

Where to find information about drugs

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SUMMARY

Good medicines information is critical to medical practice. Choose high-quality, pre-appraised sources first and make sure they are current.

Select the information that is most relevant to the needs of your particular patient.

Take the time to become familiar with the features of the resources you use. Australian Medicines Handbook, Therapeutic Guidelines, *Australian Prescriber* and NPS MedicineWise cover most routine clinical practice needs.

Introduction

Using reliable information resources informs safe and consistent practice. There is so much information available on medicines that it can be hard to identify accurate, current, unbiased and evidence-based resources.

Questions to consider when selecting an information source

Not all information sources are reliable, so it is useful to ask yourself some simple questions to help you appraise them.

Is it evidence-based?

Save time by looking at high-quality, pre-appraised evidence sources first, such as the Australian Medicines Handbook (AMH), Therapeutic Guidelines and BMJ Best Practice. These are sources which have done the work of searching and critically appraising the evidence for you. They integrate this evidence with expert review to produce the best advice currently available. Systematic reviews and meta-analyses are the next best evidence. Reviews that are not systematic, older texts, and clinical trial reports (even randomised controlled trials) are lower quality evidence and require critical appraisal.

Is it current?

Check the date of publication or review date for guidelines, websites and texts. Older information and texts should be used with caution. Medicine changes rapidly and many previously accepted practices have later been shown to be incorrect.

Is it relevant to your patient?

The type of information you require dictates where you should look first. Consider individual patient needs. Specific information may be needed for older people, children, pregnant or lactating women, those with organ impairment or comorbidities (see Table).

Sources of medicines information

AMH, Therapeutic Guidelines and NPS MedicineWise cover most commonly prescribed medicines and conditions and should be among the first resources consulted. This information is evidence-based, current and reflects Australian best practice. The layout of AMH and Therapeutic Guidelines also allows rapid access to the information needed to prescribe safely. NPS MedicineWise and *Australian Prescriber* provide free, reliable, independent information on drugs and therapeutics. NPS MedicineWise produces a number of resources prescribers can rely on to stay informed. *Australian Prescriber* covers therapeutic issues and controversies, new drugs and their place in therapy, and provides practical reviews on drug use and diagnostic tests.

Resources like BMJ Best Practice, Clinical Evidence, DynaMed Plus, UpToDate, and current evidence-based guidelines provide rapid access to information on treatment of specific conditions and should be consulted next.

An alphabetical listing of resources and access methods to drug information is given in the Box.

Pharmaceutical companies can provide information on their own products, including detailed information on stability, excipients and adverse effects.

Product information and consumer medicines information

The product information contains basic information on a medicine including its ingredients, pharmacokinetics, mechanism of action, approved indications, doses, contraindications, precautions, adverse effects and appearance. It does not contain comparative information. The product information is written by the pharmaceutical company sponsor, then reviewed and amended by the Therapeutic Goods Administration (TGA).

Table Sources of drug information – a quick guide

Category	Recommended sources	Electronic format	Comments
General			
Brief, evidence-based, current	AMH	M	Print and online
Product information	TGA*		TGA website lists most current product information
	MIMS	i,A,M	Has unique additional features
	AusDI	M	Has unique additional features
New drugs	NPS Radar*		
	<i>Australian Prescriber</i> *	M	
	AusPAR*		From TGA website – detailed information on safety, efficacy, pharmacokinetics and actions
	PBS public summary documents*		From PBS website – information on decisions to subsidise or not subsidise
Detailed	Micromedex	i,A	Print and online, may be available free to public hospital employees, students, universities
	Martindale – the Extra Pharmacopoeia		Martindale also available via Micromedex, BMJ Best Practice
	AHFS Drug Information		Print and online, published yearly
	AusPAR*		Particularly for new drugs or newly approved indications
Pharmacology	Goodman and Gilman's The Pharmacological Basis of Therapeutics	ebook	Classic pharmacology text
Pharmacokinetics	Goodman and Gilman's The Pharmacological Basis of Therapeutics, Micromedex, product information*		
	Pharmacokinetics Made Easy		Information on pharmacokinetic principles, not individual drugs
Therapeutic choice			
Brief, evidence-based, current	Therapeutic Guidelines	M	Print (individual subject titles) and online (eTG Complete)
Information on new drugs, therapeutics, evolving issues	NPS MedicineWise – Heath News & Evidence*, MedicineWise News*, RADAR*		Australian
	Australian Prescriber – The Doctor's Bag app*	i,A	App covers doses of emergency drugs in the PBS Prescriber Bag, and anaphylaxis management
	AusPAR*		
Detailed	BMJ Best Practice, DynaMed, Clinical Evidence	i,A,M	
Guidelines	NHMRC guidelines portal*		Australian
	RACGP clinical guidelines, endorsed resources and accepted clinical resources*		
	NICE* (UK), SIGN* (UK), National Guideline Clearinghouse* (USA)		Non-Australian sources may recommend treatments not available locally
Rarer conditions	UpToDate	i,A,M	Subscription rates vary

* information is free, A android app available, i iPhone app available, M mobile website

Table Sources of drug information – a quick guide (continued)

Category	Recommended sources	Electronic format	Comments
Drug interactions			
Basic information	Product information (available through TGA*, NPS MedicineWise*, MIMS, AusDI), AMH		Further detail may need to be sought
Alerts	Available in most prescribing and dispensing software		Generally brief information, further detail may need to be sought
Interaction checkers	Micromedex, Lexi-Interact	i,A	Lexi-Interact available via UpToDate (extra fee)
	MIMS, AusDI		
	Natural Medicines database		Covers complementary and alternative medicines + traditional medicine interactions
Detailed information	Stockley's Drug Interactions		Print and online, authoritative texts
Complementary and alternative medicine interactions	Natural Medicines database		Online
	Stockley's Herbal Medicines Interactions		Print and online via Medicines Complete
Free interaction checkers	Medscape*		Has other useful features
	Epocrates*	i,A	Has other useful features and additional paid content
Other sources			
Drugs in pregnancy and lactation	The Women's Pregnancy and Breastfeeding Medicines Guide		Australian, brief and clear information, now available as an online database (see page 105)
	Drugs in Pregnancy and Lactation: A Reference Guide to Fetal and Neonatal Risk		Print and online, excellent text
	Micromedex (Reprorisk database)		
	MotherSafe*, Royal Women's Hospital Obstetric Drug Information Service*		Specialist phone services
	LactMed*		Practical, detailed information (US National Library of Medicine)
	Medications and Mothers Milk	i,A	Print and online
Drugs in paediatrics	AMH Children's Dosing Companion	M	
	PEMSoft	i,A	
	NeoFax	i	Information on drug use in neonates, available as an extra subscription from Micromedex
	Paediatric Injectable Guidelines, Pediatric Injectable Drugs (The Teddy Bear Book)		Specialist texts on administration of parenteral medicines to children
	Paediatric Emergency Medication Book		Medication dosing for resuscitation (see page 95)
Complementary and alternative medicines	Natural Medicines database		Online. Provides detailed information on complementary and alternative medicines, and a drug interaction checker
	Stockley's Herbal Drug Interactions		Print and online
	Medicines Complete (online versions of Stockley's Herbal Drug Interactions, Herbal Drugs, and Dietary Supplements)		Online
	MedlinePlus*		
	National Centre for Complementary and Integrative Health*		

Table Sources of drug information – a quick guide (continued)

Category	Recommended sources	Electronic format	Comments
Other sources (continued)			
Administration of medicines	Product information*, MIMS, AusDI		Brief information
	Martindale, AHFS Drug Information		More detailed information
	Micromedex IV Compatibility	i	
	Australian Injectable Drugs Handbook		Information on administration routes, rates, and compatibility of injectable medications
	Australian Don't Rush to Crush Handbook	M	Print and online via MIMS, information on crushing and dissolving drugs for patients with swallowing difficulty or receiving enteral tube feeds
	Handbook of Drug Administration via Enteral Feeding Tubes		UK text
Renal impairment	Product information*, AMH, Therapeutic Guidelines		Brief information
	Micromedex, Martindale, AHFS Drug Information		Detailed information
	The Renal Drug Handbook		Print and online, detailed UK resource
	Seyffart's Directory of Drug Dosage in Kidney Disease		Detailed European resource, lacks information on continuous renal replacement therapies
Databases	PubMed*/Medline, Embase		References from these sources require critical appraisal
Evidence-based medicine resources	Evidence Search (NICE, UK)*		
	Cochrane library*		
	TRIP database*		Results filtered on relevance, quality and currency
Consumer information			
Official CMI	Available through TGA*, MIMS, AusDI, NPS MedicineWise		Official basic industry-written, TGA-approved information
Other information*	NPS MedicineWise		
	HealthDirect		
	Better Health Channel		Funded by the Victorian Government
	UpToDate patient information		Information often US based
	MedlinePlus (USA)		
	Mayo Clinic (USA)		

*	information is free	MIMS	originally Monthly Index of Medical Specialties
A	android app available	NHMRC	National Health and Medical Research Council
i	iPhone app available	NICE	National Institute for Health and Care Excellence (UK)
M	mobile website	PBS	Pharmaceutical Benefits Scheme
AMH	Australian Medicines Handbook	RACGP	Royal Australian College of General Practitioners
AusDI	Australian Drug Information	SIGN	Scottish Intercollegiate Guidelines Network (UK)
AusPAR	Australian Public Assessment Report	TGA	Therapeutic Goods Administration
CMI	Consumer Medicines Information	TRIP	Turning Research into Practice
IV	intravenous		

Box Alphabetical list of resources and access methods to drug information

- AHFS Drug Information 2016. American Society of Health-System Pharmacists. www.ahfsdruginformation.com
- AusDI www.ausdi.com.au
- AusPARs www.tga.gov.au/auspars-questions-answers
- Australian Don't Rush to Crush Handbook: Therapeutic Options for People Unable to Swallow Solid Oral Medicines. Society of Hospital Pharmacists of Australia. www.shpa.org.au
- Australian Injectable Drugs Handbook. Society of Hospital Pharmacists of Australia. www.shpa.org.au
- Australian Medicines Handbook <http://shop.amh.net.au>
- Australian Prescriber* www.nps.org.au/australianprescriber
- Better Health Channel www.betterhealth.vic.gov.au
- BMJ Best Practice <http://bestpractice.bmj.com/best-practice/welcome.html>
- Cochrane Library www.cochrane.org
- Drugs in Pregnancy and Lactation: A Reference Guide to Fetal and Neonatal Risk. 10th ed. Briggs GG, Freeman RK. Philadelphia (PA): Lippincott Williams & Wilkins; 2015.
- DynaMed Plus www.dynamed.com/home
- Epocrates www.epocrates.com
- Goodman & Gilman's The Pharmacological Basis of Therapeutics. 12th ed. Brunton LL, editor. New York: McGraw-Hill; 2011.
- LactMed <http://toxnet.nlm.nih.gov/newtoxnet/lactmed.htm>
- Lexi-Interact <http://webstore.lexi.com/Lexi-Interact> (also available via UpToDate and Lexicomp subscriptions)
- Martindale: The Complete Drug Reference. 38th ed. Brayfield A, editor. London: Pharmaceutical Press; 2014.
- Mayo Clinic (USA) www.mayoclinic.org
- MedlinePlus (USA) www.nlm.nih.gov/medlineplus
- MedlinePlus Herbs and Supplements www.nlm.nih.gov/medlineplus/druginfo/herb_All.html
- Medscape www.medscape.com
- Micromedex Solutions [Database] www.micromedexsolutions.com
- MIMS Australia www.mims.com.au
- National Centre for Complementary and Integrative Health <https://nccih.nih.gov> and <https://nccih.nih.gov/health/providers>
- National Guideline Clearinghouse (USA) www.guideline.gov
- Natural Medicines <https://naturaldatabase.therapeuticresearch.com/Logon.aspx?cs=&s=ND>
- NeoFax [Database] <http://micromedex.com/neofax-pediatric>
- NHMRC Guidelines www.nhmrc.gov.au/guidelines-publications
- NHS Evidence (UK) www.evidence.nhs.uk
- NICE (UK) www.nice.org.uk
- NPS MedicineWise www.nps.org.au
- NPS Radar www.nps.org.au/radar
- Paediatric Emergency Medication Book. Craig S, editor. Melbourne: Monash Children's Hospital; 2014.
- Paediatric Injectable Guidelines. Royal Children's Hospital Melbourne. <http://pig.hcn.com.au>
- PBS Public Summary Documents www.pbs.gov.au/info/industry/listing/elements/pbac-meetings/psd
- Pediatric Injectable Drugs (The Teddy Bear Book). 10th ed. Phelps SJ, Hagemann TM, Lee KR, Thompson AJ. Bethesda (MD): American Society of Health-System Pharmacists; 2013.
- PEMSoft <https://health.ebsco.com/products/pemsoft>
- Pharmacokinetics Made Easy. 2nd ed. Birkett DJ. Sydney: McGraw-Hill Education; 2009.
- Pregnancy and Breastfeeding Medicines Guide. The Royal Women's Hospital. <https://thewomenspbmg.org.au>
- RACGP Clinical Guidelines www.racgp.org.au/your-practice/guidelines
- RACGP Endorsed Resources and Accepted Clinical Resources www.racgp.org.au/support/advocacy/repstandendorsements/endorsements/#endorsements
- Seyffart's Directory of Drug Dosage in Kidney Disease. Seyffart G. Munich: Dustri-Verlag; 2011.
- Stockley's Drug Interactions www.medicinescomplete.com/mc/index.htm
- Stockley's Drug Interactions. 11th ed. Preston CL, editor. London: Pharmaceutical Press; 2016.
- Stockley's Herbal Medicines Interactions www.medicinescomplete.com/mc/index.htm
- Stockley's Herbal Medicines Interactions. 2nd ed. Williamson E, Driver S, Baxter K, editors. London: Pharmaceutical Press; 2013.
- TGA www.tga.gov.au
- TGA Prescribing Medicines in Pregnancy Database www.tga.gov.au/prescribing-medicines-pregnancy-database
- The Doctor's Bag app (*Australian Prescriber*) www.australianprescriber.com/the-doctors-bag
- Therapeutic Guidelines www.tg.org.au
- TRIP Database www.tripdatabase.com
- UpToDate www.uptodate.com/home
- UpToDate Patient Information www.uptodate.com/contents/table-of-contents/patient-information

For older or off-patent drugs, the product information may not reflect current accepted practice, and adverse effects and interactions information may not be up to date. For example, metformin is widely and safely used for type 2 diabetes in patients with creatinine clearances less than 60 mL/minute, despite this practice being contraindicated in the product information. Polycystic ovary syndrome is a recognised indication for metformin but is not listed in the product information.

The consumer medicines information is also written by the pharmaceutical company. It is based on the product information and provides clear, unbiased information to help patients take medicines safely.

The current product information and consumer medicines information are available from the TGA website, NPS MedicineWise and from compendia like MIMS and AusDI (previously AusDI Advanced or Catalyst). Many prescribing software packages use MIMS as their information source, while AusDI is the information source behind Medical Director.

Both MIMS and AusDI write their own abbreviated information for drugs and have features such as interaction checkers, gluten content, use in sport, and searchable product images that can help identify tablets and capsules. Each also has unique features. For an additional cost MIMS includes information on crushing or dissolving products for patients with swallowing difficulties or nasogastric tubes from the Society of Hospital Pharmacists of Australia's (SHPA) publication the Australian Don't Rush to Crush Handbook.

AusDI's unique features include information on lactose and latex content, and detailed independent drug monographs which cover approved and unapproved uses, mechanism of action, pharmacokinetics, interactions, dosage in age groups and organ failure, and use in pregnancy and lactation.

Australian Public Assessment Report

Australian Public Assessment Reports (AusPARs) are summaries of the TGA's evaluation of a new drug or changes to indications of an existing drug. It includes reasons for accepting or rejecting applications and detailed information on the quality, safety and efficacy of a drug. AusPARs are a useful source of information on new drugs not yet covered by pre-appraised references.

Public summary documents

Pharmaceutical Benefits Scheme (PBS) public summary documents outline the rationale behind the recommendations made by the Pharmaceutical Benefits Advisory Committee on whether or not a

drug should be subsidised. They include information on the drug's place in therapy, the evidence considered, financial impact, and the reasons for decisions.

Pharmacology texts and databases

Pharmacology texts provide information on how drugs work, how they compare to other drugs, their pharmacokinetics, interactions and uses. Goodman and Gilman's *The Pharmacological Basis of Therapeutics* is considered the gold standard text on pharmacology but there are many others. *Pharmacokinetics Made Easy* is a simple and helpful guide to practical pharmacokinetics.

Micromedex is a database containing drug monographs, an interaction checker, information on intravenous compatibility, drug use in pregnancy, Martindale (the UK standard reference on drugs), and a toxicology database (Poisindex). Some features require additional subscriptions. The monographs have detailed information on clinical use, adverse effects and comparative efficacy.

Clinical decision support tools

Clinical decision support tools help with diagnosis and treatment decisions at the point of care. They provide access to evidence-based guidelines and treatment algorithms. Some examples are BMJ Best Practice (based on BMJ's Clinical Evidence), DynaMed, and PEMSsoft (Paediatric Emergency Management).

Other evidence-based medicine sources

The TRIP database (Turning Research into Practice) is a search engine designed to find high-quality evidence quickly. Results can be filtered by type, for example systematic reviews, and scored for relevance, quality (by publisher) and currency, with higher ranked results appearing first.

The National Institute for Health and Care Excellence (NICE) provides Evidence Search, a search engine of several authoritative UK sources. The Cochrane Library is free within Australia and provides access to Cochrane reviews, critiques of other systematic reviews, economic evaluations and a large database of controlled trials.

Evidence-based guidelines such as Therapeutic Guidelines and the RACGP clinical guidelines provide information on diagnosis and treatment in specific conditions, but usually have little information on drugs other than dosage and indications.

UpToDate provides information on diagnosis and pathophysiology, but therapeutic recommendations may not be consistent with Australian practice. It may be useful for information on rarer conditions, for example those not covered by Therapeutic Guidelines.

Bibliographic databases

PubMed/Medline and Embase provide access to the medical literature and should ideally be used together. Both cover the major medical journals but they also have unique content, so using only one may mean that essential references are missed. Learning how to use them well can save time and improve the quality of information retrieved. The 'Clinical Queries' filters can save time by restricting results to clinical studies. If you do not have the time or skills to search properly, consult a medical librarian or medicines information specialist. Information found from literature searches requires critical appraisal.

Drug interactions

Many prescribing and dispensing software packages automatically check for drug interactions. MIMS, AusDI, Micromedex, Lexicomp, and UpToDate all provide interaction checkers. More detailed information on interactions and their management is available from specialised texts and databases such as Stockley's Drug Interactions.

Drug use in pregnancy and lactation

The product information rarely contains useful information on drug use in pregnancy or lactation.¹ The Women's Pregnancy and Breastfeeding Medicines Guide provides brief information on the safety of drug use in pregnancy by trimester, and in lactation. The print version was replaced by an online database in July 2015. More detailed information can be found in Briggs and Freeman's Drugs in Pregnancy and Lactation: A Reference Guide to Fetal and Neonatal Risk.

Micromedex has information on drug risk in pregnancy via the three databases in Reprorisk. There are two telephone advisory services: MotherSafe (NSW) and the Royal Women's Hospital (Victoria). Lactation resources include Medications and Mothers Milk (print and online), and free fact sheets from LactMed.

Paediatric drug dosing

The product information and standard texts often provide minimal advice on dosing in children. The AMH Children's Dosing Companion (which has replaced the Royal Children's Hospital's Paediatric Pharmacopoeia) contains information on drugs commonly used in children, but lacks information for premature neonates.

Complementary and alternative medicines

Reliable information on complementary and alternative medicines (including herbs and products used with or instead of conventional medicines) is harder to find than for conventional medicines.

One of the best resources is the Natural Medicines database. It has an interaction checker which includes conventional medicines and complementary and alternative medicines. The database also has information on indications, safety, efficacy, adverse effects, nutrient depletions, and use of complementary and alternative medicines in pregnancy, lactation and sport.

Medicines Complete offers three online resources – Herbal Medicines, Dietary Supplements and Stockley's Herbal Medicines Interactions. Reliable free information is available from MedlinePlus Herbs and Supplements and the National Centre for Complementary and Integrative Health, a US National Institutes of Health resource.

Drug administration

Information on drug administration beyond what is available in the product information is found in two Society of Hospital Pharmacists of Australia publications:

- the Australian Don't Rush to Crush Handbook (print, or online as an add-on subscription in MIMS) provides advice on which medicines can be altered for patients with difficulty swallowing or receiving tube feeds
- the Australian Injectable Drugs Handbook outlines the preparation, compatibility, administration, and stability of injectable drugs.

Renal impairment

The product information, AMH and Therapeutic Guidelines provide some advice on dosing in renal impairment with Martindale, AHFS Drug Information and Micromedex providing more detail. The Renal Drug Handbook contains more detail still. The Renal Drug Reference Guide, an Australian text, is also excellent but has not been updated since 2007.

Keeping up to date

The volume of new information published means keeping up to date is a challenge. NPS Radar, *Australian Prescriber's* new drugs section, NICE's Medicines Awareness Daily and Medscape can help by summarising important new information. Subscribing to the table of contents of relevant journals is also useful to keep up to date with new developments.

Where not to look

Wikipedia, Google and internet searches can uncover worthwhile information but they should not be relied on as the primary source of drug information. They provide background information

and show what information patients may be reading. While Google Scholar may retrieve more scholarly publications, searching is less precise than with medical databases and the quality of results is not consistent. It can be worth checking Google Scholar for full text articles. Finding the few useful references in Google or Google Scholar often takes far longer than a medical database search. PubMed/Medline, Embase, Cochrane and the TRIP database will provide more reliable references, and more precise results.

REFERENCE

1. Kennedy D. Classifying drugs in pregnancy. *Aust Prescr* 2014;37:38-40. <http://dx.doi.org/10.18773/austprescr.2014.018>

Conclusion

Your patients will benefit from the time you take to learn what resources best answer specific questions about medicines and their use. Seek advice if you are unable to find the information you need. NPS MedicineWise maintains a list of medicines resources including telephone services and free Australian resources. ◀

Conflict of interest: none declared

Book review

Paediatric Emergency Medication Book

Monash Children's Hospital Resuscitation Committee

Edited by Simon Craig

Melbourne: Monash Children's Hospital; 2014.

86 pages

This book provides a quick, easy-to-access, weight-based guide to resuscitation of infants and children. It includes medication dosing in resuscitation situations, endotracheal tube size and positioning, and emergency management of seizures, asthma, anaphylaxis and electrolyte disorders. The formatting, content and presentation have been carefully considered to achieve this aim and to make it a valuable resource.

Weight-based guidelines are presented for 2–80 kg, in a clear colour-coded format. The information for each weight is presented over two pages. It provides everything you need in a resuscitation setting at a glance, including tables for resuscitation, endotracheal tube size, and induction and paralytic drugs.

Information on drugs used in severe asthma, status epilepticus and electrolyte abnormalities is also included. Layout is the same irrespective of the

weight selected which helps readers to become familiar with this resource. Infusion guidelines are also provided, although many institutions may have these preprogrammed in their infusion pumps.

The book is spiral bound with sturdy laminated pages, making it waterproof and durable. It is easy to turn to the weight needed and access the information required in a timely fashion. The first three pages contain Advanced Paediatric Life Support (APLS) algorithms for basic and advanced life support, and status epilepticus.

This is an excellent resource for medical and nursing staff working with sick infants and children, be that frequently or occasionally, in an inpatient ward setting, mixed emergency department or paediatric emergency department. It provides clear, easily accessible important information in a visually appealing format. The section on electrolyte abnormalities is particularly useful. It could also be used as a resource for education and specifically simulation – APLS Australia have already adopted it for this use.

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