



## *You asked about...*

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# *Prescribing Drugs to the Elderly*

## *Can drugs do more harm than good?*

M.A. is a 90-year-old man living at home. He has dementia and due to wandering tendencies, requires 24-hour supervision from his 85-year-old wife.

His daughter convinces her mother to place him in respite care at a home for the aged, so the mother can go to Florida. Once placed in the new home, he becomes very agitated from being in a new environment. On the first day, he is given thioridazine and diazepam is added on the next day.

While sedated from his medications, he falls and breaks his pelvis. He is rushed to an emergency department where he is started on oxycodone-acetylsalicylic acid. He subsequently develops massive upper gastrointestinal bleeding with aspiration.

His wife returns from Florida just in time to see her husband die.



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## You asked about...



The elderly use about three times more drugs than their proportion in the population. In Ontario, almost 13% of its population is over 65, however, they use almost 40% of the drugs prescribed in the province. As the number of drugs prescribed increases, so do the chances for adverse drug reactions (ADRs). There has also been a marked increase in the use of non-prescription drugs. It shouldn't be forgotten that alcohol abuse is common in the elderly (Table 1).

### 1. Increased drug use

Here are the main reasons for the increased use of drugs in the elderly:

- Prevalence of disease in the elderly. About 80% of the elderly have a chronic disease, compared to only 40% in people younger than 65.
- There are incorrect diagnoses. For instance, a tremor versus Parkinsonism.
- Lack of reassessment of drugs.
- Treatment of individual symptoms.
- Adding drugs without reassessing prior drugs.
- Sleep disturbances with aging.
- Behavioural problems associated with dementia.

### 2. Compliance

The following items are the main factors that decrease compliance in the elderly. For ways to improve compliance in patients, see Table 2.

- Many drugs.
- Complicated regimens.

Table 1

### Reasons for drug utilisation problems in the elderly

1. Increased drug use
2. Compliance
3. Altered pharmacokinetics
4. Altered pharmacodynamics (drug sensitivity)

- Few symptoms.
- Non-comprehension.
- Disability (*i.e.*, visual, auditory, mental).
- No help or relatives at home.
- Cost.

### 3. Altered pharmacokinetics

Pharmacokinetics are altered in the elderly in four areas: absorption, hepatic metabolism, including oxidation and conjugation, distribution, and renal excretion. The latter two are the most important.

**Absorption.** There is no systematic decline in absorption with normal aging. However, with

aging comes higher comorbidity, such as malabsorption and gastric/small bowel surgery, and the use of more drugs, such as gastric acid suppressants (*i.e.*, omeprazole, ranitidine).

**Metabolism.** In general, with age comes a decline in hepatic mass, the hepatic blood flow, and phase I reactions (*i.e.*, cytochrome P-450 diazepam). However, phase II reactions remain relatively unchanged (*i.e.*, drug conjugation and lorazepam).

*It is estimated that about 20% of elderly patients receive at least one inappropriate drug.*



There are other more important factors than age that affect metabolism.

**Distribution.** There are three key areas that change with age that affect the distribution of drugs in the body: body composition, concentration of plasma proteins and local blood flow (Table 3). As a person grows older, several changes in body composition take place. Normally, as a person ages, their total weight decreases, their lean body mass decreases, their total body water decreases and their total fat increases.

Plasma proteins are also affected by aging. Albumin declines with disease rather than age, however, it is most common in the sick and elderly. If the patient is suffering from malnutrition, this can add to the problem. If, for instance, the patient were on phenytoin, problems would certainly occur because of the changes in plasma proteins.

**Elimination.** Creatinine clearance declines on average 30% to 50% from age 40 to age 80. However, muscle mass also declines so that serum creatinine levels can seem “normal.” To properly calculate the creatinine, you can use the following formulas:

Creatinine clearance (ml/min) =  $1.23 \times (140 - \text{age})(\text{weight in kg}) / \text{Creatinine}$  or  $(\text{umol/L}) \times 0.85$  for females.

#### 4. Pharmacodynamics

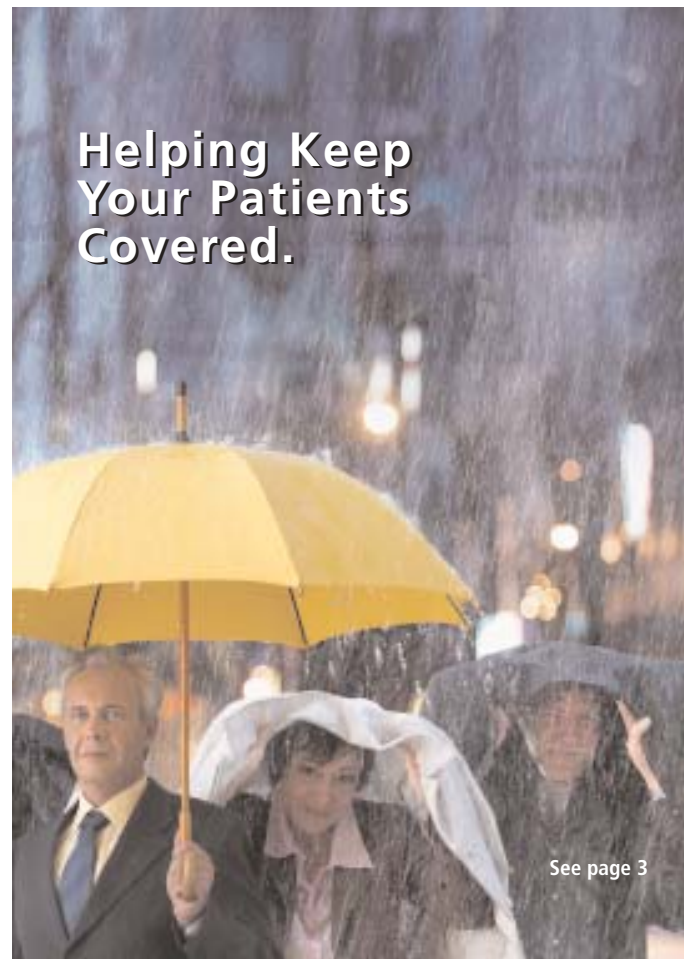
End-organ responses to drugs are related to receptor/post-receptor events. There is no general rule since the elderly have varying sensitivities to different classes of drugs, for instance, there is greater sensitivity to sedatives, warfarin, and anticholinergics, however, there is less sensitivity to beta blockers.

Table 2

#### How to improve compliance

- Few drugs
- Simple regime
- Easy opening (avoid child proof packaging)
- Written instructions
- Explanation, use of dosette, etc
- Good labels

This makes the interpretation of drug levels difficult.



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Table 3

### How age affects drug distribution

- An increase in total body fat
- A decrease in lean body mass and water
- A decrease in albumin
- An increase in alpha-1-glycoprotein
- An increase in volume distribution

#### These will cause:

- An accumulation of lipophilic drugs, *i.e.*, diazepam
- An increase in Vd of hydrophilic drugs
- An increase in peak serum concentration, *i.e.*, ethanol
- An increase in binding acidic drugs, free drugs *i.e.*, warfarin, phenytoin
- An increase in binding basic drugs *i.e.*, lidocaine

## Adverse drug reactions

Naturally, because of all these reasons, the elderly are more inclined to experience adverse drug reactions (ADRs). It has been estimated that 3% to 17% of hospitalisations are due to ADRs. As the number

Table 4

### Causes of falls and hip fractures

Nearly 14% of hip fractures are associated with drugs that caused the patient to fall. These drugs include:

- Neuroleptics;
- Antidepressants (both TCAs and SSRIs);
- Benzodiazepines;
- Antihypertensives; and
- Anticholinergics.

of drugs used increases, so does the risk for an ADR. In fact, ADRs are more related to the number of drugs used rather than age itself. Hence, the fewer drugs prescribed to an elderly patient, the less likely for an ADR to occur.

Common presentations of ADRs in the elderly are delirium, falls, urinary incontinence/retention, constipation/fecal incontinence, and misdiagnosis, which can lead to further inappropriate prescribing (Table 4). Drug-drug interactions rise exponentially with the amount of drugs used. Remember that over-the-counter drugs and herbals can cause ADRs, as well (*i.e.*, ginkgo biloba affects warfarin, St-John's wort has sedating effects).

Drugs that commonly cause ADRs can be given in various settings. In nursing homes, psychoactive drugs (sedatives/hypnotics, antidepressants, antipsychotics) and anticoagulants tend to be over-prescribed. In the community, numbers are less precise. It is estimated that about 20% of elderly patients receive at least one inappropriate drug. Physician drug reviews, with or without pharmacist input, improves these figures.

Elderly people are particularly sensitive to drugs with anticholinergic effects (Table 5). Some effects and their consequences include: blurred vision, which can lead to falls and a decrease in functional ability; dryness and pain in the oral cavity, which can lead to malnutrition and can affect speech; there can be a worsening of symptoms and pain in the gastrointestinal tract; there can be an overflow in the urinary tract causing incontinence; postural hypotension can develop in the cardiovascular system; and there can be cognitive dysfunction in the central nervous system, especially in patients with Alzheimer's disease.



## How to improve drug prescribing in the elderly

Some good prescribing guidelines are to use drugs only when indicated, make a correct diagnosis, use as few drugs as possible, and to make sure the patient understands the drug regimen. This can be done by giving clear explanations, written instructions, dosettes and aids, and using relatives or helpers.

Be wary of referring to lists of inappropriate prescribing, which helped define the rates of inappropriate prescribing in a variety of settings. These lists are arbitrary, consensus decisions, and only cover “errors of commission” without covering “errors of omission.”

Ultimately, it is important to remember that when prescribing a drug to an elderly patient, the strength of its indication must be weighed against its potential for harm. [CME](#)

Table 5

### A sample of common drugs with anti-cholinergic effects

- |                       |                   |
|-----------------------|-------------------|
| • Digoxin             | • Oxazepam        |
| • Diltiazem           | • Ranitidine      |
| • Furosemide          | • Ampicillin      |
| • Hydrochlorothiazide | • Theophylline    |
| • Nifedipine          | • Diphenhydramine |
| • Warfarin            | • Hydroxyzine     |
| • Codeine             | • Triamterene     |
| • Demerol             |                   |

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