# Tertiary Drug Information Resources

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At the end of this lecture (and possibly after some studying!), you should be able to:
- define the term "tertiary drug information resources."
- describe situations where tertiary resources may be useful for locating information.
- identify important tertiary literature frequently used by pharmacists.
- use tertiary resources to locate an answer to a drug information question.

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What are examples of drug information questions that you have been asked?

(Note: you may use the same question for this class and your herbal medicine elective)

**Tertiary resources are summaries of available information in an understandable format.** Examples include textbooks, reference texts, databases, review articles, lecture notes, and web sites.

Strengths
- Tertiary resources are the best starting point for finding the answer to drug information queries. Most answers to questions you are asked will be found in a tertiary resource.
- They are time-efficient to use compared to examining primary literature yourself.
- Because they summarize information from many sources, they may contain information important to the question which you might miss if you consulted only one piece of the primary literature.
- Tertiary resources often provide background information. For example, you may be asked about the treatment of choice for a sinus infection. Many reviews of sinus infections will also include a short summary of the epidemiology and microbiology of sinus infections, which can help you better understand and remember the treatment alternatives.
- Tertiary resources are generally more accessible to the average pharmacist than secondary or primary resources.

Limitations
- A literature summary is only as good as its author(s).
  - All authors will have interpretation bias.
  - Author(s) may not have the expertise to correctly interpret the literature or may not have consulted the literature (opinion versus fact).
  - Author may not write well.
  - You may have no information about the author.
- Information may not be complete.
  - Literature search may not be extensive.
  - Space limitations of publisher may limit amount of information that can be included.
- Information may be out of date.

- Tertiary resources which draw on information from other tertiary resources can perpetuate incorrect information.

## Tertiary resources you will use

**General medication information**. You will use these resources for questions involving indications, pharmacology, pharmacokinetics, precautions and adverse effects, administration and dosing, drug interactions, and available commercial products.

- Drugdex (Micromedex) *on-line, via Healthlinks*
- Facts and Comparisons (eFacts) *on-line, via Healthlinks*
- AHFS (Stat!Ref) *on-line, via Healthlinks*
- USPDI-I (Stat!Ref) *on-line, via Healthlinks*
- [Physician's Desk Reference (PDR)] *available on-line, but not via Healthlinks; medical, but not pharmacy students can get this for free; old copies of the book are in the PCLC*

**Natural Product Resources**

- Natural Medicines Comprehensive Database *on-line, via Healthlinks*
- Review of Natural Products (eFacts) *on-line, via Healthlinks*
- AltMedDex (Micromedex) *on-line, via Healthlinks*
- Natural Standard Online *on-line, via Healthlinks*
- HerbMed and American Herbal Products Association *on-line at www.ahpa.org*. These are quasi-tertiary resources, because links to other tertiary resources are available. They are also secondary resources (indexing) as they connect you to PubMed for info about specific studies. HerbMed is assembled by the Alternative Medicine Foundation and AHPA by a consortium of herbal product manufacturers. You will find the information on each to be similar.

**Disease state information**. You will use these resources to better understand the disease states

- UpToDate *on-line, via Healthlinks*
- The Merck Manual (www.merck.com) *on-line, via Healthlinks*
- Harrison's Online *on-line, via Healthlinks*
- medical specialty textbooks (MD Consult) *on-line, via Healthlinks*

**Pharmacotherapy references**. Use these for general information about treatment alternatives for specific disease states.

- Pharmacotherapy: a Pathophysiologic Approach *book only*
- Applied Therapeutics: The Clinical Use of Drugs *book only*

**Over-the-counter Drugs**

- Handbook of Non-Prescription Drugs *book only; in PCLC*

**Drug Interaction references**

- Drug Interaction Facts (eFacts) *on-line, via Healthlinks*
- Hansten and Horn's Drug Interactions *book only; in PCLC*

**Terminology**

- medical dictionary; Stedman's is *on-line, via Healthlinks*

- medical abbreviations (eFacts) *on-line, via Healthlinks*

**Laboratory Tests**
- Laboratory test information (online)
- Normal laboratory values (eFacts) *on-line, via Healthlinks*
- Basic Skills in Interpreting Laboratory Data *book only; in PCLC*

**Drug Identification**
- Identidex (Micromedex) *on-line, via Healthlinks*
- Drug/Imprint Index (eFacts) *on-line, via Healthlinks*
- Martindale (Micromedex) for non-US drugs *on-line, via Healthlinks*

**Bioequivalence**
- Orange book; *on-line: www.fda.gov*

**Drug Prices**
- Redbook *book only; in PCLC*
- Mosby's Drug Consult (MD Consult). This is also general medication information on this site. *on-line, via Healthlinks*

**Drug IV Compatibility**
- Handbook on Injectable Drugs *book only; in PCLC*

**Drug dosing in special populations**
- Drugs in Pregnancy and Lactation *book only; in PCLC*
- Pediatric Dosage Handbook *book, PDA versions available*
- Drug Prescribing in Renal Failure *book only; in PCLC*
- pharmacokinetic equation reference *book only*
- Geriatric Dosage Handbook *book, PDA versions available*
- The Sanford Guide to Antimicrobial Therapy *book in PCLC; PDA version available for purchase*

**Extemporaneous compounding**
- Remington: the Science and Practice of Pharmacy *book only; in PCLC*
- A Practical Guide to Contemporary Pharmacy Practice *book only*

**Patient Counseling**
- Medline Plus (medications, medical conditions, trials) *on-line at medlineplus.gov*
- Med Facts: Patient Counseling (eFacts): in English and Spanish *on-line, via Healthlinks*
- CareNotes (Micromedex) *on-line, via Healthlinks*

**Toxicology**
- Poisindex (Micromedex) *on-line, via Healthlinks*

**Clinical Guidelines**
- National Guideline Clearinghouse *on-line at www.guideline.gov*

- Cochrane Library *on-line, via Healthlinks* This resource is unique and designed to support practitioners of "evidence-based medicine" (EBM), which is when evidence from studies is combined with practitioner expertise and patient preference to provide the best care possible to that patient. There are 7 databases in the Cochrane Library:
  - *The Cochrane Database of Systematic Reviews*
  - *The Database of Abstracts of Reviews of Effects* (DARE)
  - *The Cochrane Central Register of Controlled Trials (CENTRAL)*
  - *The Cochrane Database of Methodology Reviews*
  - *The Cochrane Methodology Register*
  - *The Health Technology Assessment Database*
  - *The NHS Economic Evaluation Database*

  The first database (The Cochrane Database of Systematic Reviews) is the one you will use the most.

**Meta-search engines**

These engines pull from a variety of search engines to help you access both tertiary and primary literature (so they are really a combination of 3° and 2° resources). They are categorized as EBM resources

- TRIP+ database; TRIP = turning research into practice; started by an employee of the UK National Health Service; updated monthly; links to many national health care health quality and informatics web sites
- PrimeAnswers; funded by a NLM grant, this tool was developed by our own health science library to facilitate access to multiple sources of health information; in addition to searching a wide variety of textbooks, health information web sites, and drug databases, it has other nifty tools, such as links to calculators, a dermatology atlas, and the UWMC antibiogram
- SUMsearch; administered by University of Texas Health Science Center; its technology is dated

## Other health information web sites

Another resource you will use frequently is Google®. It will help you find a surprisingly large number of resources, some of which will be useful and many of which will not. You will have to judge quality yourself. Do not quote information from low quality web sites. Things to think about when considering quality of a tertiary resource assembled by an individual or organization:

- What are the qualifications of the author(s)? (degrees/specialties, affiliations, prior publications in the area) How likely is it that these qualifications might result in interpretation bias? Does the author(s) give you a sense of knowing the topic thoroughly by explaining difficult concepts well and by answering or addressing common questions that a clinician would have?
- Are facts referenced? If so, are the references credible? Are they relevant to the topic being discussed?
- Is the material on the web site updated frequently? When was the resource published? Updated?
- Is the resource clear, concise, and easy to read?
- A poor web site resource will be wordy, disorganized, unreferenced, not updated frequently (or no update information), have no information about the group or author or will try to present an author as being more qualified than that person or group really is, or try to sell you

something. Always be leery of web sites that look amateurish—they are, and so are unlikely to be reliable sources of information. Amateurish web sites often have a non-white background, pictures (annoying if animated) that have nothing to do with the information they are presenting (the web author/s have stolen these from other web sites), non-uniform size, style, and colour of font, and no information about the site author and information sources. Remember these three important points when examining a web site put together by an individual or special interest group:

- People can claim anything. That doesn't mean that what they say is true. Look for evidence to back up claims.
- Use ≠ effectiveness. Just because a medication is used for a condition, doesn't mean it works. It also doesn't necessarily mean it's safe.
- Emotion ≠ evidence. Web sites that use emotion-evoking words but provide no evidence to back up their claims should not be trusted.

- There are some independent agencies that will examine web sites and certify them for quality. They are:
  - HONcode; Health on the Net Foundation, created in 1995; a non-profit organization accredited by the UN; criteria considered: authority, complemenarity, confidentiality, attribution, justifiability, transparency of authorship, transparency of sponsorship, honesty in advertising and editorial policy
  - AMA; American Medical Association; criteria considered: content quality, navigability, clear ownership, apparent funding/sponsorship, expert review, date of posting/revising, source of content, integrity of links, location of advertising, privacy and confidentiality of patient information
  - DISCERN; based in Oxford and funded by the UK National Health Service; criteria considered: reliability, credibility, relevancy, transparency of author/sponsor, transparency of sources, balance/bias, presence of working links to additional information; identification of uncertain areas, treatment description + clear risks/benefits of treatment/no treatment/alternative treatments

## Using these resources

You must be familiar with all of these sources by the time you graduate. There will be questions on them in your licensing exam.

**In-class self-study**. Which references would be good to check for the following questions?

Is there anything over-the-counter that I can use for my baby's diaper rash?

I'm taking prescription drugs for my anxiety but I want to use something natural instead, my sister told me kava works for her. How much kava would you recommend I take instead of the Paxil 30mg I'm taking now?

I've been taking Celexa 40mg every day for 3 months now and I've been sweating more than usual. Could Celexa cause this?

I just prescribed Lipitor for my patient. He called me because he says he found on the internet that Lipitor interacts with grapefruit juice. He drinks a glass every day for breakfast and doesn't want to stop. What should I do?

Additional self-study questions are included at the end of these lecture notes.

## Citing these resources

If your tertiary resource comes from a **biomedical journal**, use:
Lastname INITIALS, Lastname INITIALS, Lastname INITIALS, et al. Title of article. Journal Title Abbreviation year;volume:beginning page number – ending page number.

If your tertiary resource comes from a **paper textbook**, use:
Lastname INITIALS, Lastname INITIALS, Lastname INITIALS, et al. Title of article. Journal Title Abbreviation year;volume:beginning page number – ending page number.

If your tertiary resource is an **electronic database or web site**, use:
Lastname INITIALS. Title of article. In: Name of resource. [Internet] Location: Publisher; ©year [date updated;date accessed]. Available from: paste internet address here.
*note:location = city (state); format for international dates, such as those you find from internet resources are YYYY Mon DD, e.g., 2004 Oct 5*

## The tertiary resources assignment

There are 5 parts to this assignment.

**Part 1** covers drug references. You will use these references:
- Drugdex (Micromedex)
- Facts and Comparisons
- AHFS or USPDI (Stat!Ref)
- Natural Medicines Comprehensive Database

**Part 2** covers disease references. You will use these references:
- UpToDate
- The Merck Manual (www.merck.com)
- Harrison's Online
- medical specialty textbooks (MD Consult)

**Part 3** covers references (mostly electronic) other than general drug and disease references. You will use any of the references you were given in these lecture notes that occur after the disease references (see above to determine disease references).

**Part 4** covers non-reference text web resources.

**Part 5** covers mostly book resources, including
- Drugs in Pregnancy and Lactation
- Handbook on Injectable Drugs

- Basic Skills in Interpreting Laboratory Data
- Hansten and Horn's Drug Interactions
- Pharmacotherapy: a Pathophysiologic Approach or Applied Therapeutics
- Handbook of Non-Prescription Drugs

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**Self-study questions for this lecture:**
A woman in your pharmacy tells you that her brother has just been diagnosed with hemochromatosis. She wants to know more about it. Which database will probably give you the best information about this condition?
a) Applied Therapeutics
b) Micromedex
c) Drugs in Pregnancy and Lactation
d) UpToDate

A patient wants to know if her garlic capsules (she buys these at the grocery store) will interact with the warfarin she gets filled at your pharmacy. Which of the following resources would give you the best information for answering this question?
a) Natural Medicines Comprehensive Database
b) Drug Interaction Facts
c) a review article examining the effects of herbal medications on warfarin
d) Micromedex

A nurse calls you and wants to know whether she can inject furosemide into the Y-site of an IV line concurrently infusing dopamine. You would want to check on this in:
a) Remington: the Science and Practice of Pharmacy
b) Pharmacotherapy
c) Facts and Comparisons in eFacts
d) Handbook on Injectable Drugs

A patient developed bronchitis while on vacation in England and was given an inhaler of salbutamol. His American physician isn't familiar with this drug and has called you in order to determine the most similar drug available in the US. Which resource will be the most likely to help you answer this physician's question?
a) Facts and Comparisons in eFacts
b) Geriatric Dosage Handbook
c) National Guideline Clearinghouse
d) Martindale

You are trying to determine whether or not a new generic form of levothyroxine (a thyroid drug) is not as bioequivalent as another form which a patient had been previously taking. Where is the best place to find this information?
a) Basic Skills in Interpreting Laboratory Data
b) The Merck Manual
c) Orange book
d) Review of Natural Products

You have been asked by your pharmacy director to find out if the patients diagnosed with a heart attack are being discharged with prescriptions recommended by a national panel of experts. The first place you would check is:

a) National Guideline Clearinghouse
b) Pharmacotherapy: A Pathophysiologic Approach
c) Heart Disease: A Textbook of Cardiovascular Medicine (in MD Consult)
d) Identidex

A patient asks you about ichthammol ointment, which her grandmother said she bought at the pharmacy and used for cuts and scrapes, as long as she can remember. You are unfamiliar with this medication. The best place to look for information about it would be:

a) UpToDate
b) Handbook of Non-Prescription Drugs
c) Natural Medicines Comprehensive Database
d) Geriatric Dosage Handbook

A patient just started citalopram (Celexa®) and is complaining that her eyes are dilated. What reference would likely tell you whether or not this is a side effect of Celexa?

a) The Merck Manual
b) Drugdex
c) Psychiatric Secrets (textbook in MD Consult)
d) Medline Plus

A physician phones you. He has a patient with a skin infection, who is allergic to penicillin. The doctor is nervous about giving a cephalosporin and wants to know if any other oral agent will likely cure the skin infection. Assuming you don't know the answer to this off the top of your head, you would most likely check which of the following references?

a) Applied Therapeutics: The Clinical Use of Drugs
b) Basic Skills in Interpreting Laboratory Data
c) The Sanford Guide to Antimicrobial Therapy
d) UpToDate