online databases
- Internet
- Verbal communication

Books

Up until a few years ago, books were our main resource for most questions. They have many advantages, including the fact that we can be fairly sure that they are accurate, we do not need anything to access them except hands and eyes and, once we have bought them, they are available to us forever. However, they do have some drawbacks. Particularly in fast-moving fields of research, they may contain out-of-date information even before they are published. Also, unless they are very well indexed, it can be difficult to find the information we are looking for. But they are still one of the best sources for a good general overview of a topic. I enthusiastically recommend keeping a copy of a good medical textbook on your desk, such as *Harrison's Principles of Internal Medicine*, or the *Merck Index*, and a medical dictionary. Also, some sort of pharmacopoeia is useful (e.g., *British Pharmacopoeia*, *United States Pharmacopoeia*, *European Pharmacopoeia*, *Martindale—The Extra Pharmacopoeia* or *Physician's Desk Reference*), as these are a very useful source of information for many drugs. These can often provide a quick answer. However, for a more thorough exploration of a topic, you might want to turn to their electronic versions (either CD—ROM or online versions) or to the other sources below.

Online databases

An online database is a resource provided by a service provider. It either contains data that have been located and put together onto the database by trained professionals (e.g., the Registry of Toxic Effects of Chemical Substances [RTECS] gives actual LD50 values), or contains a link to the source (e.g., PubMed, which contains links to abstracts and scientific articles). This second type of database is sometimes referred to as an online index or a bibliographic

database. Here, I will refer to both types of database as online databases.

Online databases have many advantages, including the fact that they are updated regularly to ensure they contain the latest information, and that they are of high quality. They provide access to a huge amount of information, and often have excellent search facilities. However, they do have disadvantages. They often require a subscription to the service provider in order to access them, and this can be expensive. Also, there is so much data that there is the potential to lose focus and drown in the data. Some databases require training in order to use the search functions effectively (training courses may be provided free). Also, the scope of the database is determined by the sources that the database researchers reviewed—they may look mainly at US or European sources. It is important to know the sources for the database, so that you are aware of its potential limitations.

The Internet

This is the one we all know and love! What did we do before Google?! The internet has many advantages, including being mostly free, and the vast amount of information that is available using online search engines. However, the disadvantages include the vast amount of information available using online search engines...! It is very easy to spend long hours chasing links through an array of web pages, and not be much wiser at the end. Also, it is not always easy to determine whether the information is up-to-date (check whether there is a date of last update at the bottom of the web page). Another issue is the reliability of the information. For example, Wikipedia can be very helpful. But be aware that just about anyone can upload information into it, so it is not a 'reliable' source and should never be used as a citation!

Verbal communication

Never underestimate the value of a well-placed phone-call to someone who you know is knowledgeable in a certain area. Or even a quick chat with your colleagues. It is amazing how much information we store in that grey-matter, and colleagues may at least point you in a starting direction.

Performing literature searches

This is one of the activities that medical writers do on a regular basis. It may be a formal, structured search to support a marketing application or a safety update, or it may just be a 'let's see what's out there' search to support a

¹ Based on the EPDP foundation workshop "Information Sources for Medical Writers"

more free-form text. As mentioned above, online databases are available through service providers. Of course, we all prefer to use free databases, so the most famous, and probably most commonly used, is Medline.

Medline is available from the National Library of Medicine (NLM) and contains access to vast amounts of medical information from journals, chapters in books and symposia. It is updated several times a week, so it is up-to-date. It is available free from various service providers, including PubMed and NLM Gateway. Both service providers provide search tools that, in combination with Medline's online thesaurus (called MeSH [medical subject headings]), allow us to locate exactly the information we want (with a bit of practice!). Indeed, this database contains so much information that it is tempting to use it as a single source for our literature searches. But beware! Medline has its limitations. Although it contains information from as far back as 1950, it has a bias towards US sources, and does not cover European literature as comprehensively. Read on...

EMBASE, the Excerpta Medica database, covers biomedical and pharmaceutical fields, is updated weekly and, like Medline, has its own thesaurus (called EmTree) to aid searching (although note that MeSH and EmTree terms are often slightly different). This database is not available free, but is available by subscription through various service providers. Since it is not free, fewer of us use it. But it is important to note that approximately one third of the information that is on EMBASE is not available on Medline, and vice-versa! Although EMBASE only goes back to 1974, it has a more comprehensive coverage of European data, and has a better coverage of drug related articles, trade-names and manufacturers for drugs and devices.

So if you need to do a comprehensive worldwide literature search on a subject, you should consider searching both Medline and EMBASE (at least). To do this, you will need to sign up with a service provider such as STN, DataStar or Dialog. These are by no means the only service providers out there so, if you are planning to start up a subscription, have a look for the provider that will be most efficient for your needs (you will need to look at the databases that are available, the costs, the search facilities, and the help features that are available). Access is usually via an annual subscription, although there is the possibility of doing one-off searches with some providers. Even within service providers, there are choices as to the service package you choose, so making this decision can take some hard thinking. However, once you have chosen your provider and package, you can search any of the databases that are available and combine the results (to remove duplicates), thus streamlining your search process. Regarding costs, be aware that as well as the annual subscription there is usually a per use cost. You will pay both for the time you are 'online' using the database, and for each result that you download. And that is before you source the actual article. If cost is important to you, you will need to think out your search strategy very carefully before you go online. Having said that, your clients can be confident that the results they

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receive from a multiple database search are more comprehensive than those from a simple Medline search.

Of course, Medline and EMBASE are not the only useful databases for literature searching. Other databases are available through service providers that include data on life sciences, conferences, and some more specific areas.

Other information available via online databases

There are huge numbers of databases available through service providers, and any one of these could contain just the information you are looking for. Of use to regulatory writers, IMS provide databases that cover the licensing status and history of drugs in development, as well as launched products by country and date of launch, along with details of composition and pack information. Pharmaprojects provides similar information on drugs in development, launched products, and discontinued drugs, while Adis R&D Insight contains information on drugs in development.

If you are looking for an in-depth review of clinical trials in a particular therapeutic area or indication, then Adis Clinical Trials Insight could be the one for you. Key papers are evaluated and presented in a structured format to provide an evaluation of the study, the comparative treatment outcomes, key messages and results. It also provides a percentage score for clinical trials as an independent guide to the quality of the trial, design and reporting.

Selected URLs:

Database service providers:

STN:

www.stn-international.de

Dialog/Datastar:

www.dialog.com

Ovid (SilverPlatter):

<http://www.ovid.com/site/products/index.jsp?top=2>

Databases available free:

PubMed (Medline):

www.ncbi.nlm.nih.gov/sites/entrez

NLM Gateway:

<http://gateway.nlm.nih.gov/gw/Cmd>

NLM (access to all databases):

<http://www.nlm.nih.gov>

Medical writing:

CMA Medical Writing Centre:

http://www.cma.ca/index.cfm/ci_id/8452/la_id/1.htm

World Assembly of Medical Editors:

www.wame.org

W.Strunk "Elements of Style"

www.bartleby.com/141

ACS Style Guide

<http://www.oup.com/us/samplechapters/0841234620/?view=usa>

ICMJE:

<http://www.icmje.org/>

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There are also various databases containing information on drug toxicity, including RTECS, ToxFile, and ToxCenter. Note that several toxicology databases are also free via NLM Gateway.

If you are particularly interested in epidemiological information, you may be interested in the Incidence and Prevalence Database, which contains epidemiology, incidence, prevalence, morbidity, mortality, trends, cost, risk-factors, and disease classifications. It is biased towards US data, contains information from 1988 onwards, and is updated quarterly.

If you are interested in natural or complementary medicines, you may find the Allied and Complementary Medicine or Natural Products Alert Databases helpful.

This is only a brief taster of what is available—there are hundreds of databases out there. Take a look at some of the service provider database information and see whether any of the databases could make your life easier.

Searching the Internet

The internet is such a vast interconnecting web of information that searching it effectively is a considerable challenge. Many of us (myself included) often take the lazy option and ‘Google’ a keyword. And to be fair, it often works! I often use Google to find regulatory guidance that is almost impossible to find on the official regulatory site. However, there are times when we need to perform a more formal search, or where the search term is not simple, and that is where we can come unstuck. Some tips. Firstly, choose your search engine carefully. Although Google is a wonderful tool, there are other search engines (e.g., Yahoo, AltaVista). Dogpile is a search engine which searches the major search engines, so if you have a very obscure term, this may be a good place to start. Secondly, you may reduce the number of non-medical hits if you use a medical search engine (e.g., Health on the Net, Medscape, Medical World Search). Thirdly, ALWAYS look at the ‘help on searching’ section in the search engine you choose, and almost always use the advanced search function to help you limit the strategy. Remember that if you use several words in your search, the engine will look for each of them independently. So if you want to look for a specific multi-word term (e.g., epidermal growth factor), put it in quotation marks (“epidermal growth factor”) to ensure that the engine only retrieves hits containing the entire term.

Internet resources

In this last section, I will provide information on the websites that I consider to be particularly useful to a medical writer. There are a lot more that I do not have time and space to discuss here. If you think there is a really good website that I have not cited, please let me know.

Journal articles

It is not always easy to get access to an article without having to pay a fee (and a copyright fee). However, there are some sites to help you find articles that can be accessed for free, including PubMed Central from NLM, Free Medical Journals, and BioMed Central. Of course, if you cannot access the article for free, you will have to buy it. There are

various sources, including service providers (as discussed above), the British Library, and Science Direct.

Regulatory information

Each country and geographical area has its own regulatory authority website (e.g., the European Medicines Agency [EMA] and the Food and Drug Administration [FDA]). These are a useful source for regulatory information, particularly for guidelines, format and content of specific regulatory documents, templates, etc.

Evidence-based medicine

The Cochrane library is a very useful source of information. Access is free in a lot of countries: United Kingdom (UK), US, Canada, Finland, Norway, Poland, and others. It contains various databases, including the Systematic Reviews and Protocols database, which has reviews of randomised trials (some with meta-analyses), other reviews, Methods Studies, Health Technology Assessments, and National Health Service (NHS) Economic Evaluations. There is also a link to the Health Economic Evaluations Database, as well as several online books and encyclopaedias.

Clinical trial information

Clinical trial information (both ongoing trials and results) can be accessed via the search portal of the International Federation of Pharmaceutical Manufacturers and Associations (IFPMA), including the following three websites:

- ClinicalTrials.gov: A registry of federally and privately supported clinical trials conducted in the US and around the world, since February 2000.
- Current Controlled Trials: An international register of ongoing randomised controlled trials, since 1998.
- Pharmaceutical Research and Manufacturers of America (PhRMA): Clinical study results (mainly phase 3 and 4) in a standardised format, since October 2002.

Prescribing information

It can quite often be difficult to find prescribing information, particularly Summaries of Product Characteristics (SmPCs). Although I frequently revert to Google (!), there are some useful websites. For the UK, try the Medicine Guides, which includes the electronic medicines compendium (eMC), SmPCs and Patient Information Leaflets (PILs). For US-biased information, try RXList, which provides all sorts of prescribing information, including patient monographs, and also has a pill identifier and medical dictionary. However, trying to find country-specific information is still a struggle.

Medical writing

Lastly, since we are medical writers, it is probably helpful to have some medical writing resources. The Canadian Medical Association Medical Writing Center has lots of useful writing help, and contains links to all sorts of useful medical writing information. The World Assembly of Medical Editors (WAME) can also be helpful. Bartleby.com provides access to the “Elements of Style” by William Strunk, although there is debate as to the value of

some of the advice in this book (see page 89 in this issue. The American Chemical Society (ACS) book *The ACS Style Guide: A Manual for Authors and Editors* from Oxford University Press is also a useful resource. When preparing manuscripts, you will need to look at the Uniform Requirements for Manuscripts Submitted to Biomedical Journals: Writing and Editing for Biomedical Publication, which is available from International Committee of Medical Journal Editors (ICMJE).

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I hope you have enjoyed our journey through the various information sources available. Hopefully, you have even found a new resource that will make your work easier. I am looking forward to hearing about all those great resources that I have missed...

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Some thoughts on medical writing

"In a nutshell then, the darkest interpretation of the story so far is that medical writing in English is often bad to the point of dreadful. Its exponents, or certainly the younger ones, have passed through an increasingly restrictive and specialized system of education in which the placental nourishment of English literature is severed at a tender age. They then find themselves required, largely without formal guidance, to furnish evidence of their abilities—though one might ask, abilities of what?—by writing and having published academic papers. The models for these great works are their colleagues' academic papers, of variable quality, many of which have not been subjected to any significant editorial process whatsoever. In words that suit the topic: there exists the potentiality for an on-going vicious circle situation."

This paragraph appears on page 21 of our book [1]. I remember it was written by Martin and he was spot on. An added problem is that most writers simply do not care. Perhaps they know that in all likelihood no one will read what they have written, most published work remaining unread; certainly they do not really care whether anyone reads it or not, because all that matters is that it is published and can appear on a curriculum vitae. Electronic publication will not bring improvement.

I spent many years rewriting papers. In general, writers (I cannot call them authors) whose first language was not English were grateful, sometimes effusively so; writers whose first language was supposed to be English were often defensively ungrateful, sometimes obnoxiously so. This is a generalisation, although I cannot remember a non-English writer who was ungrateful rather than merely non-committal.

There is no simple answer to poor medical writing. The roots of the problem are in the system of education, and there will be no improvement while education is seen by governments simply as a means of getting the population to work. I remember some telling arguments I've had about the meanings of words. In the most extraordinary, a group of workers was describing a laryngoscope blade. This is put in the mouth to enable anaesthetists to insert tubes into the trachea, but the relation of the blade to the anatomy of the mouth and throat is complicated, and this is what the group was describing. They talked about the length of the blade, which corresponded to the blade going into the mouth. Then they talked about the width of

the blade, which surely should be in the same dimension as the width of the mouth. But no! This group described the width of the blade in the same dimension as the opening of the mouth, i.e., as the blade fitted between the upper and lower teeth: what anyone with common sense and a reasonable vocabulary would call the depth. When I stood up and said this was tantamount to calling the left the right, I was informed that it couldn't be changed because they had already had a paper on the same subject using their nomenclature. Try explaining to such people the difference between affect and effect, or imply and infer.

The passive is often praised because it celebrates the 'passive observer'. All that matters is what is said, not who is saying it. I think this is complete nonsense but the passive is deeply entrenched. I still have my first year school science books. There it is: "A beaker was filled with 100 ml water and brought to the boil". Not: "I filled a beaker..."

Of all the reasons given for preferring complicated prose the most pervasive and pernicious is that ordinary prose is not serious enough. Again as appears in our book somewhere, I was at a meeting where some chap described how "Rats were haemorrhaged 5 ml..." I asked him why he didn't use the simpler (and correct, since transitive) "bled", and he replied that he thought haemorrhage was more scientific. Thus, to some, scientific is synonymous with complicated. True, some science is immensely complicated, but why that should mean its description should be similarly complicated escapes me. Remember also that for doctors knowledge is power, and telling a patient that they have erythema will impress more than telling them they have a red rash.

Why are journalists better writers than scientists? As Tim Albert says, if a journalist doesn't come up with a punchy first sentence, the reader will move on to the next story [2]. No one is forced to read a piece from a journalist, but medical scientists have to read research papers, no matter how badly written.

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References:

1. Goodman NW and Edwards MB. *Medical Writing A prescription for clarity* Third edition. Cambridge University Press, 2006.
2. Albert T. *A-Z of Medical Writing*, BMJ Books 2000, p66 (see entry under **Introductions**)