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Prescribing in the elderly

Background

Balancing medication use in the elderly is a complex task, made more difficult by the physiological changes and increased burden of disease seen with aging.

Objective

This article reviews recent literature and outlines the basic principles and problems of medication use in older people, and provides potential strategies to optimise prescribing.

Discussion

Competing risks and benefits complicate medication use in the elderly. General practitioners need to be aware of these risks and benefits in order to tailor the most appropriate treatment regimen to each individual patient.

Keywords: aging; prescriptions, drugs; drug utilisation; quality of health care; therapeutics



With the first of the 'baby boomer' generation turning 65 this year, and an estimated one in four Australians projected to be aged over 65 years by 2050, Australia's population is aging rapidly.^{1,2} This brings great challenges to primary care. In addition to being aware of the physiological changes of aging and their potential sequelae, general practitioners must balance the increasing complexity of comorbid diseases, target polypharmacy, and remain vigilant to potential medication misuse.

Physiological changes with aging

Age related changes in pharmacokinetics and pharmacodynamics lead to a reduction in physiologic reserves. This leaves elderly patients particularly vulnerable to the potential complications of polypharmacy. The major pharmacokinetic and pharmacodynamic changes associated with aging are outlined in *Table 1*.^{3,4}

In addition, differences in receptor numbers and binding affinities (eg. down regulation of cardiac beta-1 adrenergic receptors),⁵ changes in target organ responses and impaired compensatory reflexes (eg. autonomic blood pressure control) also result in less predictable outcomes.⁶ Under appreciation of these changes may contribute to inappropriate dosing, inadequate monitoring and increased adverse drug reactions.^{7,8}

Polypharmacy

The physiological changes that come with aging are often compounded by an increasing number of chronic conditions necessitating multiple medications. Although lacking a consensus definition, polypharmacy is commonly described as the 'concurrent use of more than anywhere between four and 10 medications'.⁹ This definition however, neglects to take into account the number of comorbid diseases legitimately requiring treatment, and risks oversimplifying the issue and encouraging inappropriate underprescribing. An alternative definition of polypharmacy is 'the use of more medications than are clinically indicated'.⁹⁻¹²

Up to two-thirds of people aged over 60 years are prescribed in excess of four medications.¹³ This 'pill burden' increases with age, especially in residents of aged care facilities.¹⁴ Other factors associated with polypharmacy include female gender, number of diagnoses, recent hospitalisation, and depression.¹⁵ The most



Table 1. Pharmacokinetic and pharmacodynamics changes in the elderly

Action	With aging	Significance
Absorption/first pass	Unchanged absorption Reduced first pass metabolism (reduced liver mass, reduced blood delivery to liver)	Same amount of medication absorbed, but increased bioavailability of some drugs (eg. metoprolol, nortriptyline)
Volume of distribution	Increased body fat Decreased body water	Prolonged half life of fat soluble drugs (eg. diazepam) Increased serum concentrations of water soluble drugs (eg. digoxin, paracetamol)
Protein binding	Lower serum albumin in frail or unwell elderly	Increased free concentrations of protein bound drugs (eg. warfarin, phenytoin)
Metabolism	Reduced oxidative metabolism (liver) Unchanged conjugative metabolism (liver)	Prolonged half life, higher steady state concentrations of some drugs (eg. diazepam, metoprolol, phenytoin)
Excretion	Reduced with decreased glomerular filtration rate (GFR) and tubular excretion	Prolonged half life, higher steady state concentrations of some drugs or metabolites (eg. digoxin, cephalexin, morphine)

significant risk factor is, however, the prescribing doctor.³

With increasing number of medications there is an exponential rise in adverse drug events (ADEs).¹⁶ In the elderly, ADEs have been strongly linked to many of the 'geriatric syndromes', including falls, confusion, and depression, and may lead to hospitalisation or death.¹⁷ Overall, 2–4% of hospital admissions are related in some way to medications, but this number rises to 30% in people aged over 75 years.¹⁸ It has been estimated that half to three-quarters of these adverse events are potentially preventable, highlighting the importance of careful prescribing.^{3,18} Even 'benign' adverse reactions can trigger a 'prescribing cascade', whereby successive new medications are added to counter drug side effects.¹⁹

Prescribers are often unaware of the full list of medications taken by their patients,²⁰ with consequent unrecognised potential for harm. This is particularly evident at the community/hospital interface.⁸ It is estimated that approximately 5–7 medication changes are made during hospitalisation,²¹ but that these changes are often poorly or incorrectly communicated to the treating GP and patient.²²

Hoarding and sharing of medications can be another under-recognised hazard, with up to 42% of patients having at least one medication at home that they no longer use.²³ Additionally, older Australians are significant users of complementary and alternative medications, with up to 40% of those with chronic diseases consuming at least one complementary medicine.²⁴

Undertreatment

Complicating matters further, undertreatment – or nonprescription of an indicated drug without good reason – is paradoxically associated with polypharmacy.²⁵ More than 40% of elderly people are thought to be 'undertreated', commonly in the areas of cardiac failure, acute myocardial infarction, osteoporosis and, importantly, pain.^{26–29} While

prescriber concerns regarding polypharmacy, treatment burden, cost and compliance are legitimate, these need to be balanced against the negative impacts of not treating.

Optimising treatment

It is almost inevitable that patients with multiple comorbidities will require multiple medications. How then, does the GP optimise treatment regimens for complex elderly patients while minimising the risks associated with polypharmacy?

Domiciliary medication management reviews

Dedicated medication management reviews conducted by the GP, or pharmacist in consultation with the GP (*Table 2*), have been shown to improve medication use and decrease drug and resource expenditure.^{30,31} Effects on mortality and morbidity have been less well validated.³² However, one Australian study showed an impressive 37% reduction in hospitalisation for heart failure after a home medication review.³³

In the early 90s, Beers et al³⁴ described and created a list of 'inappropriate medications' (many of which are no longer used) for the nursing home population. Since then, many different tools have been devised to assist in quality use of medicines, such as SAIL³⁵ (*Table 3*), START,³⁶ POM,³⁷ MAI,³⁸ ACOVE,²⁸ and DBI³⁹. While each approach has its merits, when applied to the same sample, they can produce widely discordant results, reflecting the complexity of the task.⁴⁰

With or without the use of a tool for each medication, the GP needs to consider the interplay between patient factors, disease factors and treatment factors.

A patient's anticipated life expectancy and other factors, such as cognition and available social supports, need to be balanced against



the patient's list of comorbid diseases.¹⁰ It can be helpful to consider comorbidities with regard to:^{41–45}

- the dominant medical condition (prioritise treatment for this)
- concordant diseases – those where treatment goals overlap (eg. blood pressure control for diabetes and cardiovascular disease)
- discordant diseases – those where treatment goals do not overlap (eg. bisphosphonate therapy for osteoporosis vs. gastro-oesophageal reflux disease management)
- symptomatic versus asymptomatic diseases and preventive health.

Individual medications are evaluated not only for drug interactions, but more particularly for net benefit versus risk in a particular patient. For example, weighing up the time until the treatment takes effect relative to life expectancy, or the number needed to treat against potential adverse effects and treatment burden, will help in deciding the value of an individual medication.

It is also beneficial to review classes of drugs associated with increased harm in elderly patients. The commonest culprits for

Table 2. Domiciliary medication management review (DMMR)

Item 900, fee: \$143.40. Can be claimed once every 12 months except where there has been a significant change in the patient's condition or medication regimen requiring a new DMMR.

Steps

- The GP refers the patient to their preferred accredited community pharmacy
- The pharmacist visits the patient at home and provides the GP with a report suggesting medication management strategies
- The GP discusses the review with the pharmacist
- The GP develops a written medication management plan following discussion with the patient

Patient eligibility

The GP must assess that the DMMR is clinically necessary. Examples of indications include (but are not limited to) patients:

- taking five or more regular medications
- taking more than 12 doses of medication per day
- with significant changes to their medication regimen, including recent discharge from hospital
- taking medication with a narrow therapeutic index
- having difficulty managing their own medicines because of literacy or language difficulties, impaired sight

The DMMR service is not available to inpatients of a hospital, day hospital facility or care recipients in residential aged care facilities. Although there is a medication review which aged care residents may qualify for (item 903)

Source Medicare Australia www.medicareaustralia.gov.au

Table 3. SAIL tool

- S** Keep the drug regimen as **SIMPLE** as possible. Aim for once daily or twice daily dosing. Try to simplify complex drug regimens by discontinuing any drug that does not achieve its defined therapeutic goal
- A** Understand the potential **ADVERSE EFFECTS** of each drug and potential drug–drug interactions. Whenever practical, choose drugs with broad rather than narrow therapeutic indices
- I** Each prescribed drug should have a clear **INDICATION** and a well defined therapeutic goal. Prescribe using evidence based medicine as much as is practical
- L** **LIST** the name and dosage of each drug in the patient's chart, and provide this information to the patient

causing ADEs in the elderly include benzodiazepines, nonsteroidal anti-inflammatory drugs, anticoagulants, opioid analgesics, cardiac glycosides, diuretics, oral hypoglycaemic agents and antipsychotic medications.^{18,39,46}

In practice, rationalising a medication regimen is a difficult negotiation best done sequentially over time. Each medication needs to be reviewed for ongoing relevance and safety, just as each comorbidity needs review for treatment optimisation.¹⁰

Adherence

As the number of prescribed medications increases, compliance decreases.^{47,48} Reasons for deliberate nonadherence include distrust in the prescriber, concern regarding number and effectiveness of medications, and cost.^{23,49} Impaired cognition and physical dexterity can lead to unintentional nonadherence. Examples include difficulties reading labels, opening jars, halving tablets and swallowing, as well as confusion regarding medication regimens and proprietary versus generic drug names.

Adequate clear education and regular review of patient understanding is crucial. Simplified regimens (eg. once daily) are preferable and the use of blister packs or dosette boxes can be of benefit, provided the patient can open them! Enlisting a carer or community nursing service to supervise medication administration can also be very effective.

Clinicians must also be vigilant to the issue of medication misuse, or 'inappropriate administration of medication'. This can manifest in many forms throughout hospitals, residential care facilities and private homes. An example is inappropriate use of benzodiazepine and psychotropic medications, which is of particular concern for the vulnerable patient cohort in aged care facilities. A review of American nursing home residents showed that 40% of those prescribed these medications had no appropriate indication.⁵⁰ Encouragingly, the rate of benzodiazepine use is decreasing overall in Australia, however their use remains high in the elderly.⁵¹



Conclusion

Prescribing in the elderly remains a complex task of weighing up risks and benefits for each individual. The task can be daunting, but ultimately rewarding to the clinician who takes the time to rationalise and optimise treatments. Championing the quality use of medicines remains a pivotal part of the GP's role, particularly in the frail elderly.

Summary of important points

- Prescribing in the elderly is made more complex by the physiological changes associated with aging and increased burden of disease.
- Polypharmacy is associated with a significantly increased risk of adverse drug reactions and represents a largely preventable cause of patient morbidity.
- Underprescribing on the basis of age alone may result in suboptimal patient care.
- Regular review and rationalisation of medications should be part of routine practice and can improve patient outcomes.

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