Managing Medicines in Older People
Continuing Professional Development
Managing Medicines in Older People

Authors
Dr Andrea Linton
Prescribing Adviser
Northern Health & Social Services Board

Prof Carmel Hughes
Prof of Primary Care Pharmacy
School of Pharmacy, Queen’s University Belfast

Dr Lezley-Anne Hanna
Teaching Fellow in Pharmacy Practice
School of Pharmacy, Queen’s University Belfast

Editor
Dr Frances Lloyd
Assistant Director of Northern Ireland Centre for Pharmacy Learning and Development

Reviewer
Dr Peter Passmore
Consultant Physician, Belfast City Hospital

Ms Judith Wallwin
Pharmacist in Elderly Care
Ulster Hospital, Belfast

Design
www.darraghneely.com

© Queen’s University, Belfast 2012
Northern Ireland Centre for Pharmacy Learning and Development
Riddel Hall, 185 Stranmillis Road, Belfast BT9 5EE, Northern Ireland
## Contents

Acknowledgements ......................................................... 3
Introduction .............................................................. 4
Section 1  The changes and challenges of ageing .................. 9
Section 2  The effects of ageing on drug response ................. 25
Section 3  Prescribing for older people ............................. 49
Section 4  The use of non-prescription medicines in older patients 99
Section 5  The older patient and compliance ................... 135
Index ............................................................................. 156
Acknowledgements

We wish to pay tribute to all those who have contributed to this training course, and in particular, we gratefully acknowledge the contribution of the many individuals who participated in the various workshops that culminated in this course.

We are also grateful to Dr Brenda Bradley and Dr Ian Sturgess who authored the original distance learning course in 1999.

Participants are reminded that information contained in this course is correct at the time of publication but it is their responsibility to keep up-to-date with any changes in practice.

The Centre for Pharmacy Learning and Development reviews its distance learning programme every twelve months to ensure currency. If updated information is produced, it will be available to download from the CPLD website, www.nicpld.org.

The Centre for Pharmacy Learning and Development does not accept any responsibility for errors or omissions.
**Introduction**

Although older people constitute a minority group within the total population, they nonetheless represent a growing proportion of the population. For example, in 1971, 13% of the population was aged 65 years or older and by 2005, this figure had risen to 16%. Indeed, in the same time period the proportion of those aged 85 and over increased from 7% to 12%. It is generally thought that the current maximum longevity is unlikely to increase substantially and therefore, the main function of modern medicine is to allow ageing people to maintain function and quality of life to achieve the maximum life-span potential.

Older people as a group in society have special needs relative to their use of medicines. These needs arise as a result of several cumulative factors:

- Compared to the rest of the population, older people are more susceptible to disease, suffer from more illness and as a consequence consume more drugs. This is illustrated by the fact that 58% of those over the age of 65 years suffer from at least one long-term illness compared to 15% of those in younger age groups and those over 75 years old use on average four times as many drugs as other younger adults.

- The physiological changes occurring in older age contribute to an increased sensitivity to drugs leading to a higher incidence of adverse drug reactions in this patient group. Unfortunately, these are not always recognised as drug-related, sometimes leading to further compromise of the individual’s health.

- There may be increased communication difficulties between patients and healthcare professionals as a result of the anatomical, physical, psychological or sociological changes that can occur as a natural part of the ageing process. This in turn may lead to problems such as non-compliance.

It is therefore important that particular attention is given to this group of patients and that specialist services are provided by healthcare professionals to help older people use medicines more appropriately and safely.
In requesting this course (planning) you have already identified one or more specific personal learning needs. Before reading further, write down these learning needs and the method by which you identified these (reflection).

1. 
2. 
3. 
4. 
5. 
6. 

These learning needs should be recorded appropriately in the reflection stage of your CPD cycles.

Having completed your study you should record what you learned, and what you did not learn but had expected to learn (action).

In evaluating the outcomes of your learning you should indicate if your learning need has been met and if you have identified additional learning needs as a result of your study. You should also record how you have been able to translate your learning into practice (evaluation).
Aim
To assist the healthcare professional in maintaining and enhancing the quality of care and services provided for older patients.

Learning outcomes
Having completed this course you should be able to:

- Discuss the ageing process and its impact on drug therapy
- Describe the general guidelines for prescribing for older patients
- List and describe the common prescription and non-prescription medication-related problems experienced by older patients
- Provide practical steps to improve medication compliance in this patient group.

Signposts
Throughout the course the following signs have been used to guide you accordingly.

- Learning outcomes that specify what you should know, or be able to do, as a result of your study.
- Exercises, as distinct from case studies, where you have to give a written response. Some exercises may require you to use a BNF/MIMS as a resource.
- Case studies that present patient-orientated challenges to which you have to offer written explanations or solutions.
- Summary points of important information that practitioners should take into consideration when managing patients.
Using the course to best effect

The course should take about 14 hours to complete but is so designed to facilitate short periods of study. It is also self-contained in that all the basic material you need is provided. References have been included to allow you to undertake further study.

1. Plan to set aside specific times to work through the material and discipline yourself to keep these appointments. However, there are no prizes for finishing quickly. It’s what you learn that counts, not how fast you learn it.

2. Make use of any occasional spare time you may have for study (for example, less busy periods in your practice; during a train/bus journey to work).

3. Study in manageable and digestible ‘chunks’. That is, don’t do too much during each study period, but rather intersperse study with practice, looking for opportunities in which to apply and/or test the knowledge you have gained.

4. Complete the exercises in each section as fully as possible before comparing your responses with the answer or comments that follow at the end of the section. Don’t be tempted to jump or look ahead until you have made your own written response.

5. Discuss your responses to the exercises with a colleague whenever possible. This can be an extremely useful way of consolidating and extending your knowledge and expertise.

This course is divided into 5 sections. Section 1 sets the scene by describing the ageing process and how this can affect health and illness. Section 2 deals with the ways in which ageing affects the pharmacokinetics and pharmacodynamics of medicines and the implications of this for prescribing. Sections 3 and 4 discuss the use of prescription and non-prescription medication, respectively, in older people, while section 5 addresses the issue of compliance in this patient population. Each section is self-contained and therefore it is not absolutely necessary for you to study the sections in their written order. The text is referenced throughout and you will find a bibliography and/or references at the end of each section. The answers to the exercises and case studies are given at the end of each section.

Evaluation

The course includes a self-assessment covering the scope of the material in the text. The assessment is a straightforward multiple-choice questionnaire with the stem of each question requiring a true or false answer. A separate reply page is provided for you to insert your answers to these questions. On completion, the reply page should be returned to the address indicated. Alternatively answers can be submitted online at www.nicpld.org. We would strongly encourage you to complete and return the questionnaire as it forms an integral part of the course, particularly in allowing you to gauge the extent of your learning.
Introduction

As health care professionals, there is a tendency to refer to older people as one large homogeneous group in society with special needs. Whilst it is important to recognise that many older people do have an increased need for help, particularly with health-related matters, it is also worth remembering that the people making up this group are all individuals with widely differing requirements.

Presentation of illness in older people can differ greatly from that in younger patients. For example, myocardial infarction in those over 80 years of age more commonly presents with shortness of breath rather than with chest pain. In addition, signs and symptoms of disease may be non-specific, with the normal clues to presence or absence of serious illness being missed upon examination. Furthermore, serious disease in older persons may be mistakenly ascribed to changes associated with age and frequently older people minimise their symptoms, often attributing decline in function to their age. This can be further complicated by multiple comorbidities and polypharmacy.

This section is designed to set the course in context by examining the ageing process. The anatomical, physiological, psychological and sociological changes that occur as a natural part of the ageing process are outlined and the effects these changes can have on health and illness are described. Additionally, this section demonstrates how people of advanced years are more distinct and unique than individuals at any other stage in their lives as a result of this ageing process and attempts to challenge you regarding your personal attitudes and behaviours towards this group of patients.

Learning outcomes

Following completion of this part of the course you should be able to:

- **Define** the six dimensions of health
- **Describe** the four dimensions of the ageing process
- **Recognise** the implications of ageing to health care delivery
- **Modify** your behaviour to be more effective in consultations with older people.
Section One
The Changes and Challenges of Ageing

Dimensions of health
Health means different things to different people, depending on a combination of many factors in their lives.

What do you understand by the term “health”?
Ask four other people (either at work or home) to define what “health” means to them.

1.

2.

3.

4.

Compare your response to the comments made in the exercise review

As you will have discovered from the above exercise there are generally accepted to be six dimensions to health and your definitions may include aspects of some or all of these dimensions. These six dimensions are outlined below.

Physical
This is the aspect of health that is given most attention and is considered by some as the only important one. It is concerned with the mechanical functioning of the body. As people get older, the emphasis on this aspect of health may change with some individuals having to adapt to a reduction in physical health. Consequently, the other dimensions of health may become more important.

Mental and emotional
These two dimensions of health are closely linked and concern the ability to think clearly and coherently, as well as being able to recognise and appropriately express emotion. An individual’s mental and emotional state will influence their ability to cope with factors such as depression or stress.

Social
This is concerned with developing and maintaining relationships with others.

Spiritual
This includes the adherence to religious beliefs and ethical and moral codes and demonstrates the spiritual needs and aspirations of individuals.
Environmental
Environmental factors can be considered as both internal and external. Internal factors include an individual's internal structure such as genetic make-up. External environmental factors encompass one's surroundings such as occupation, housing, and geographical location, all of which can have a bearing on the health of individuals.

It is important that you are aware of the relationship between these factors and the bearing they can have on the health of individuals in order to communicate effectively with all patients, particularly older patients.

Dimensions of ageing
From the moment of conception, our bodies are slowly changing and it is difficult to state at what point "development" stops and "ageing" begins: there is no one accepted point in our lives where we become "old". It is often said that "you are only as old as you feel", a statement regarded by many as true since the onset of the changes accompanying the ageing process are generally more obvious to others than to the individual himself. So long as an individual adapts to ageing without shock or challenge, it is possible to reach old age in a state of biological equilibrium, without feeling much different from beginning to end. Therefore, it is difficult to define what we mean by “old”, other than a state of mind.

Generally, there are two categories of theories used to describe the ageing process:

- stochastic theories, which attribute ageing events to factors acting outside the body
- nonstochastic theories, which maintain that ageing events are genetically predetermined.

Regardless of theories, it is clear that ageing is a multifactorial process and comprises several components. The process of ageing can be understood across four main dimensions and these are anatomical, physiological, psychological and sociological.

Case study 1

Mr James White is a 72 year old widower who frequents your pharmacy. His wife died fifteen years ago and he has two grown-up children. His son is married and lives in Canada and his daughter is also married and lives nearby. Mr White attends a local church and has served on several church committees. He is also a keen bowls player. He is reasonably well off financially, having worked as an accountant before retiring.

Apart from a few dental problems, resulting in the need for some dentures, Mr White’s health was excellent until six months ago when he had a minor stroke.
Section One

The Changes and Challenges of Ageing

He was in hospital for several weeks after the stroke and is now back at home. He now takes regular medication, which he finds inconvenient. His mobility has largely returned although he still has his meals delivered to his house and a home help visits daily.

His daughter tries to visit as often as possible. Although he has started to go back to his church activities, he is no longer able to play bowls.

Identify the factors that you feel illustrate the four dimensions of ageing in this case, using the headings provided below.

Anatomical:  

Physiological:

Psychological:  

Sociological:

Compare your response to the comments made in the case study review

All four dimensions of ageing interface with each other so that physiological changes can also have a psychological effect. For this reason, there is likely to be some overlap between the responses given in each of the dimensions. We will now look at each of the four dimensions in more detail.
Anatomical dimension of age

With increasing age, major changes occur within the anatomy. These include skeletal changes, alteration of posture and body contours and changes to skin, hair, teeth and nails. This means that older people are characterized by shortened trunks and comparatively long extremities.

Adipose tissue becomes redistributed away from the periphery, contributing to changes in appearance such as bony hands and concentration of fat over the lower trunk. The skin usually becomes wrinkled and dehydrated, due to thinning of the epidermis and loss of structural collagen. Thinning, greying and drying of the hair occurs and in men is characterized mainly by male-pattern baldness. Axillary and pubic hair is also lost, yet paradoxically new hair growth may develop in the ears of some men over 40 and above the lips and on the chins of women of the same age. Loss of teeth is generally a feature of increasing age but where teeth are retained, the enamel is subject to yellowing. Nail growth is also affected by age and the nails tend to become harder and thickened, particularly the large toenails, and the nail plate is often elevated.

Several other anatomical changes also occur. Firstly, the predominance of bone resorption over bone formation is an important age-related change, and may result in osteoporosis. Osteoporosis is a condition which will affect one in three women and one in 12 men at some time in their lives. In 2011, the National Institute for Health and Clinical Excellence (NICE) amended the Technology Appraisal (TA) guidance 160 (Alendronate, etidronate, risedronate, raloxifene and strontium ranelate for the primary prevention of osteoporotic fragility fractures in postmenopausal women). 6 Furthermore, in February 2012, NICE published draft guidance entitled ‘Osteoporosis: assessing the risk of fragility fracture’. 7

Secondly, an individual’s lean body mass (made up of skeletal muscle, body organs and the nervous system) invariably decreases with age, usually after the age of 40. Thirdly, many of the body’s organs shrink in size. The prostate gland and the heart are exceptions to this rule, although the prostate undergoes normal cell loss and atrophy resulting in compromised function.

Physiological dimension of ageing

The anatomical changes resulting from ageing are usually clearly shown in an individual’s appearance. Additionally, impaired vision and dulled hearing are clear signs of the progressive loss to the senses. However, at a more fundamental level, a whole array of physiological changes occur within the body systems (Table 1) and these changes generally start to occur in the fifth decade of life. The changes are relatively organ specific, i.e. organs appear to age in ways independent from each other and are unaffected by some overall organism-wide process.

One of the major outcomes of these physiological changes is a reduction in the overall control of homoeostasis within the body and this is responsible for the relatively high frequency of adverse reactions to drugs in old age. These changes have major implications for medical care, especially as they relate to the use of medicines (see Section 2). With older people now living with multiple chronic diseases, current evidence-based approaches to drug therapy demand that these chronic diseases are treated with multiple drugs. This is a major challenge for health care professionals involved in prescribing and monitoring medication.
Table 1: Key changes as a result of physiological ageing

<table>
<thead>
<tr>
<th>System</th>
<th>Key changes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cardiovascular system</strong></td>
<td>No change in stroke volumes, heart rate, cardiac output, or ejection fraction at rest</td>
</tr>
<tr>
<td></td>
<td>Increased myocardial stiffness</td>
</tr>
<tr>
<td></td>
<td>Increased arterial stiffness</td>
</tr>
<tr>
<td></td>
<td>Decline in maximum heart rate and maximum oxygen uptake with exercise</td>
</tr>
<tr>
<td></td>
<td>Increased blood pressure particularly systolic</td>
</tr>
<tr>
<td><strong>Central nervous system</strong></td>
<td>Decreased chemical transmission</td>
</tr>
<tr>
<td></td>
<td>Decreased brain flow and impaired autoregulation of perfusion</td>
</tr>
<tr>
<td></td>
<td>Slowed central processing and reaction time</td>
</tr>
<tr>
<td></td>
<td>Cerebral atrophy occurs with ageing</td>
</tr>
<tr>
<td><strong>Respiratory system</strong></td>
<td>Chest wall stiffens</td>
</tr>
<tr>
<td></td>
<td>Ciliary action less effective</td>
</tr>
<tr>
<td></td>
<td>Increased residual volume</td>
</tr>
<tr>
<td></td>
<td>Decreased FEV1 and FVC</td>
</tr>
<tr>
<td></td>
<td>Cough less effective</td>
</tr>
<tr>
<td></td>
<td>Decreased lung mass</td>
</tr>
<tr>
<td></td>
<td>Decreased respiratory muscle strength</td>
</tr>
<tr>
<td><strong>Immune system</strong></td>
<td>Function declines</td>
</tr>
<tr>
<td></td>
<td>Increased frequency of infections</td>
</tr>
<tr>
<td></td>
<td>Increased prevalence of neoplasms and autoimmune disorders</td>
</tr>
<tr>
<td><strong>Gastro-intestinal system</strong></td>
<td>Increased gastric acid production</td>
</tr>
<tr>
<td></td>
<td>Reduced gastric emptying time</td>
</tr>
<tr>
<td></td>
<td>Reduced gut motility</td>
</tr>
<tr>
<td></td>
<td>Reduced gut blood flow</td>
</tr>
<tr>
<td></td>
<td>Reduced absorption surface</td>
</tr>
<tr>
<td><strong>Hepatic system</strong></td>
<td>Reduced liver mass</td>
</tr>
<tr>
<td></td>
<td>Reduced liver blood flow</td>
</tr>
<tr>
<td></td>
<td>Impaired clearance of drugs that require Phase 1 metabolism</td>
</tr>
<tr>
<td><strong>Genito-urinary system</strong></td>
<td>Decreased glomerular filtration rate</td>
</tr>
<tr>
<td></td>
<td>Decrease of 25% in renal mass</td>
</tr>
<tr>
<td></td>
<td>Decreased renal blood flow</td>
</tr>
<tr>
<td></td>
<td>Impaired ability for sodium and potassium handling</td>
</tr>
<tr>
<td>- Kidney</td>
<td>Incomplete bladder emptying</td>
</tr>
<tr>
<td></td>
<td>Bladder capacity reduced</td>
</tr>
<tr>
<td>- Bladder</td>
<td>Decrease in vaginal secretions</td>
</tr>
<tr>
<td>- Reproductive tract</td>
<td>Increase in pH of vaginal secretions</td>
</tr>
</tbody>
</table>
Psychological dimension of ageing

The psychological dimension of ageing is closely linked to, and in many cases dependent upon, anatomical, physiological and sociological factors. Therefore, the psychological changes which occur due to the ageing process, and the behavioural changes which may result, can be due to either intrinsic factors, e.g. organic disease, senile dementia, or extrinsic factors, e.g. bereavement, retirement. For example, depression may be caused by intrinsic factors such as debilitating diseases like arthritis, or by extrinsic factors such as the inability to adjust to a new lifestyle following retirement.

A common crisis in older adults is the loss of cognitive skills including memory. It is a common observation that older people can clearly recall events from the distant past, but are generally less able to recall recent events. On the other hand, verbal learning ability is often well maintained, as are some forms of muscular memory such as piano playing.

List TEN implications of psychological/mental ageing for health care and suggest strategies for positive action.

<table>
<thead>
<tr>
<th>Implications</th>
<th>Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td></td>
</tr>
</tbody>
</table>

Compare your response to the comments made in the exercise review.
Section One
The Changes and Challenges of Ageing

Sociological dimension of ageing

There are many sociological factors that are important in the ageing process, including life expectancy, living arrangements, economic situation, housing conditions, marital status, support systems and healthcare demands.

Life expectancy has been increasing over many years, the consequence of this being that the older population is growing (Figure 1). Moreover, within this overall increase, the proportion of the population over age 75 shows a more dramatic rise. From 1971 to mid-2011, the percentage aged 65 and over increased from 13 per cent to 18.4 per cent. Within this age group even greater increases were seen for those aged 85 and over. The proportion of those aged 85 and over increased from 7 per cent in mid-1971 to over 11 per cent in mid-2011.

The number of people aged 85 and over grew by over 37,000 (2.8 per cent) in the year to 2008 to reach a record 1.3 million. The major factors affecting this shift in the population are the fall in birth rate, fall in death rate of younger people, improved public health, better healthcare and control of infectious diseases. At all ages of life, female life expectancy exceeds that of men. In the UK, the overall life expectancy at birth for men is 77.1 years while for women it is 81.8 years.

A female aged 65 has an average life expectancy of 20.24 years. This reinforces the advice of trying to preserve good health in older people. There may be a view that at age 65/70 people are ‘over the hill’ but this is simply not the case.

Animal studies have shown that species generally have what is termed a maximum life-span potential. This is an estimate of the greatest length of life for a species when all external hazards have been removed. Populations in developed countries generally reach this potential, and most investigators feel that the current maximum longevity is unlikely to increase substantially.

Figure 1: Growth in the UK elderly population from 1948 with projection to 2051 (Source: Office of Health Economics, www.ohe.org)
Approximately 5% of older people live in some form of residential or institutionalised care; the vast majority live at home. That females generally outlive males implies that a greater proportion of the older female population lives alone; it has been estimated that 3 out of 5 women over the age of 75 live alone. Living alone for either men or women can give rise to social difficulties, for example, coping with loneliness or adapting to change following the death of a spouse. One consequence of this is that some older people may use their local community pharmacy for social support.

Older people often live in older dwellings that frequently lack many of the basic amenities and, in general, their housing conditions are worse than those of younger people. As a result of the ageing process, many older people are also unable to carry out functions required in order to maintain their homes.

The income of older people is often much lower than the average income, resulting in relative poverty. This impoverishment can contribute to feelings of worthlessness and low self-esteem and perpetuates the low status of older people.

The requirement for social support systems continues to grow given the increasing size of the older population. This is reflected in both formal and informal care offered through statutory agencies, self-help and social groups, family and friends. Healthcare needs from the health professionals’ point of view are often seen only in terms of drug treatment. However, the ability of those professionals to advise on the different support facilities, while valuable, is often a neglected contribution to healthcare.

Each of these dimensions of ageing has potential cost implications in terms of caring for patients. For example, a recent report commissioned by the Alzheimer’s Society on changing trends in dementia has estimated that in 2010, over 820,000 people in the UK have some form of dementia. It was predicted in 2007 that this figure would rise to 1.7 million by 2051 but given the recent 2010 figure, it is suspected that this was an underestimate. Current costs of caring for those with dementia are estimated at £23 billion and will rise as the incidence and prevalence of dementia increase. On a more general level, health care costs rise with increasing age. This is partially illustrated in Figure 2, which shows the average number of NHS GP consultations per person per year by age of patient in GB in 2009.

Figure 2: Average number of NHS GP consultations per person per year by age of patient; GB, 1975 – 2009.

The income of older people is often much lower than the average income, resulting in relative poverty. This impoverishment can contribute to feelings of worthlessness and low self-esteem and perpetuates the low status of older people.

The requirement for social support systems continues to grow given the increasing size of the older population. This is reflected in both formal and informal care offered through statutory agencies, self-help and social groups, family and friends. Healthcare needs from the health professionals’ point of view are often seen only in terms of drug treatment. However, the ability of those professionals to advise on the different support facilities, while valuable, is often a neglected contribution to healthcare.

Each of these dimensions of ageing has potential cost implications in terms of caring for patients. For example, a recent report commissioned by the Alzheimer’s Society on changing trends in dementia has estimated that in 2010, over 820,000 people in the UK have some form of dementia. It was predicted in 2007 that this figure would rise to 1.7 million by 2051 but given the recent 2010 figure, it is suspected that this was an underestimate. Current costs of caring for those with dementia are estimated at £23 billion and will rise as the incidence and prevalence of dementia increase. On a more general level, health care costs rise with increasing age. This is partially illustrated in Figure 2, which shows the average number of NHS GP consultations per person per year by age of patient in GB in 2009.

Clearly, there are increased costs associated with patients aged 65 years and over.

19
Summary points

- The four dimensions of ageing are anatomical, physiological, psychological and sociological.

- The major anatomical changes associated with age are the predominance of bone resorption that may result in osteoporosis, a decrease in lean body mass and shrinking in size of many of the body’s organs.

- The outcome of the array of physiological changes within body systems is a reduction in the overall control of homoeostasis which is responsible for the relatively high frequency of adverse reactions to drugs in old age. This is complicated by the presence of multiple chronic diseases and polypharmacy.

- A common crisis in older adults is the loss of cognitive skills including memory and resistance to change.

- The sociological factors that are important in the ageing process include life expectancy, living arrangements, economic situation, housing conditions, marital status, support systems and healthcare demands.

Having completed your study of The Changes and Challenges of Ageing you should now be able to:

Define the six dimensions of health
Describe the four dimensions of the ageing process
Recognise the implications of ageing to health care delivery
Modify your behaviour to be more effective in consultations with older people.

If you are not able to do all of these, go back and review the section again.
References


Exercise and case study reviews

Exercise 1 review

Although the definitions you have received may have some similarities, there are also likely to be differences between them. There are generally accepted to be six dimensions to health and your definitions may include aspects of some or all of these dimensions – physical, mental, emotional, social, spiritual and environmental. See text for further information.

Exercise 2 review

Your answer should have included some or all of the following implications and strategies for positive action:

<table>
<thead>
<tr>
<th>Implications</th>
<th>Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Information difficulties</strong></td>
<td>Assimilating information</td>
</tr>
<tr>
<td></td>
<td>Understanding information</td>
</tr>
<tr>
<td></td>
<td>Memorizing information</td>
</tr>
<tr>
<td></td>
<td>Recalling information</td>
</tr>
<tr>
<td></td>
<td>Structured explanations</td>
</tr>
<tr>
<td></td>
<td>Brevity of essential instructions</td>
</tr>
<tr>
<td></td>
<td>Clarity of instructions</td>
</tr>
<tr>
<td></td>
<td>Choice of terminology</td>
</tr>
<tr>
<td></td>
<td>Speech fluency</td>
</tr>
<tr>
<td></td>
<td>Rate of speech</td>
</tr>
<tr>
<td></td>
<td>Provision of adequate time</td>
</tr>
<tr>
<td></td>
<td>Questioning for understanding</td>
</tr>
<tr>
<td></td>
<td>Reinforcing information</td>
</tr>
<tr>
<td></td>
<td><strong>Resistance to change</strong></td>
</tr>
<tr>
<td></td>
<td>Change of product</td>
</tr>
<tr>
<td></td>
<td>Anticipating the problem and explaining changes, i.e. pre-emptive action</td>
</tr>
<tr>
<td></td>
<td>Change of presentation</td>
</tr>
<tr>
<td></td>
<td>Stopping/starting therapy</td>
</tr>
<tr>
<td></td>
<td>Educating for action influencing skills</td>
</tr>
<tr>
<td></td>
<td>Change of staff</td>
</tr>
<tr>
<td></td>
<td>Active personal introductions, maintaining/creating confidence,</td>
</tr>
<tr>
<td></td>
<td>portrayal of professional caring image, engendering patient worth</td>
</tr>
<tr>
<td></td>
<td>Change of environment</td>
</tr>
<tr>
<td></td>
<td>Ensuring patient comfort and convenience</td>
</tr>
<tr>
<td></td>
<td>Medication record scheme</td>
</tr>
<tr>
<td></td>
<td>Explaining benefits, assuring confidentiality, guaranteeing</td>
</tr>
<tr>
<td></td>
<td>individual freedom to choose</td>
</tr>
</tbody>
</table>
Case study 1 review

Your answer should have included some or all of the following:

**Anatomical:**
- reduction in mobility
- dental problems.

**Physiological:**
- CVA (stroke)
- need for medication
- nutrition.

**Psychological:**
- bereavement
- compliance
- adapting to change
- stress
- coping with retirement
- isolation/loneliness
- loss of independence
- boredom.

**Sociological:**
- potential increase in health care demands
- life expectancy
- economic status
- independence
- social/church/family support
- marital status
- contribution to society.
Section One

The Changes and Challenges of Ageing
Section Two

The Effect of Ageing on Drug Response
Introduction
There is the tendency to assume that old age is always associated with a decline in physiological functions. For some older people, drugs behave to a great extent in the same way as in much younger people. Having said this, there is a tendency for physiology to change with advancing years and this results in trends of changed pharmacokinetics and pharmacodynamics. Most of these changes happen imperceptibly and at different rates in different individuals. Furthermore, it should be remembered that biological age often differs from chronological age.

While this section deals with such trends, it is important, when choosing and monitoring treatment regimens, that each patient is treated as an individual. For the purposes of this discussion, older people are considered as those individuals who are 65 years and over.

Learning outcomes
Following completion of this part of the course you should be able to:

- **Identify** the ways in which the absorption, distribution, metabolism and elimination of medicines are affected by ageing
- **Appreciate** changes in the responsiveness of target organs and homoeostatic mechanisms
- **Evaluate** the clinical significance of these changes for therapeutic response and toxicity.
Section Two

The Effect of Ageing on Drug Response

Changes in pharmacokinetics

Pharmacokinetics can be defined as ‘how the body handles a drug’. Age-related changes in pharmacokinetics make older people more susceptible to drug effects.

Unless a drug acts topically, it must first enter the bloodstream and then be distributed to its site of action. The rate at which a drug reaches its site of action depends on two rates: absorption and distribution. Absorption is the passage of the drug from its site of administration into the blood, and distribution is the delivery of the drug to the tissues. To reach its site of action, a drug must cross a number of biological barriers and membranes, predominantly lipid. Competing processes, such as binding to plasma proteins, tissue storage, metabolism and excretion determine the amount of drug finally available for interaction with specific receptors (see Figure 3).

**Figure 3**: Factors affecting drug concentration at its site of action
Drug absorption

Gastro-intestinal absorption

Drugs ingested orally are designed to be absorbed into the bloodstream from the gastro-intestinal system where they pass after swallowing. Many factors alter the rate and amount of drug absorption.

Some of these factors will be influenced more than others by the ageing process. For instance, the presence of food and/or other interactants, will result in similar effects, regardless of age. On the other hand, the general health of the GI mucosa, and thus drug absorption, may be affected by the age of the patient.

Below is a list of changes to the gastro-intestinal tract that occur with advancing years. Which of these can affect drug absorption to a degree that is clinically significant?

- Increased gastric acid secretion  yes  no
- Slowed gastric emptying  yes  no
- Decreased intestinal motility  yes  no
- Decreased gastro-intestinal blood flow  yes  no
- Atrophy of the gastro-intestinal villi  yes  no

Compare your response to the comments made in the exercise review

Of the factors listed above, decreased gastric emptying and atrophy of the gastro-intestinal villi result in changes to drug absorption. This decrease in absorption rate leads to decreased peak serum drug concentrations (Cpmax) and the time taken to achieve these peaks (tmax) tends to be prolonged (See Figure 4).

However, with the exception of drugs that are subject to first pass metabolism, the extent of drug absorption (defined as the area under the curve) in older people is relatively unchanged when compared with younger adults.
Section Two

The Effect of Ageing on Drug Response

**Figure 4:** Plasma concentration-time drug profiles in older and young adults showing the influence of a decreased rate, but similar extent, of drug absorption (assuming passive absorption and similar drug distribution, metabolism and excretion)

**Decreased gastric emptying**
There is a general decrease in the rate of gastric emptying with advancing age. This tends to delay drug absorption rather than reduce it, as most drugs are absorbed primarily from the mucosa of the small intestine, which is facilitated by its large surface area. Only a few acidic drugs such as aspirin are absorbed directly from the stomach. A reduction in intestinal motility is also associated with ageing and tends to slow the passage of drug through the remainder of the intestinal tract, thereby delaying absorption. However, these changes in motility are relatively unimportant when compared with a slowed gastric emptying rate.

**Atrophy of the gastro-intestinal mucosa**
There is a considerable atrophy of the gastro-intestinal mucosa with advancing age. This results in a decrease in the available surface area for drug absorption. This physiological change decreases the rate of absorption of drugs from the gastro-intestinal tract of older people.

The other factors have minimal effect on the absorption of drugs from the gastro-intestinal tract. Reductions in gastric acid secretion, gastro-intestinal blood flow and less effective active drug transport mechanisms should, in theory, affect drug absorption, but in practice they appear to have minimal, if any, clinical consequences. An exception is iron, where absorption is generally reduced in older patients.

**Absorption from non-oral routes**
Absorption of drugs from other sites of administration can also be influenced by age. For example, with intramuscular administration, the connective tissue content of muscle increases with age, while blood flow to the muscle is reduced and this leads to a decrease in the rate of drug absorption. A reduction in the rate of drug absorption is also expected following topical administration.
This is caused by age-related physiological changes in the skin, such as decreased hydration, increased keratinisation and reduced blood perfusion. Age-related changes in drug absorption from buccal, sublingual, rectal and pulmonary sites have not been widely investigated. However, a decrease in systemic drug absorption would be expected given the reduced perfusion of these sites that occurs with advancing years.

### Drug distribution

The principal changes in body composition that occur with advancing age are summarised in Figure 5. While total plasma body protein concentrations remain relatively constant, the amount of albumin present tends to decrease. Albumin is the main protein associated with the binding of drugs in that it binds both acidic and basic drugs.

![Figure 5: Changes of body composition with age](image)

Albumin has a half-life of approximately 20 days and a decrease in serum albumin is an early indicator of poor nutritional status. A decrease in serum albumin is also seen in sick older patients due to cytokine excess.
When a drug is introduced into the body, where it ends up depends on a number of factors: (1) blood flow (tissues with the highest blood flow receive the drug first), (2) protein binding, (3) lipid solubility and the degree of ionisation.

The extent and pattern of drug distribution will be dependent mainly on the plasma and tissue protein binding characteristics of the drug and its lipid solubility (solubility in fatty tissue). For example:

- drugs that are highly bound to plasma proteins, such as albumin, distribute very little into organs since bound drug cannot cross the capillary membranes
- highly lipid-soluble drugs tend to concentrate in fat tissue and in the brain, while certain drugs have a high affinity for muscle tissue, for example, digoxin accumulates in heart and skeletal muscle to the extent that only low levels remain in the plasma (large volume of distribution)
- drugs that are highly water-soluble at pH 7.4 (plasma pH) may be confined to extracellular fluid since they will not easily diffuse across cellular membranes.

Clearly, there are implications for drug kinetics when changes such as increased fat content, alterations in plasma protein concentrations and decreased intracellular fluid occur in body composition due to the ageing process.

Taken together, these factors may lead to changes in the apparent volumes of distribution of highly lipid or water-soluble drugs with age. Apparent volume of distribution (Vd) is described by the following formula:

\[
V_d = \frac{\text{amount of drug in the body}}{\text{plasma concentrations (bound + free)}}
\]

In older patients, since the albumin concentration is decreased, there will be an increased free concentration of extensively bound drugs such as phenytoin. Generally phenytoin is 90% bound, leaving 10% of the drug free to exert an effect. Most drugs that are bound to albumin exist in dynamic equilibrium between the free and bound drug forms. Since the therapeutic effect is usually related to the amount of free drug, the general effect of a decrease in albumin is to increase the proportion of free (and hence active) drug at any one time. This is particularly true during the initial acute phase of drug administration before elimination of the drug has allowed steady state to be reached. These effects may become more problematic in sick older patients. In older patients the free level of phenytoin may rise to more than 10% leading to toxicity that may not be evident from total phenytoin concentration alone. In such cases measurement of free phenytoin levels would be a better indicator.

In older people Figure 5 shows that the percentage of body fat to total body weight increases with a consequent increase in the half-life of lipophilic drugs such as diazepam. In contrast, there is a lower proportion of body water to total body weight. Therefore, there is a need to reduce the loading dose of water-soluble drugs in older patients.
Below are examples of three drugs whose apparent volume of distribution is likely to be affected as a result of the ageing process:

**Digoxin (highly water-soluble drug)**
In older patients, there is a decrease in the total water content of the body and since digoxin is a highly water-soluble drug, there will be an increase in plasma concentration. Hence, the volume of distribution for digoxin is reduced in older people. This means that a smaller loading dose is required to provide adequate digitilisation and avoid potential toxicity.

**Diazepam (lipid-soluble drug)**
In older patients there is an increase in body fat and lipid-soluble drugs will pass out of the plasma compartment into fat tissue, resulting in a decrease in plasma concentration of the drug with a reduction in pharmacological effect. The apparent volume of distribution (Vd) will be seen to increase and may lead to an increased half-life of the drug (> 3 days if plasma drug clearance, Cl, remains constant) which is described by the formula:

\[
t_{1/2} = \frac{0.693 \times Vd}{Cl}
\]

**Warfarin (extensively bound to plasma albumin)**
Since this is bound extensively (>99%) to plasma albumin it remains largely within the plasma, having a relatively low apparent volume of distribution (Vd). Because older people tend to have decreased plasma concentrations of albumin, drugs that are highly bound to this protein may exhibit a larger volume of distribution (Vd) than observed in younger patients.
A reduction in albumin concentration may lead to toxic effects of the following drugs in older patients. For each drug write down the principal toxic effect(s).

Acetazolamide:

Diazepam:

Phenytoin:

Warfarin:

Glibenclamide:

Aspirin:

Clomethiazole:

Compare your response to the comments made in the exercise review.

Maximum cardiac output decreases with age (cardiac output at rest remains unchanged). Decreases in perfusion also occur in older patients; in the limbs, liver and mesentary, perfusion may reduce by up to 45%, while blood flow to the brain is decreased by 28% at age 80 versus young.

Once a drug is present in the bloodstream, its distribution throughout the body will be dependent on the blood flow to the different regions of the body. Although little clinical data are available as to the significance of these changes, it would appear logical that decreased tissue perfusion would decrease the rate of drug distribution to tissues.

Although the effect of ageing on drug distribution may necessitate a reduction in drug dosage, it is important to note that drug distribution does not act in isolation to absorption and elimination. The combined effects of all pharmacokinetic and indeed pharmacodynamic properties of the drug must be considered prior to dosage adjustment.
Drug metabolism

First pass metabolism
Once absorbed following oral administration, drugs pass through the portal vein into the liver, after which they pass directly into the circulation or undergo a degree of first pass metabolism (see Figure 6) by the liver enzymes. Drugs such as glyceryl trinitrate undergo almost complete metabolism meaning the drug does not reach the systemic circulation. This is one of the reasons why glyceryl trinitrate is given sublingually.

![Figure 6: Example of a drug subject to 1st pass metabolism](image)

Apart from first pass metabolism, other processes occur which may activate drugs, inactivate them or make them more water-soluble for excretion.

Phase 1 metabolism
This occurs in the liver mostly via cytochrome P450, which is a large number of enzymes that can be categorised into groups and sub-groups. This phase may result in:

- complete inactivation of the drug, e.g. warfarin prior to excretion via the kidneys
- production of a less active metabolite that requires Phase 2 metabolism before the kidneys can excrete it, e.g. verapamil or
- production of an active drug. A drug that is activated by Phase 1 metabolism is termed a pro-drug. The active drug then undergoes Phase 2 metabolism to inactivate it prior to excretion by the kidneys, e.g. enalapril.

For more detail on clinically relevant CP450 subgroups, see Section 3.

Phase 2 metabolism
At this stage the drug or the phase 1 metabolite is conjugated to another molecule to make it more water–soluble and easily excreted in urine or bile.
Altered metabolism

Hepatic metabolism reduces with age (see Figure 7), potentially increasing plasma concentrations of some drugs with extensive first pass metabolism, e.g. propranolol and metoclopramide. This leads to improved bioavailability, with a consequent need to reduce the maintenance dosage. There are two main factors resulting in reduced metabolism, reduced hepatic blood flow and decreased hepatic mass. Available data shows that with ageing hepatic volume and perfusion decrease by approximately 30%.

Figure 7: The ontogeny of hepatic drug metabolic activity

The majority of drugs avoid first pass and the rate of metabolism is determined by enzyme activity. In general, hepatic mass decreases by 20-30% in older people and the number of functioning hepatocytes is reduced. The reduction in total liver size would be expected to result in a decrease in the levels of drug metabolising enzymes and a consequent reduction in the hepatic clearance of drugs such as theophylline. Often there is a reduction in phase 1 metabolism with little change in phase 2. These changes are generally not clinically significant unless combined with poor diet, smoking and co-morbidity.

Give examples of THREE drugs metabolised by microsomal enzymes with which you would exercise caution in older patients.

1.

2.

3.

Compare your response to the comments made in the exercise review
Other drugs undergo hepatic metabolism through conjugation by glucuronidation, sulfation, or acetylation, usually, but not always, to pharmacologically inactive metabolites. This form of metabolism is unaffected by ageing.

**Give examples of THREE drugs metabolised by conjugation.**

1. 
2. 
3. 

*Compare your response to the comments made in the exercise review*

The hepatic reserve is quite large and changes in hepatic enzyme activity are likely to be most marked in frail older people, resulting in higher blood concentrations and an increased risk of adverse reactions. It is also important in older people with liver disease, since severe liver disease may also result in changes in drug metabolism. The BNF provides general information on prescribing in hepatic impairment under Guidance on prescribing at the start of the book, with further detail provided within the individual drug monographs.

**Drug excretion**

The most important and predictable change in pharmacokinetics is a reduction in renal drug clearance. The total size of the kidneys, the number of functioning nephrons and renal blood flow all decrease with age. Renal blood flow decreases by approximately 10% per decade after a peak in young adulthood and the renal plasma flow is reduced by 50%. This will result in a progressive decrease in renal function. The processes of tubular secretion and reabsorption are also likely to be affected but any decrease in these processes will, in most cases, be reflected in a parallel decrease in the GFR. The magnitude of the decline in kidney function varies greatly between individuals and also depends on whether chronic conditions such as diabetes, hypertension or heart failure have caused further renal impairment. An acute infection, such as a chest infection that leads to dehydration, can also worsen renal function.

These effects can lead to the accumulation of some drugs, although the magnitude of effect will be determined by the percentage of the total drug eliminated by glomerular filtration. This is a problem for drugs that are mainly excreted unchanged by the kidney and have a narrow therapeutic index, e.g. digoxin or lithium, which consequently require reduced doses in older people. The current BNF provides a comprehensive list of drugs to be avoided or used with caution in patients with renal impairment.
**Table 2: Summary of relevant changes in ageing and pharmacology**

<table>
<thead>
<tr>
<th>Age-related changes</th>
<th>Clinical effect</th>
<th>Overall significance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Absorption</strong></td>
<td>Minimal changes associated with ageing</td>
<td>Changes often not significant</td>
</tr>
<tr>
<td>Splanchnic blood flow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>absorptive surface</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GI motility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>gastric pH</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Distribution</strong></td>
<td>Higher concentrations of drugs</td>
<td>Some processes reduced, others</td>
</tr>
<tr>
<td>Total body water</td>
<td></td>
<td>unaffected</td>
</tr>
<tr>
<td>serum albumin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>lean body</td>
<td></td>
<td></td>
</tr>
<tr>
<td>fat mass</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Metabolism</strong></td>
<td>Decreased biotransformation and first-pass metabolism</td>
<td>Significantly changed to the</td>
</tr>
<tr>
<td>Liver blood flow</td>
<td></td>
<td>younger adult</td>
</tr>
<tr>
<td>enzyme activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Elimination</strong></td>
<td>Decreased renal elimination of drugs</td>
<td>Significantly reduced renal function in</td>
</tr>
<tr>
<td>Renal perfusion</td>
<td></td>
<td>most older people</td>
</tr>
<tr>
<td>GFR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>tubular secretion</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Case study 2**

Mrs Sarah Barnes is a 69 year old widow who, in her late fifties, developed late onset diabetes. Initially this was well controlled with dietary management but, more recently, drug treatment has been introduced. In addition, this lady suffers from congestive heart failure that currently is being treated with digoxin, lisinopril and furosemide. Following an acute chest infection she was admitted to hospital for treatment and a general review of her health. Mild renal failure was identified. On discharge from hospital she was prescribed the following drugs:

- **Digoxin 62.5 micrograms mane**
- **Ramipril 5 mg o.d.**
- **Furosemide 40 mg mane**
- **Gliclazide 80 mg mane**

Write down why you think these choices are suitable for Mrs Barnes.
## Section Two

The Effect of Ageing on Drug Response

<table>
<thead>
<tr>
<th>Drug</th>
<th>Reasons for choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digoxin</td>
<td></td>
</tr>
<tr>
<td>Ramipril</td>
<td></td>
</tr>
<tr>
<td>Furosemide</td>
<td></td>
</tr>
<tr>
<td>Gliclazide</td>
<td></td>
</tr>
</tbody>
</table>

Compare your response to the comments made in the case study review
Case study 3

Mr Samuel Bryson, a 76 year-old, has come into your pharmacy with his regular repeat prescription for:

- Phenytoin 300 mg at night for epilepsy
- Ramipril 5 mg daily for hypertension
- Beclometasone 100 mcg two puffs twice a day for asthma
- Salbutamol two puffs prn for asthma

He looks quite unwell and asks if you would be able to review his medication under the Managing Your Medicines scheme he saw advertised at the surgery. You are surprised by this as you have mentioned the medicines management initiative to him several times and he has not been interested.

During the first review you notice that he appears to be rather confused and his speech is slurred. He also seems unsteady on his feet. He reports no other problems and has been on his current medication for many years. What are the potential causes of this confusion and unsteadiness and what action should be taken?

Compare your response to the comments made in the case study review
Changes in pharmacodynamics

The age-associated altered pharmacokinetics do not fully explain the altered drug action or increased drug toxicity frequently seen in older people. Just as the pharmacokinetics of a drug are altered with advancing years, so too are the pharmacodynamics. Pharmacodynamics may be defined as ‘what a drug does to the patient’. This can be significantly altered with increasing age because of changes in the responsiveness of target organs. In general older people have an increased sensitivity and altered homoeostatic mechanisms (such as BP, balance, thirst & hydration, body temperature, brain sensitivity, sleep). In terms of drug sensitivity it is found, for example, in older people that:

- they are more sensitive to the effects of benzodiazepines
- Warfarin requirements are usually about 25% less than in younger people
- there is an increased susceptibility to the anticholinergic effects of drugs, e.g. tricyclic antidepressants
- β1 and β2-receptor responsiveness is decreased
- α-receptor responsiveness is decreased.

These pharmacodynamic changes may be due to a change in receptor binding, a decrease in receptor number, or altered translation of a receptor-initiated cellular response into a biochemical reaction. In addition to these impairment occurs, for example, in:

- thermoregulation
- blood pressure regulation
- bladder function
- bowel function
- blood sugar levels
- fluid and electrolyte balance.

Due to these impaired homoeostatic mechanisms, with a consequent loss of reserve, older people have an increased susceptibility to drug-induced side-effects such as urinary incontinence, urinary retention, confusional states, hypothermia and postural hypotension.

Additionally, the pharmacodynamics of a drug may well be altered by the presence of disease, either directly by the pathological process, or indirectly by associated complications such as peripheral circulatory failure, anaemia, malnutrition, as well as hepatic, renal or cardiac failure. In many older people there will, of course, be multiple pathologies, which makes the problem worse.
Section Two

The Effect of Ageing on Drug Response

Summary points

- The decrease in gastric emptying rate and gastro-intestinal motility seen with advancing age tends to delay oral drug absorption rather than reduce the amount of drug absorbed.

- The concentration of serum albumin is decreased in older patients and, for extensively bound drugs, this will increase the free concentration of drug and therefore therapeutic response, which may become problematic in sick older patients.

- While hepatic mass and blood flow both decrease with age, the hepatic reserve is large and the effect of changes in hepatic enzyme activity are likely to be most marked in frail older people, resulting in higher blood concentrations and an increased risk of adverse reactions.

- The size of the kidneys, number of nephrons and renal blood flow decrease with age, all of which tend to reduce the elimination rate of renally excreted drugs. The significance of reduced renal clearance will depend on the percentage of total drug eliminated by glomerular filtration and its therapeutic index.

- The age-associated changes in pharmacokinetics do not fully explain the altered drug action or increased drug toxicity frequently seen in older people.

Having completed your study of The Effect of Ageing on Drug Response you should now be able to:

Identify the ways in which the absorption, distribution, metabolism and elimination of medicines are affected by ageing

Appreciate changes in the responsiveness of target organs and homoeostatic mechanisms

Evaluate the clinical significance of these changes for therapeutic response and toxicity.

If you are not able to do all of these, go back and review the section again.
Bibliography


Exercise and case study reviews

Exercise 3 review

Of the factors listed, decreased gastric emptying and atrophy of the gastrointestinal villi result in changes to drug absorption to a degree that is clinically significant.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased gastric acid secretion</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Slowed gastric emptying</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Decreased intestinal motility</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Decreased gastro-intestinal blood flow</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Atrophy of the gastro-intestinal villi</td>
<td>yes</td>
<td>no</td>
</tr>
</tbody>
</table>

Exercise 4 review

The principal toxic effect of each drug is listed below:

- **Acetazolamide**: haemolysis due to erythrocyte accumulation.
- **Diazepam**: increased sedation.
- **Phenytoin**: osteomalacia, cerebellar toxicity.
- **Warfarin**: bleeding tendency.
- **Glibenclamide**: hypoglycaemia.
- **Aspirin**: GI bleeding.
- **Clomethiazole**: sedation.
Exercise 5 review

Examples of drugs metabolised by microsomal enzymes include: diazepam, barbiturates, phenytoin, warfarin and theophylline.

Exercise 6 review

Examples of drugs metabolised by conjugation include: lorazepam, oxazepam, oestrogens.
Case study 2 review

The main issue of concern in this patient is her renal state and hence her ability to excrete drugs. In renal impairment there is considerable potential for drugs to accumulate in the body leading to toxicity. For this reason the actual choice of drug is crucially important as is the dose used. If drugs that are mainly excreted by the renal route are to be prescribed in situations where there is some renal impairment, then a reduction in dosage is usually necessary. The table below outlines the justification for the therapeutic choices in Mrs Barnes’ case.

**Digoxin**
Digoxin is often used in the treatment of congestive heart failure since it improves symptoms and exercise tolerance and reduces hospitalisation due to acute exacerbations. It does not, however, reduce mortality. Because it is renally excreted, a dosage reduction is necessary. Digoxin toxicity is increased by electrolyte disturbances. However, in obese patients a higher dose will usually be required because of greater distribution of the drug throughout the body.

**Ramipril**
ACE inhibitors have a valuable role to play in the treatment of heart failure since they improve symptoms and exercise tolerance, reduce hospitalisation due to acute exacerbations and reduce mortality. Ideally, it would be desirable to have a drug in this class which would be metabolised in the liver, thus reducing the impact of any reduction in kidney function. It is recommended to start with a low dose and to monitor renal function and electrolytes frequently during treatment. The BNF provides specific information on maximum daily doses of ramipril in renal impairment. Doses vary depending on a patient’s estimated glomerular filtration rate (eGFR). Alternatively, fosinopril is partly eliminated by biliary excretion and may be used in patients with impaired renal function.

**Furosemide**
Diuretics are used in patients with heart failure of long standing. Thiazide diuretics are ineffective in patients with poor renal function and a loop diuretic is preferred. Electrolytes should be monitored closely.

**Gliclazide**
The long-acting sulphonylureas, chlorpropamide and glibenclamide, are associated with a higher risk of hypoglycaemia. For this reason they should be avoided in older people and shorter-acting alternatives such as gliclazide should be used instead. Chlorpropamide also has more side-effects than other sulphonylureas and therefore is no longer recommended because of its renal elimination and long half-life. For obese patients metformin is preferred as it can contribute to weight loss. However, it is not recommended where there is renal failure to any degree, as lactic acidosis may well result. **The glitazones are contra-indicated due to the presence of heart failure.** Repaglinide should be used with caution in renal impairment.

With regards to the glitazones it should be noted that the marketing authorisation for rosiglitazone (Avandia®, Avandamet®) has been suspended (September 2010) following a review by the European Medicines Agency.11
Case study 3 review

Samuel’s epilepsy has been treated for years with phenytoin, which is a drug with a narrow therapeutic index. Phenytoin is extensively bound to plasma albumin and in older people there are generally lower levels of serum albumin with a consequent reduction in binding and a larger proportion of free drug to exert an effect. In older people this free level may rise to more than 10% leading to toxicity that may not be evident from total phenytoin concentration alone. In such cases measurement of free phenytoin levels would be a better indicator. As phenytoin toxicity is associated with symptoms such as confusion and slurring of speech it is possible that this is what is causing Samuel’s problems. As Samuel has been stabilised on phenytoin for many years and these symptoms have had a sudden onset it is likely that the reduction in protein binding has been caused by onset of an acute illness rather than an age-related reduction in serum albumin. Therefore, Samuel should be referred to his GP urgently and you should recommend that the GP monitors both the free and total phenytoin levels as symptoms may be due to changes in protein binding. His GP should also review his general health status.

It should be noted that dizziness, unsteadiness and slurred speech are also highly suggestive of stroke. It “appears” that the onset here is sudden. If onset was very sudden, then stroke is very highly likely, so immediate GP consultation is necessary.

Mr Bryson (76) takes ramipril for hypertension and has been doing so for many years. It is worth noting that the 2011 NICE guideline on the clinical management of primary hypertension in adults (CG127) recommends that adults >55 years (and black people of African or Caribbean family origin of any age) are offered a calcium-channel blocker (CCB) as step 1 therapy. If a CCB is not suitable, or if there is evidence of heart failure or a high risk of heart failure, these patients should be offered a thiazide-like diuretic12.
Section Two

The Effect of Ageing on Drug Response
Introduction

While older patients have benefited from the multitude of drugs available for the treatment of a wide range of diseases, there is growing evidence that polypharmacy, with associated adverse drug reactions, interactions and iatrogenesis, has become a significant problem in this age group. The common prevalence of multiple medical problems co-existing in the same person can sometimes make it difficult to determine the cause of signs and symptoms. New symptoms or common complaints are often assumed to be caused by an existing medical problem rather than being an adverse effect of medication.

Almost half of the NHS drugs bill is spent on medicines for older people\(^1\). Therefore, before prescribing for this age group, it is particularly important to diagnose accurately and set therapeutic objectives. Regular medication reviews are necessary to ensure drug treatment remains appropriate. Some syndromes related to age, especially cognitive impairment, affect the ability of older people to engage with health services. It is paramount that medication regimens are kept as simple as possible and that effective communication is maintained between everyone involved in the care of older people.

This section deals with the increasing complexity of prescribing in the older population and discusses commonly encountered medicine-related problems in older patients.

Learning outcomes

Following completion of this part of the course you should be able to:

- **Describe** the general guidelines for prescribing for older patients
- **List and describe** the common medication-related problems experienced by older patients
- **Implement** strategies to resolve medication-related problems in this patient group
- **Undertake** a medication review
- **Recognise** the need for effective communication between primary/secondary care interface and nursing/residential homes.
Prescribed medication in older people

In the 2011 Northern Ireland census the demographic picture showed that older people accounted for 14.56% of the total population, which then stood at 1.81 million. It is a similar picture in the whole of the UK with 16.7% of the total population being aged 65 or over. The previous census data showed that older people have more chronic diseases than the younger population; approx 58% of those over the age of 65 years suffer from at least one limiting long-term illness compared to 15% of those in younger age groups. The 2011 data has not been fully analysed yet but is expected to show similar statistics. See www.nisra.gov.uk for the NI data and www.ons.gov.uk for the UK data as the census results are released.

This leads to greater use of chronic medication in older patients. Research has found that four in five people over 75 take at least one prescribed medication on a daily basis and use, on average, at least four times as many drugs as other younger adults. There are differences in drug use patterns of older patients residing in their own homes and those who are in hospital or being cared for in nursing or residential homes. In general, medication use by community dwelling older people is lower than that of those who are institutionalised or hospitalised.

National statistics show that 60% of all prescriptions dispensed in England in 2005 were for older people. Nonetheless, the common perception that all older patients take numerous medicines is not always applicable. Studies have consistently shown that the average number of medicines used by community dwelling older people, within the UK, is between two and three medicines per individual. Of those aged over 75, 36% are taking four or more drugs. The majority of medicines taken by this group are taken on a regular basis for a chronic disease state.

Within recent years prescribing rights have been bestowed on healthcare professionals other than general medical and dental practitioners. Appropriately trained healthcare professionals, including nurses and pharmacists, are now able to prescribe dependently or independently and with the increase in deregulation of drugs from prescription (POM) to pharmacy (P) status, wider numbers of medicines are available for community pharmacists to recommend. Therefore, issues relating to prescribing will become central to an increasing number of healthcare professionals’ daily practice.

When prescribing for older people, a practitioner should keep the objectives of drug therapy at the forefront. These goals include:

- alleviating pain, suffering and disability
- improving functional capacity
- promoting quality of life
- prolonging life.

Inappropriate prescribing

Despite increasing awareness of the importance of good and appropriate prescribing, a number of difficulties in prescribing for older patients have been highlighted.

Excessive amount

Polypharmacy is a particular risk factor in older people for adverse drug reactions and admissions to hospital. A number of studies have indicated that older patients are prescribed more drugs than they can be reasonably expected to cope with in a practical way.
Inadequate clinical indication
In the context of multiple problems with symptoms, not all require a pharmacological solution, particularly as the risk-benefit ratio is higher in old age. Non-pharmacological interventions may be an alternative for certain conditions, e.g. lifestyle advice for insomnia, physiotherapy for osteoarthritis. In addition many reported symptoms in older patients are vague and non-specific, for example confusion, so it is important to establish the exact cause before treating if possible.

Excessive duration of treatment
Often prescribed medication is continued beyond therapeutic benefit. Inadequate repeat prescribing systems and infrequent medication review are often associated with this problem. Patients are reluctant to question the continued need of prescribed medicines, which can lead to widespread stockpiling of drugs. There is evidence that long-term treatment with multiple medicines is not necessary for many patients. Examples of such practice include the use of hypnotics and non-steroidal anti-inflammatory drugs.

Inappropriate prescribing includes both overuse and underuse of drugs. Although older patients often require multiple prescribed drugs to manage concurrent diseases, excessive prescribing is still widespread. Some reasons for inappropriate prescribing in older people include:

- an excessive desire to respond to symptoms and problems with drug treatment
- failure to recognise an adverse drug reaction, which, in turn, may lead to incremental prescribing, e.g. a non-steroidal anti-inflammatory drug (NSAID) may cause hypertension for which an antihypertensive is prescribed
- the patients’ or their carers’ demands for, or refusal of, drugs
- an inappropriate response to non-medical problems
- unrealistic expectations by the prescriber, patient or both
- a failure to individualise treatment for older patients and to consider their overall needs
- inadequate review leading to failure to increase or decrease doses or to discontinue unnecessary drugs.

Inappropriate prescribing may lead to sub-optimal disease management. However, finding the balance between underuse of medicines and over-prescribing is often difficult. Sufficient information now exists for most drugs to enable prescribers to decide on the best regimen for older people. Each older patient should be treated as an individual and a comprehensive medical history and assessment should be made before treatment is agreed. Underprescribing can be detected with the Assessment of Underutilisation of Medication where the health professional matches a list of chronic medical disorders to prescribed medication to establish whether there is an omission of a needed drug.

The Medication Appropriateness Index (MAI) is a measure of prescribing appropriateness that assesses ten elements of prescribing: indication, effectiveness, dose, correct directions, practical directions, drug-drug interactions, drug-disease interactions, duplication, duration and cost. In one study frail older inpatients included in a health services intervention had at least one drug with one or more inappropriate ratings, and 44% had at least one unnecessary drug.
Prescribing for Older Patients

Medication-related problems

A medication-related problem is an event or circumstance involving drug treatment that actually or potentially interferes with the patient experiencing an optimal outcome of medical care. Although age itself is not a significant predictor of such problems, many older patients have been shown to have problems emanating from their drug therapy. Medication-related problems in older patients can be divided into three categories:

- non-compliance
- adverse drug reaction (ADRs)
- drug interactions.

As these may be the cause of increased morbidity in older people, an aim of caring for these patients should be to identify, resolve and prevent drug-related problems. Full and regular medication reviews provide an important opportunity to identify and resolve medication-related problems. Examples of common medication-related problems are discussed below.

Non-compliance

It has been estimated that as many as 50% of older people may not be taking their medicines as intended and therefore do not derive optimum benefit of treatment\(^1\). Non-compliance may be intentional or non-intentional and can take the form of overuse, e.g. laxative abuse, and underuse, e.g. anti-thrombotic agents to prevent stroke. Ambiguous directions and/or labelling or poor understanding of the purpose of the

---

Write down FIVE points to remember when prescribing for older people.

1. 
2. 
3. 
4. 
5. 

Compare your response to the comments made in the exercise review
medication can lead to non-compliance. This aspect of treating older patients will be discussed in more detail in Section 5.

### Adverse drug reactions

Polypharmacy and age-related changes in clinical pharmacology, as discussed in Section 2, put older people at particular risk of adverse drug reactions (ADRs). They remain an important cause of morbidity and even mortality in older patients, especially those who are frail with an acute illness. Hospital-based studies in a number of countries have shown increasing rates of adverse drug reactions with ageing.

It is estimated that adverse drug reactions account for 5-17% of all hospital admissions\(^1\), meaning that in Northern Ireland as many as 2000 older in-patient admissions may be related to ADRs each year. Furthermore, while in hospital, 6-17% of older in-patients experience adverse drug reactions\(^1\).

Write down FOUR factors that significantly increase the risk of an older patient suffering from an adverse drug reaction.

1. 
2. 
3. 
4. 

Compare your response to the comments made in the exercise review

Many ADRs in older people are preventable by good prescribing practice. Most are dose-dependent and therefore predictable. Polypharmacy is strongly correlated with the incidence of ADRs in older people.

ADRs often go undetected in older patients as they present in a vague and non-specific way, e.g. as confusion, constipation, postural hypotension and falls. Table 3 provides examples of the ADRs of drugs commonly used in older patients.
### Table 3: Examples of common adverse drug reactions in older patients

<table>
<thead>
<tr>
<th>Type of drug</th>
<th>Common side-effect</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypnotics</td>
<td>Excessive sedation, hangover effect, falls, confusion</td>
<td>Drugs with short half-life are preferred. Use only on a short-term basis to reduce risk of dependence.</td>
</tr>
<tr>
<td>Diuretics</td>
<td>Dehydration, incontinence, electrolyte disturbances</td>
<td>Should not be used on a long-term basis to treat simple gravitational oedema. Regular review is necessary when used to treat hypertension or heart failure.</td>
</tr>
<tr>
<td>NSAIDs</td>
<td>Upper gastro-intestinal upset, gastro-intestinal bleeding, oedema, heart failure</td>
<td>Bleeding associated with NSAIDs is more common in older patients. Older patients can also present with NSAID-induced impaired renal function. Other side-effects can be more severe in patients with heart disease or impaired renal function. Short-term use preferred and careful monitoring required.</td>
</tr>
<tr>
<td>Opioid analgesics</td>
<td>Constipation</td>
<td>Substitute opioid-containing combination analgesics with paracetamol where possible. Repeat prescriptions for opioid analgesics should be discouraged.</td>
</tr>
<tr>
<td>Anticholinergics</td>
<td>Confusion, dry mouth, constipation, urinary problems</td>
<td>Older people may receive several drugs with anticholinergic activity simultaneously. For most drugs with anticholinergic activity an alternative is available.</td>
</tr>
<tr>
<td>Long-acting oral hypoglycaemics</td>
<td>Hypoglycaemia</td>
<td>Hypoglycaemia is of particular concern in those who live alone or have a poor understanding of diabetes self-management. Avoid in older patients.</td>
</tr>
<tr>
<td>Antidepressants</td>
<td>Hyponatraemia</td>
<td>Hyponatraemia has been associated with all types of antidepressants but has been reported more frequently with SSRIs and should be monitored more closely in older people</td>
</tr>
</tbody>
</table>
Where an ADR is suspected, the prescriber should report it to the MHRA by using the electronic form at www.yellowcard.gov.uk. Alternatively, Yellow Cards for reporting ADRs to the MHRA (by post) are provided inside the back cover of the BNF.

**Falls**

Falls are a symptom rather than a diagnosis. When a patient, usually an older person, presents with a history of falls, it is necessary to be meticulous to find the reason for the falls. Falls are a problem for older patients because they may indicate underlying pathology that caused the fall or simply inadequacy of the locomotor system, but also because older patients are much more likely to suffer significant or even serious injury in a fall. In fact, in 2005 there were 2118 admissions due to falls in Northern Ireland, 61% of which were suffered by older patients. The NSF standard on falls points out that polypharmacy is a risk factor for falls.

Over 30% of people over 65 have at least one fall a year and half of those fall at least twice. The risk increases with increasing age and those taking 4 or more medicines are at a greater risk of falls.

A medical history should be taken, for example, is the patient being treated for hypertension. Most newer treatments for blood pressure are less likely to produce postural hypotension than older ones but it may still occur, e.g. doxazosin. It is important to review all drugs, paying particular attention to those that may cause confusion or sedation. Dehydration in patients taking diuretic or laxative medicines can also contribute to falls. Furthermore, older people taking oral corticosteroids are at increased risk of developing osteoporosis and giving preventive treatment such as bisphosphonates reduces the risk.

Innovative schemes have been set up in the community, demonstrating how pharmacists can work effectively with others in the primary care team to help reduce the risk of medicine-related falls, particularly in older patients, through medication review, advice and referral. Such schemes are advocated in the community pharmacy strategy for Northern Ireland “Making it Better”.

Interventions to reduce the incidence of falls in nursing homes have mainly focused on reviewing the appropriateness of psychotropic medicines use.

**Constipation**

The likelihood of a patient experiencing constipation increases with age due to reduced mobility and altered diet and this can be further exacerbated or initiated by prescribed medicines. Drugs commonly implicated in constipation include opioid analgesics, anticholinergics and iron preparations. Investigations into the cause should include a medication history. Any offending medication should be discontinued or substituted where possible and only when this fails, should treatment with laxatives be considered.
Confusion
Deliurn occurs in about 15-20% of all general admissions to hospital\textsuperscript{13}. The incidence is higher in older people and those with pre-existing cognitive impairment. Drug use is implicated in nearly 50% of cases, involving drugs such as benzodiazepines, analgesics, anticonvulsants, anticholinergics, antiparkinsonism medications and steroids. Investigations to determine the cause of delirium should include a full medication history to rule out an adverse drug reaction as the underlying cause.

The role of medications may be suggested by a temporal relationship between onset of delirium and start of new medication. However, this is not always the case and practitioners need to be aware of this. The exact mechanism of delirium is unclear but it is postulated that central cholinergic pathway blockade is a major factor. This may explain why anticholinergic medications readily lead to delirious states. It may be that this factor along with the pharmacokinetic changes that occur later in life and co-morbidities increase the susceptibility of older patients to drug-induced delirium.

Management involves stopping the offending drug although the actual causal medication is often unknown. In this case all unnecessary medications should be stopped or doses reduced. These medications can be increased or re-introduced when the patient has improved. Furthermore, it may be prudent to prescribe alternatives to medications with high anticholinergic activity, e.g. proton pump inhibitors rather than cimetidine.

Drug interactions
The term drug interaction is applied most frequently to those situations in which the actions of one drug are altered by the concurrent use of another, or when the medication is affected by nutrients or food or where the effects of drugs interact adversely with underlying medical conditions.

Table 4: Clinically relevant CP450 isoforms

<table>
<thead>
<tr>
<th>CYP isoform</th>
<th>% Drug metabolised</th>
<th>Drugs metabolised*</th>
</tr>
</thead>
<tbody>
<tr>
<td>CYP3A4, 5, 7</td>
<td>40%</td>
<td>Macrolides, nifedipine, benzodiazepines, statins, antivirals, immune modulators, anti-arrhythmics</td>
</tr>
<tr>
<td>CYP2D6</td>
<td>20%</td>
<td>Antipsychotics (haloperidol), tricyclic and SSRI antidepressants, beta-blockers</td>
</tr>
<tr>
<td></td>
<td>10%</td>
<td>Ibuprofen, warfarin, phenytoin, NSAIDs, oral hypoglycaemics, all ß-blockers</td>
</tr>
<tr>
<td>CYP2C19</td>
<td>10%</td>
<td>Proton pump inhibitors, indometacin, phenytoin, phenobarbital</td>
</tr>
<tr>
<td>CYP1A2</td>
<td>10%</td>
<td>Theophylline, caffeine, paracetamol, naproxen</td>
</tr>
</tbody>
</table>

*Several examples within classes described
Types of drug interactions

Drug-drug interactions can be pharmacokinetic or pharmacodynamic in nature. The most frequent pharmacokinetic drug-drug interactions involve several isoenzymes of the hepatic cytochrome P450 and drug transporters. Some of these isoforms are listed in Table 4, along with examples of the drugs that are metabolised by that isoform.

Examples of drugs that inhibit CP450 are: imidazole antifungals, metronidazole, sulphonamides, macrolide antibiotics, 4-quinolone antibiotics, cimetidine, PPIs, SSRIs, amiodarone, verapamil & diltiazem, allopurinol, alcohol, grapefruit. Table 5 lists some of these enzyme inhibitors and examples of drugs which, if given concomitantly, would exhibit a risk of toxicity through an increase in plasma concentration.

Table 5: Examples of enzyme inhibitors

<table>
<thead>
<tr>
<th>Enzyme inhibitor</th>
<th>Increased concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSRI</td>
<td>Benzodiazepines, carbamazepine, theophylline, NSAIDs, antipsychotics</td>
</tr>
<tr>
<td>Verapamil, diltiazem</td>
<td>Alcohol, digoxin, nifedipine, theophylline</td>
</tr>
<tr>
<td>Grapefruit juice</td>
<td>Calcium channel blockers, simvastatin, atorvastatin, sildenafil, amiodarone, sertraline, warfarin</td>
</tr>
<tr>
<td>Alcohol</td>
<td>Many drugs</td>
</tr>
</tbody>
</table>

Examples of drugs that induce CP450 are: barbiturates & primidone, phenytoin & carbamazepine, rifampicin & rifabutin, St. John’s Wort, SSRIs, efavirenz, nevirapine, griseofulvin. Table 6 also lists some of these enzyme inducers and examples of drugs which, if given concomitantly, exhibit a risk of treatment failure through a reduction in plasma concentration.

Table 6: Examples of enzyme inducers

<table>
<thead>
<tr>
<th>Enzyme inducer</th>
<th>Reduced concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbamazepine</td>
<td>Antiepileptics, steroids, risperidone, theophylline, warfarin</td>
</tr>
<tr>
<td>St John’s Wort</td>
<td>Warfarin, antiepileptics, digoxin, simvastatin, theophylline</td>
</tr>
<tr>
<td>SSRI</td>
<td>Haloperidol, atypical antipsychotics</td>
</tr>
<tr>
<td>Griseofulvin</td>
<td>Warfarin</td>
</tr>
</tbody>
</table>
In pharmacodynamic drug-drug interactions the outcome is an amplification or decrease in the therapeutic effects or side-effects of a specific drug. They may be due to competition at receptor sites or occur between drugs acting on the same physiological system.

Other types of drug interactions are drug-alcohol, drug-herbal product, or drug-nutritional status interactions. Lastly, drug-disease or drug-patient interactions take place when a drug has the potential to exacerbate an underlying disease or medical disorder. Table 7 provides some examples of different types of drug interactions and adverse outcomes that can be seen in older patients.

Table 7: Examples of different types of drug interactions and their consequences

<table>
<thead>
<tr>
<th>Type of interaction</th>
<th>Example</th>
<th>Mechanism of action</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pharmacokinetic drug-drug</strong></td>
<td>Ciprofloxacin and olanzapine</td>
<td>Ciprofloxacin inhibits CYP1A2 leading to an increase in plasma concentration of olanzapine</td>
<td>Rigidity, falls</td>
</tr>
<tr>
<td><strong>Pharmacodynamic drug-drug</strong></td>
<td>Anticholinergic and donepezil</td>
<td>Antagonism</td>
<td>Decreased effect of donepezil</td>
</tr>
<tr>
<td><strong>Drug-nutritional status</strong></td>
<td>Low albumin and phenytoin</td>
<td>Increase in free phenytoin concentration</td>
<td>Confusion, somnolence, ataxia</td>
</tr>
<tr>
<td><strong>Drug-herbal product</strong></td>
<td>Gingko and aspirin</td>
<td>Decrease in platelet function and adhesion</td>
<td>Increased risk of bleeding</td>
</tr>
<tr>
<td><strong>Drug-alcohol</strong></td>
<td>Alcohol and chronic use of benzodiazepines</td>
<td>Synergy</td>
<td>Increased sedation and risk of falls</td>
</tr>
<tr>
<td><strong>Drug-disease or drug-patient</strong></td>
<td>Metoclopramide for gastric dysmotility in a patient with Parkinson’s disease</td>
<td>Increase in dopamine receptor blockade</td>
<td>Worsening of Parkinson’s disease</td>
</tr>
</tbody>
</table>

Management of drug interactions in older people

It is difficult to determine the incidence of clinically important drug interactions but an increased risk of these problems is reported in older patients. This is mainly due to the prescribing of a large number of medicines and prevalence of multiple concurrent pathologies in the older patient. Doctors are often not aware of all the drugs their older patients are taking meaning that physicians may not consider interactions as a possible cause of the presenting complaints of older patients. Furthermore, vague presenting
symptoms such as confusion, falls, urinary incontinence and weakness could confound the detection of drug interactions. The possibility of drug interactions should be considered if patients present with new problems.

Management of drug interactions in older people can be difficult. One recent clinical approach\(^\text{14}\) suggests categorising interactions into those that are common, complex or cascade interactions. The first category includes those that occur when drugs with a narrow therapeutic index such as digoxin, phenytoin or warfarin are used. They are generally well known, are associated with a therapeutic monitoring test and are detected by drug interactions software systems. Also included in this category are drugs that are substrates, inhibitors or inducers of cytochrome P450 isoenzymes.

Complex interactions will include those patients with nine or more drugs and five or more co-morbidities. The choice of drugs used to manage every disorder is generally appropriate when considered individually, but the overall combination could yield unwanted results in terms of interactions.

Finally, cascade interactions. This begins when an adverse effect of one drug is misdiagnosed as a new medical complaint. Another drug is then prescribed and the patient is placed at risk of developing additional ADRs relating to this potentially unnecessary drug.

Below are some tips for the management of drug interactions\(^\text{14}\).

1. When possible, discontinue the drug causing the interaction, or the drug affected by the interaction. Alternatively, decrease the dose or change the time of administration.
2. Review all medication for appropriateness and ensure a lowest effective dose.
3. Consider substituting the suspected drug with another of similar efficacy but lower potential to cause interactions.
4. Monitor drug concentrations where possible.

Computer decision support systems are a useful prescribing aid though they are not exhaustive and do not identify potential interactions with OTC medicines. Other drawbacks of such systems include the need to be kept up to date, and the fact that users have to filter the alert messages to identify those that are clinically significant. Furthermore, none of the commercial systems are designed for specific use in older patients.

Although some drug interactions develop unexpectedly and are impossible to predict, like adverse drug reactions, most are predictable and therefore preventable. Although therapeutic alternatives might be considered and steps taken to more closely monitor combination therapy, older patients must not be deprived of therapy from which they can benefit.
Section Three
Prescribing for Older Patients

Effective interventions

Effective repeat prescribing systems
Most of the medicines taken by older people are obtained as a repeat prescription. Repeat prescribing is essential in this group to reduce health professional workload and patient inconvenience. However, it also reduces contact between doctors and patients, potentially contributing to clinical problems. Considerable effort is required to ensure that the systems for ordering, synchronising quantities, ensuring regular review of the need for each medicine and monitoring that the medicine is being taken and the patient is benefiting from it, are effective. With that in mind General Practice staff are encouraged to regularly audit repeat prescribing processes to manage the risks associated with them.

Review of medication

List FOUR benefits of medication review

1. 
2. 
3. 
4. 

Compare your response to the comments made in the exercise review

One definition of medication review is:

“A structured critical examination of a patient’s medicines with the objective of reaching an agreement with the patient about treatment, optimising the impact of medicines, minimising the number of medication-related problems and reducing waste”[15].

There is an increasing body of evidence supporting the effectiveness of medication review as a means of optimising therapy, improving health outcomes, reducing the likelihood of medicine-related problems and cutting waste. Evidence is also emerging that targeted medication review can help older patients maintain their independence and avoid admission to residential care or hospital.

Regular review of medication is an important factor in improving prescribing for older patients and the following aspects should be considered in this process.
What is the indication for the therapy?
This is based on the assumption that there should be an indication for prescribing each drug. Is the reason clear from the history summary? It may sometimes be difficult to identify the reason for which the patient is taking the medicine. If this is the case, then it may be impossible to determine whether the desired outcome is occurring. If a drug is being used, with no apparent indication, then it would seem reasonable that the drug should be discontinued.

Is the medication appropriate for this patient?
Using clinical knowledge and published literature, it should be possible to assess the effectiveness of the drug for the indication for which it is prescribed.

Is the dosage suitable?
Dosage adjustments in this population are routine. Following the guidelines on prescribing for older patients, medicines should be commenced at the lowest therapeutic dose and titrated for each individual to provide the desired outcome. Consideration should be given to tests required to monitor dosage.

Are the directions correct?
This relates closely to the suitability of the dose. Each medicine has a recommended dosage and frequency for each indication. These guidelines should be followed, bearing in mind that, since drug elimination is often slower in older patients, the dosing interval may be prolonged.

Is the patient capable of taking this drug and is compliance satisfactory?
If the patient is unable to incorporate the taking of their medicines into their daily routine because it is impractical, then the patient will be unlikely to comply with the directions, with reduced effectiveness of treatment. For example, some patients do not have the cognitive ability to take bisphosphonates weekly or to remember to take them on an empty stomach whilst sitting or standing. The NSF for older people recommends that GPs and pharmacists should work together to ensure no older person is in receipt of medicines labelled “as directed”. Table 8 outlines a number of ways in which drug regimens can be made more practical.
Section Three

Prescribing for Older Patients

Change | Comments
---|---
**Reduce dose frequency** | Use a drug with a suitable half-life within the same therapeutic group. (Remember: using an agent with a very long half-life may be problematic in older patients as the action can be prolonged leading to adverse effects, e.g. chlorpropamide). Use modified-released formulations to facilitate once or twice daily dosing (e.g. nifedipine). However, the non-generic products tend to be more expensive and there can be problems with missed doses.

**Reduce number of drugs** | Use of combination drugs instead of two separate drugs (Please note, however, that this decreases dosing flexibility). Discontinuation of drugs with little proven efficacy. Discontinuation of unnecessary drugs.

**Synchronise doses** | Some patients have a fear of taking different drugs at the same time and so they spread the doses throughout the day, increasing the number of total doses taken daily. Informing the patient that they can take most drugs, e.g. those tablets to be taken in the morning, at the same time, reduces the number of dosing times required throughout the day. Attention should be paid to possible interactions between drugs taken at the same time (e.g. calcium and vitamin D preparations and bisphosphonates).

**Define cues** | Link the taking of a tablet to an every day activity such as brushing teeth or taking a cup of tea in the morning.

### Table 8: Possible changes to drug regimen to ensure it is more practical

- **Is the drug producing side-effects? Are any tests required to monitor side-effects?**
  Side-effects are frequently an extension of the pharmacological profile of the drug and are often predictable. Patients should be encouraged to report any new symptoms experienced to either the pharmacist or their GP. If the side-effect can be attributed to a particular drug that the patient is taking, then it may be appropriate to change the therapy to an alternative.

- **Are side-effects of one drug being treated with another?**
  Unfortunately, older patients are frequently prescribed medication to treat the side-effects of another drug, which can lead to polypharmacy.

- **Are there any clinically significant drug interactions?**
  Health professionals should always be aware of potential drug-drug or drug-disease interactions. Appendix 1 of the BNF is a particularly useful source of information.

- **Is there unnecessary duplication of drug therapy?**
  The use of two agents that act in a similar manner is neither cost-effective nor desirable for the patient; indeed it may pose more problems than benefits. However, there are occasions when apparent duplication can be beneficial, e.g. for synergistic effects of similar drugs in patients unresponsive to a single agent.
Is the duration of the therapy appropriate? What would happen if the drug was stopped?

You should ensure that the duration of the therapy is long enough to achieve the desired outcome. In other circumstances, treatment may be prematurely ended because of lack of effect, although sufficient time must be allowed for the drug effect to be seen. At time of medication review a decision should be taken on whether or not repeat medication can be continued for the next 6 or 12 months.

Lastly, the review should include the identification of any non-repeat items that are being prescribed regularly and conversion to formal repeats if appropriate, before setting the next review date.

Further information on medication review can be found in the online distance learning course, Patient Medication Review and Records, 2012 (www.nicpld.org).

Give examples of TWO drugs that take a prolonged time to demonstrate an effect.

<table>
<thead>
<tr>
<th>Medication</th>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
</tbody>
</table>

Compare your response to the comments made in the exercise review

Initially reviews should be targeted at older people who are more likely to experience problems, i.e. those recently discharged from hospital, those in care homes and those on multiple medicines. Suitably trained health professionals, e.g. pharmacists, can carry out these reviews in clinics, pharmacies, or the patient’s home.
'Managing Your Medicines’ is a medication review service widely available across community pharmacy in Northern Ireland, funded by DHSSPS and administered through the Health Board. In this scheme eligible people who are taking multiple medicines, have a history of poor compliance or have recently been discharged from hospital, can have their complete medication reviewed by their local community pharmacist. This includes patients who are:

1. Taking four or more medications (systemic, non prn)
2. Taking any high risk medicines e.g. – digoxin, warfarin, diuretics, Lithium, methotrexate, phenytoin, NSAIDs, insulin, antiplatelets and who have
3. Low level of support for managing medicines
4. Poor prescription compliance/administration compliance (evident from Pharmacy or GP patient records),
5. Been recently discharged from hospital with a significant medication change

Many older people prescribed medication will fit the above criteria and therefore be suitable for review under the scheme. Further information on this service is available on the Business Services Organisation (BSO) website.21

Similar schemes are being put in place in NHS hospitals in response to the Audit Commission’s ‘A Spoonful of Sugar’16. One local example is that of the Integrated Medicines Management (IMM) service available within some hospital Trusts in Northern Ireland.

Repeat dispensing
In February 2004, the Making it Better strategy for community pharmacy12 acknowledged that repeat dispensing can yield benefits to patients and GPs. The majority of community pharmacies in Northern Ireland are now providing a repeat dispensing service. Provided patients are carefully selected and are stable on their repeat medication then the repeat dispensing service may resolve some of the problems associated with prescribing for older people, for example, synchronising of supplies of repeats to improve compliance and reduce confusion.

Role of carers
Carers are in a position to support older people in medicine taking but the NSF for Older People1 recognised that their potential contribution is under-used. Home care workers often assist people with medicine taking and need training in medicines and their use to ensure that this is appropriate. Their insight into the patient’s health and any worsening of symptoms is often unused. The NSF recommends that medicines management systems should involve carers to ensure older people get the most from their medicines.
Education and training

Education and training should be ongoing and include updates, not only for relevant healthcare professionals such as GPs, pharmacists and nursing home staff, but also for patients and their carers.

Patients and carers require advice on usage, handling and storage of medicines and community pharmacists can provide this support. Written information should be provided to complement verbal information.

Nursing/residential home staff require basic training on medicines and the potential for medication-related problems and what action to take.

Lastly, all healthcare professionals need training to develop consultation styles that are likely to meet the needs of older people and their carers.

Nursing/residential homes

Older residents in nursing homes are at particular risk of polypharmacy and inappropriate prescribing. Nursing home residents in the UK take an average of six to seven drugs. Systematic and regular reviews of medication have been shown to be effective in improving care and saving money. Some non-recurrent funding has been available in various parts of Northern Ireland to provide GPs with protected time to review the medication of this population. Other schemes have used practice-based pharmacists or community pharmacists to carry out such reviews.

One area of particular concern is the prescribing of antipsychotic medicines for patients in nursing and residential homes. Such medicines are often prescribed to treat behavioural complications of dementia and may hasten cognitive decline. The sedative effects of antipsychotic medicines can be further exacerbated by hypnotics, another therapeutic class of drugs often prescribed to this group of patients.

Good communication between GPs, nursing or senior care staff and local pharmacists is essential. Agreed management policies should be established for common clinical conditions and the use of medicines, particularly psychotropic medicines. The regulatory framework by which nursing homes in the USA operate provides disincentives to homes for extended prescribing of medicines in the absence of documentation justifying its use and this has been shown to influence prescribing.

Primary/secondary care interface

Communication needs to be improved to reduce the delay in transfer of medication histories and recommendations at the time of hospital admission and discharge. Increasingly, GPs, community pharmacists and nursing/residential homes are asked to provide detailed medication histories at time of admission by clinical pharmacists. This should include repeat medicines, acute medicines and allergy status. Dates of issue of drugs provide important information with respect to compliance for older patients. This is of particular importance for older patients who are more likely to be taking multiple medicines, undergoing frequent changes to regimens and experiencing ADRs. The National Patient Safety Agency (NPSA) in conjunction with the National Institute for Health and Clinical Excellence (NICE) issued guidance (Technical patient safety
solutions for medicines reconciliation for adults on admission to hospital) in December 2007 to ensure that medicines on admission correspond to those taken before admission. Full guidance available on www.nice.org.uk.

GP practices are encouraged, where possible, to use clinical system templates to ensure that information is accurate, up-to-date and is provided in a timely and consistent manner. In policy documents such as a ‘Spoonful of Sugar’ \(^{16}\) it has been recognised that secondary care communication needs to be improved to reduce the delay in transfer of medication recommendations to primary care to ensure that treatment that was only intended short-term, during in-patient stay, is discontinued on discharge and to include adequate explanations for medication changes. Studies \(^{19}\) have shown that unintentional discrepancies in medication are found in half of patients after they have left hospital and include patients or GPs restarting medication that was stopped in hospital and duplication of treatment (e.g. two beta-blockers being prescribed simultaneously).

Methods to improve care include:

- better communication between health professionals
- maintaining accurate and up-to-date records
- ensuring discharge information indicates the indication for drug therapy, duration of treatment and monitoring requirements
- counselling patients on their drugs before discharge
- written instructions and self-medication programmes to improve knowledge and adherence.

An Electronic Care Record pilot project started in 2010 enabling secondary care pharmacists to have direct access to GP clinical systems for medication records of patients admitted to hospital. By the end of the pilot, more than 200 clinical staff in the Ulster and Belfast City hospitals were using the system. A case has been prepared for the procurement and implementation of a NI-wide Electronic Care Record system \(^{22}\).

In May 2012, Health and Social Care Northern Ireland (HSCNI) announced that a £9m contract had been awarded to software supplier, Orion Health, which brings Northern Ireland a step closer to a national electronic patient care record \(^{23}\).

**GMS contract**

The Quality and Outcomes Framework (QOF2) of the new General Medical Services (GMS) contract for GPs recognises the importance of good quality healthcare in general practice. One of the QOF2 domains rewards achievement in clinical care covering the major chronic diseases such as asthma, cancer, coronary heart disease and diabetes. As many older patients will be suffering from at least one of these morbidities, pharmacists should be familiar with the indicators in QOF2 linked to prescribed medicines. These indicators will influence prescribing in older people in order to obtain specific outcomes, for example, up to 17 points will be awarded if between 40 and 70% of patients registered in a practice with a diagnosis of heart disease have a last measured total cholesterol (measured in the previous 15 months) of 5 mmol/l or less.

As part of the new GMS contract 2012/13, a number of changes to the QOF have been agreed and can be viewed on NHS employers website \(^{24}\).
Influenza/pneumococcal immunisation

The influenza immunisation programme is now one of the biggest public health programmes in the United Kingdom and Northern Ireland and has consistently achieved very high rates in the target groups. One of the at-risk groups is all patients over 65 years old and pharmacists have a role in identifying members of this target group and promoting the benefits of the immunisation on an annual basis. Furthermore, older patients in Northern Ireland should also receive a one-off administration of the pneumococcal vaccine.

Case studies

Contrary to popular belief, the treatment of disease in older patients is similar to treating the same disease in younger sufferers, although the guidelines on prescribing for older patients should be adhered to and changes in pharmacokinetics and pharmacodynamics taken into consideration.

The following six case studies illustrate some of the medication-related problems that may be encountered in older patients. For each patient you should comment on their medication, identify the problems with treatment and propose solutions to these problems.
Case study 4

Mrs Esther Williams is an 85 year old widow who now lives in a residential home. She is frail and unsteady on her feet at times and spends most of the day sitting in the day room where she likes to watch TV.

Medical history
Esther has long-standing Type 2 diabetes and hypertension, both of which are being managed with a number of drugs. She has had a number of falls recently and has been complaining of feeling dizzy. The staff in the home contact you to discuss Esther’s dizziness. They also note that she rarely sticks to her diabetic diet, often eating sweets and cakes given to her by the other residents.

Prescribed medication
• Lisinopril 10 mg daily
• Glibenclamide 5 mg one in the morning
• Paracetamol 500 mg tablets
• Fybogel sachets one in the morning
• Aqueous cream apply to legs in the morning and at night

Comment on Esther’s prescribed medicines.
What would your plan of action be?
Problem                                Action

Compare your response to the comments made in the case study review
Case study 5

Mr Herbert Bell is a 79 year old man and, until three months ago, lived with his wife, Betty, who now resides in a nursing home. He considers himself in good health for someone of his age and walks to visit Betty every day. He enjoys gardening and doing odd jobs around the house. He religiously visits the pharmacy every month to obtain his repeat prescriptions.

Past medical history
Until a year ago Herbert’s only complaint was occasional back pain, which he has suffered since middle age and which he treats with bed rest and paracetamol. A year ago Herbert was diagnosed as having benign prostatic hypertrophy (BPH), which caused him a lot of distress and discomfort at the time but now it does not affect his daily routine. Since Betty moved to the nursing home, he has had difficulty sleeping and has felt very depressed, so much so that he has lost interest in his garden and has not personally been to collect his medication. A month ago the doctor prescribed an antidepressant to relieve his depression. When you next speak to Herbert, he tells you that he fears that his BPH is getting worse as he is having some urinary problems. He has been incontinent at night with increasing frequency, yet during the day he has difficulty going to the toilet. He also complains that those new tablets do not seem to be doing any good and he feels no better.

Prescribed medication
- **Finasteride 5 mg daily**
- **Temazepam at night when required (records show three prescriptions of 30 tablets)**
- **Doxulepin 25 mg one three times a day**
- **Senna tablets two at night**

Comment on Herbert’s medication and identify problems in his therapy.
What would your plan of action be?

Problem  Action

Compare your response to the comments made in the case study review
Case study 6

Isabel White is a 72 year old widow who lives at home with her older sister, Helen. Both are quite frail and virtually housebound, only getting out once a week when Isabel’s daughter takes them to do their shopping. A home help visits twice a week to help with housework and when Isabel needs to see her GP or nurse, they come to the house. In addition, the local pharmacy delivers her medicines.

Past medical history
Isabel was diagnosed as having Parkinson’s disease four years ago and has not had any worsening symptoms since she was stabilised on her current dose of co-beneldopa. Two years ago she was diagnosed with chronic obstructive pulmonary disease (COPD). She had been a heavy smoker all her adult life, but gave up when she was diagnosed with COPD.

She complains that the new inhalers that have been prescribed for her have not improved her breathlessness, in fact it has been getting worse. She has also noticed that her hands are shaking more frequently since starting the medicines and that her tongue feels ‘furry’ and looks white.

Prescribed medication
- Co-beneldopa 25/100 mg twice daily (long-term therapy)
- Ipratropium bromide 20 micrograms metered dose inhaler, two puffs four times daily (long-term therapy)
- Salbutamol 100 micrograms metered dose inhaler, two puffs four times daily (started 8 weeks ago)
- Beclometasone 250 micrograms metered dose inhaler, two puffs twice daily (started 8 weeks ago)

Comment on Isabel’s medication, identifying problems in her therapy and include any advice you would give her.
What would your plan of action be?

<table>
<thead>
<tr>
<th>Problem</th>
<th>Action</th>
</tr>
</thead>
</table>

Compare your response to the comments made in the case study review
Case study 7

Irene Butler is 81 years of age and lives on her own. She feels her health is good for someone of her age and is still active. She is still able to drive and collect her prescriptions and medicines herself. She enjoys walking her dog, although she is not as quick or as steady as she used to be.

Past medical history
She has had hypertension for many years and her blood pressure has been controlled well with her current therapy. In the past she has had a peptic ulcer, which was successfully treated, and only occasionally experiences some dyspepsia, particularly after going to her daughter’s house for Sunday lunch.

Irene tells you that her knees are bothering her, particularly after walking to the local shops and this has been gradually developing over two to three years. However, she did not think it was important to mention as the discomfort had been minor and she thought it was normal for someone of her age. She also has difficulty lifting heavy objects and opening containers such as bottles and jars. She reports that her knuckles are red and slightly swollen. She had been taking paracetamol, bought from the supermarket, to ease the pain, but in recent months even the maximum dose does not relieve her pain any more.

Prescribed medication
- Bendroflumethazide 2.5 mg in the morning
- Atenolol 50 mg in the morning
- Gaviscon liquid 20 ml when required
- Lactulose solution 10 ml at night

Comment on Irene’s prescribed medication and presenting symptoms.
<table>
<thead>
<tr>
<th>Problem</th>
<th>Action</th>
</tr>
</thead>
</table>

Compare your response to the comments made in the case study review.
Case study 8

Hugh Devine is a 69 year old widower who lives alone. Since his wife died, he has been living in sheltered accommodation and does not get out much. Recently he has started going to a day centre three mornings per week.

Past medical history
Three years ago Hugh was admitted to hospital with shortness of breath, rapid heart beat and ankle swelling. He was diagnosed with congestive heart failure and is currently prescribed a diuretic, an angiotensin-converting enzyme (ACE) inhibitor and digoxin.

Hugh contacts you because he is increasingly breathless especially when he is walking from one room to another and his legs are slightly swollen. On further discussion with Hugh, you find out that he is reluctant to take his furosemide on the mornings that he goes to the day centre as it makes him need to go to the toilet at the day centre and he is embarrassed as they insist on helping him to the toilet. Hugh had been overweight but has lost almost 14lbs since his wife died as he has not been eating as well. Recently, he has been feeling nauseous and has vomited on the odd occasion.

Prescribed medication
• Enalapril 10 mg two in the morning
• Furosemide 40 mg one in the morning
• Digoxin 250 micrograms one in the morning

Comment on problems in Hugh’s medication
### What would your plan of action be?

<table>
<thead>
<tr>
<th>Problem</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Compare your response to the comments made in the case study review.
Archie Murray is a 77 year old man who was recently admitted to hospital due to a general deterioration in his health. His past medical history includes a renal transplant 15 years ago, type 2 diabetes, atrial fibrillation, congestive heart failure and early Alzheimer’s disease. A medication history taken at admission by a ward clinical pharmacist has uncovered that his current regular medication includes ciclosporin, furosemide, losartan, gliclazide, prednisolone, warfarin, levothyroxine, donepezil, lactulose, digoxin, calcium and vitamin D supplement, and gingko biloba (for his memory). In addition, 7 days prior to admission clarithromycin was started for bronchitis.

List the potential drug-drug interactions and drug-disease interactions which Archie may experience.
What would your plan of action be?

<table>
<thead>
<tr>
<th>Problem</th>
<th>Action</th>
</tr>
</thead>
</table>

Compare your response to the comments made in the case study review.
Summary points

- Older patients suffer from more chronic diseases and often have multiple concurrent medical conditions.

- Polypharmacy occurs more frequently in older patients and can lead to medication-related problems such as reduced compliance, heightened risk of adverse drug reactions and increased potential for drug interactions.

- Problems in older patients caused by prescribed medication may be attributed to prescribing excessive amounts, excessive duration of treatment and inadequate clinical indication.

- When prescribing for older patients, you should include a thorough clinical assessment prior to commencement of treatment, use a limited range of medicines, simplify treatment regimens, use lower initial doses and review patients regularly.

Having completed your study of Prescribing for Older Patients you should now be able to:

**Describe** the general guidelines for prescribing for older patients

**List and describe** the common medication-related problems experienced by older patients

**Implement** strategies to resolve medication-related problems in this patient group

**Undertake** a medication review

**Recognise** the need for effective communication between primary/secondary care interface and nursing/residential homes.

If you are not able to do all of these, go back and review the section again.
References


11. **Patient UK website.** www.patient.co.uk. Recurrent falls.


Resources/further information

www.hscbusiness.hscni.net/services/2151.htm

www.immservice.co.uk

www.nice.org.uk

www.npsa.nhs.uk


Exercise and case study reviews

Exercise 7 review

When prescribing for older people it is important to consider the factors below:

- ensure an accurate diagnosis
- question necessity for the drug
- consider the patient as a whole, not a collection of symptoms
- can non-pharmacological interventions be used?
- has the most suitable drug been chosen for the patient?
- be familiar with the drugs you prescribe
- is the dose correct? start low and titrate carefully. try to ensure therapeutic dose achieved
- consider potential for drug interactions
- ensure a thorough drug history is taken, including otc medication
- are there any contra-indications?
- is the treatment regimen as simple as possible? where possible, prescribe on a once or twice daily basis
- has the patient and any carer been counselled about the treatment and do they understand how to take the drugs?
- would a compliance aid be useful?
- how long will the medication be continued for? determine the criteria for stopping treatment
- set an appropriate date for medication review
- is any drug monitoring required?

See also guidelines on ‘prescribing for the elderly’ in the BNF.
Factors increasing the risk of an older patient suffering from an adverse drug reaction include: polypharmacy, female gender, small body size, hepatic or renal insufficiency, previous adverse drug reactions.

Your answer may have included the following benefits of medication review: avoid unnecessary treatment, use as few drugs as possible, stop drugs when no improvement is evident, simplify drug regimens, supervise patient medication use more closely, monitor for adverse reactions.

You could have included: diuretics used in hypertension, NSAIDs for inflammation and antidepressants in depression.
Case study 4 review

Esther’s diabetes is being treated with glibenclamide, a medium to long-acting sulphonylurea. As a result of changes in older patients’ ability to handle oral hypoglycaemic agents, the action of glibenclamide may be prolonged, causing hypoglycaemia, a symptom of which is dizziness. Checking blood glucose concentrations will determine if hypoglycaemia is present and the dose of glibenclamide adjusted as necessary. However, it would be preferable to change her antidiabetic therapy to a shorter-acting agent, such as gliclazide or toulbutamide.

Esther is not adhering to her diabetic diet. This, coupled with the possible hypoglycaemic attacks, suggests that her diabetes is poorly controlled, which may lead to long-term complications such as retinopathy, nephropathy or neuropathy. It would be advisable to discuss her diet with her and stress that she should be avoiding foods with refined sugar in them, reducing fat intake and increasing fibre. Evidence of long-term complications of diabetes are already present in Esther in the form of hypertension. Her hypertension is being treated with an ACE inhibitor which is an appropriate antihypertensive agent to use in diabetic patients as it has been shown to reduce the progressive decline in renal function. However, the antihypertensive treatment may also be causing her dizziness due to postural hypotension. The dose prescribed is within the lower limit of the recommended dose for treatment of diabetic nephropathy. However, monitoring of Esther’s blood pressure both lying and standing will determine if lisinopril is causing postural hypotension. Regular monitoring of blood pressure is advised as it is a useful indication of outcome and success of treatment.

Blood glucose testing is the most commonly used method of monitoring glycaemic control. Type 2 patients with adequate control should test for blood glucose control twice a week and if management changes or control are poor, this should be increased to twice daily monitoring. Where blood glucose testing is not acceptable, urine glucose testing may be used. As Esther’s glycaemic control appears to be poor, and the hypoglycaemic drug may be causing problems, she should be encouraged to more frequently monitor her blood glucose. Counselling on the importance of glucose monitoring is vital to ensure that glucose concentrations are maintained within recommended range. Current guidelines relating to the self-monitoring of blood glucose in Type 2 diabetes can be found in NICE25 clinical guideline 87.

Falling is a symptom, not a diagnosis, and is one of the most common problems in older patients. One third of people over the age of 65 years fall each year and this is associated with morbidity, functional decline and increased health care expenditures. Reduced sensation in her lower limb may mean that she may not feel injury to her leg. In addition, if she falls, the skin on her leg (which is thin in older people) will damage more easily and the present neuropathy means that wound healing would be slow.

It is possible that Esther’s dizziness has led to an increase in falls and as such should be investigated. The staff have asked that something be prescribed for Esther’s dizziness. However, it would be inappropriate to prescribe a drug for dizziness such as prochlorperazine as it is likely that the cause of Esther’s dizziness is her current medication. Investigating the actual cause of the dizziness is recommended to determine whether a medicine is indicated to treat it.
Another care issue is her lack of mobility as Esther tends to sit all day. Diabetic patients often have poor circulation in their legs which may result in ankle swelling. As the patient is sitting all day, appropriate class support stocking should be worn to improve circulation in the legs and prevent swelling. Supply of suitable support stockings should be arranged for Esther. In addition, she should be encouraged to walk more frequently as this will improve circulation; though, she should be supervised until her dizziness has subsided.

Esther probably has dry, flaky skin on her legs for which she is using aqueous cream. This is more evidence of microvascular complications as neuropathy can impair normal sweating mechanisms, which can lead to dry skin. However, latest evidence suggests that the use of aqueous cream as a leave-on emollient may increase the risk of skin reactions, particularly in eczema and states that aqueous cream can be used as a soap substitute after hand washing and in the bath (see BNF). Therefore, her dry skin may need to be managed by an alternative emollient and bath additives and washes may also be required.

Up-to-date information on constipation can be found on the PRODIGY website. Additionally, comprehensive information is provided in the COMPASS therapeutic notes on the management of chronic constipation in primary care.

Paracetamol: no dosage instructions given. Ensure she is taking these as per the recommended daily dosage; no more than 8 tablets in 24 hrs.

**Action plan**

<table>
<thead>
<tr>
<th>Problem</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Possible adverse effect of glibenclamide</td>
<td>Monitor blood glucose for hypoglycaemia. Either reduce dose of</td>
</tr>
<tr>
<td>causing dizziness</td>
<td>glibenclamide or replace with low dose of shorter-acting agent such as</td>
</tr>
<tr>
<td></td>
<td>gliclazide or tolbutamide</td>
</tr>
<tr>
<td>Possible adverse effect of lisinopril</td>
<td>Check lying and standing blood pressure. Monitor blood pressure</td>
</tr>
<tr>
<td>causing dizziness due to postural hypotension</td>
<td>regularly.</td>
</tr>
<tr>
<td>Poor glycaemic control</td>
<td>Discuss importance of keeping to diabetic diet and counsel on blood</td>
</tr>
<tr>
<td></td>
<td>glucose monitoring.</td>
</tr>
<tr>
<td>Inappropriate request for medicine</td>
<td>Prescribing a drug to treat the dizziness would be inappropriate as</td>
</tr>
<tr>
<td>from home staff</td>
<td>it is likely to be caused by current medication. Investigate nature of</td>
</tr>
<tr>
<td></td>
<td>dizziness as above.</td>
</tr>
<tr>
<td>Inactivity may exacerbate poor circulation</td>
<td>Suitable support stockings should be worn to improve circulation.</td>
</tr>
<tr>
<td>Increased risk of falling</td>
<td>Reduction in dose of oral hypoglycaemic may reduce risk of falling. If</td>
</tr>
<tr>
<td></td>
<td>postural hypotension is present, dose reduction of antihypertensive</td>
</tr>
<tr>
<td></td>
<td>therapy should be considered and patient should be counselled to get</td>
</tr>
<tr>
<td></td>
<td>up slowly.</td>
</tr>
<tr>
<td>Dry skin</td>
<td>May need additional emollients prescribed.</td>
</tr>
</tbody>
</table>
Case study 5 review

Finasteride is appropriate treatment for benign prostatic hypertrophy. It is a specific inhibitor of the enzyme 5-reductase, thus it prevents the metabolism of testosterone into the more potent androgen, dihydrotestosterone. This inhibition leads to a reduction in the size of the prostate gland and improved urinary symptoms. As cases of male cancer have been reported with finasteride, patients or their carers should be told to promptly report to their doctor any changes in breast tissue such as lumps, pain or nipple discharge (see BNF).

Temazepam was probably prescribed when Betty moved to the nursing home three months ago. From the records it appears that he has been taking it regularly since then. Care must be taken when prescribing benzodiazepines in older patients as adverse effects are a common problem in their use, particularly producing hangover effects the next day and development of tolerance to their hypnotic effect. Guidelines on appropriate prescribing of benzodiazepines indicate that in short-term insomnia, as suffered by Herbert, the lowest possible dose that controls the symptoms should be used; treatment should not continue for more than two weeks and intermittent dosing, i.e. every other night, is recommended. Chronic long-term use of hypnotic benzodiazepines is not advised. It would be appropriate to stop temazepam but Herbert should be warned that sleep may be disturbed for a few days before normal rhythm is re-established; broken sleep with vivid dreams may persist for several weeks and he should be given advice on good sleeping habits.

Additionally, temazepam and the antidepressant may be interacting and have the potential to cause increased sedation in Herbert. This may lead to instability and potentially increase his risk of falls.

Tricyclic antidepressants (TCA) have been the mainstay in the treatment of depression for many years. However, they are associated with anticholinergic side-effects such as constipation, urinary retention, impaired cognition and sedation, particularly in older patients and are no longer considered first line-treatment. Dosulepin is a second generation TCA and as such, is reported to have less marked anticholinergic side-effects. Nonetheless, in older patients constipation, urinary retention and sedation are common. When a patient complains of new or worsening symptoms following the commencement of a new drug in their therapy, ADRs must be suspected. In Herbert’s case, the addition of dosulepin may explain the recent urinary problems that he has been having.

An alternative such as a serotonin selective reuptake inhibitor (SSRI), for example citalopram or sertraline, should be considered because they have a more favourable side-effect profile in older patients and do not have anticholinergic effects. SSRIs are taken once daily, which would simplify Herbert’s drug regimen as he was taking dosulepin three times a day. In addition, the dosulepin may also be contributing to Herbert’s constipation for which he is taking senna.

Herbert is also complaining that his new drug is not working. As with all treatments for depression, there is a delayed response between commencing treatment and the onset of action. A clinical response is usually seen within 4 weeks; however, improvement in symptoms may be seen after 2-4 weeks. Further counselling explaining the delay in onset of action of antidepressants should be provided. Furthermore, dosulepin is now considered to be less suitable for prescribing as it is particularly dangerous in overdose.

If an SSRI is prescribed it should be borne in mind that hyponatraemia (usually in the elderly and possibly due to inappropriate secretion of antidiuretic hormone) has been associated with all types of antidepressants, however, it has been reported more frequently with SSRIs than with other antidepressants. Hyponatraemia should be considered in all patients who develop drowsiness, confusion, or convulsions while taking an antidepressant.
### Action plan

<table>
<thead>
<tr>
<th>Problem</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inappropriate prescribing of temazepam</td>
<td>Cessation of temazepam and counselling on good sleep habits if Herbert feels he still has difficulty sleeping.</td>
</tr>
<tr>
<td>Drug interaction between temazepam and dosulepin. Increased risk of sedation</td>
<td>Cessation of temazepam will prevent interaction.</td>
</tr>
<tr>
<td>Dosulepin worsening BPH symptoms</td>
<td>Stop dosulepin and replace therapy with an SSRI such as sertraline or citalopram as clinical need still exists. Alternatively could replace dosulepin with mirtazapine and stop temazepam, as mirtazapine causes sedation. Monitor urinary symptoms to check that they improve following discontinuation of dosulepin.</td>
</tr>
<tr>
<td>Possible constipating adverse effect of dosulepin</td>
<td>Laxative may not be required following cessation of dosulepin but if still constipated consider a bulk-forming laxative as a longer-term option and advise on increasing fibre and fluid.</td>
</tr>
<tr>
<td>Poor understanding of antidepressant therapy</td>
<td>Further counselling on delay of action of antidepressant medicines to be provided.</td>
</tr>
</tbody>
</table>

### Case study 6 review

Before any conclusions are reached about the medications prescribed the most important two things to check are:

1. Compliance
2. Inhaler technique

Check compliance using computer records. Then check with patient. It is wise to use careful questioning as patients will often tell you what you want to hear. Check all medications and not just inhalers. Over ordering can tell you as much as under ordering. If over ordering, too much medication may be being taken which is leading to side effects. It may also be an indicator of poor inhaler technique as several puffs may need to be taken to get one dose. Additionally, the increased number of inhalers, with different dosing regimens, may have confused Isabel and led to a decline in compliance.

Check inhaler technique. Isabel has noted that her disease control has got worse since starting the new inhalers. The increase in tremor, may have adversely affected her use of the inhaler and hence, sub-optimal doses of her inhaled medication may be being administered. Pressurised metered dose inhalers are notoriously difficult to use, even for patients who are not frail and who do not have Parkinson’s disease. They require the greatest co-ordination to ensure that the appropriate dose is
administered. There is no mention of a spacer and Helen has said that her tongue feels ‘furry’. Oral candidiasis is a common side-effect of inhaled corticosteroids especially with poor inhaler technique. It may be worthwhile considering an alternative type of inhaler device, however, effort should be made to have as few different devices as possible as it is difficult to change from one inhaler technique to the other on a regular basis. Note that the combination inhalers discussed below are only available as Accuhaler, Turbohaler or pMDI. The LAMA, tiotropium is available as Handihaler or Respimat – these 2 devices are not available for any other medication.

Most patients – whatever their age – are able to acquire and maintain adequate inhaler technique given adequate instruction. The exception to this is that those with significant cognitive impairment (as a guideline, those with a Hodkinson Abbreviated Mental Test Score of 4 or less) are unable to use any form of inhaler device. In most patients, however, a pragmatic approach guided by individual patient assessment is needed in choosing a device (NICE clinical guideline 101).

Compliance and inhaler technique should be checked at each meeting with Isabel.

Isabel's Parkinson's disease is being appropriately treated with co-beneldopa (levodopa in combination with a dopa-decarboxylase inhibitor, benserazide). The dose is within the recommended limits for older patients and she does not appear to be suffering from any side-effects. However, since she started the new inhalers she has noticed that tremor in her hands has worsened. A common adverse effect of inhaled salbutamol is fine tremor, therefore the salbutamol may have exacerbated this Parkinsonian symptom.

Promote effective inhaled therapy
In people with stable COPD who remain breathless or have exacerbations despite use of short-acting bronchodilators as required, offer the following as maintenance therapy:

- “If FEV1 ≥ 50% predicted: either long-acting beta2 agonist (LABA) or long acting muscarinic antagonist (LAMA). If FEV1 < 50% predicted: either LABA with an inhaled corticosteroid (ICS) in a combination inhaler, or LAMA.” [NICE clinical guideline 101 2010]

- “Offer LAMA in addition to LABA+ICS to people with COPD who remain breathless or have exacerbations despite taking LABA+ICS, irrespective of their FEV1.” [NICE clinical guideline 101 2010]

Isabel is currently taking salbutamol 100mcg at a dose of 2 puffs twice daily. Consider reducing this to when required in line with NICE guidance above.

Beclometasone inhalers containing CFCs have now been withdrawn. The two CFC-free pressurised metered-dose inhalers, Qvar® and Clenil Modulite®, are not interchangeable (Qvar® is approximately twice as potent) and therefore should be prescribed by brand name. Additionally, it is worth noting that while Clenil® is available as a 250micrograms/metered dose inhaler, Qvar® is not.
“In chronic obstructive pulmonary disease inhaled corticosteroid therapy may reduce exacerbations when given in combination with an inhaled long-acting beta2 agonist.” BNF 61 (March 2011). Additional information is provided in the flow chart entitled “Use of inhaled therapies in chronic obstructive pulmonary disease” BNF 63 (March 2012).

The next step in Isabel’s treatment will depend on her spirometry results. If FEV1 $\geq$ 50% predicted: either long-acting beta2 agonist (LABA) or long acting muscarinic antagonist (LAMA).

LABA’s available are salmeterol and formoterol. Salmeterol has a slower onset of action than salbutamol or terbutaline. Formoterol’s speed of onset of action is similar to that of salbutamol. At recommended inhaled doses the duration of both salmeterol and formoterol is about 12 hours, hence twice daily dosing is recommended.

The only LAMA available is tiotropium. Tiotropium is effective for the management of COPD; it is not suitable for the relief of acute bronchospasm. A short-acting antimuscarinic bronchodilator (in this case ipratropium) should be discontinued when a long-acting antimuscarinic bronchodilator is started.

If FEV1 < 50% predicted: either LABA with an inhaled corticosteroid (ICS) in a combination inhaler, or LAMA. There are three combination inhalers on the market: Seretide, Symbicort and Fostair. The only combination inhalers that are licensed for the treatment of COPD are Symbicort 200/6 – dose 2 puffs bd, Symbicort 400/12 – dose 1 puff bd, Seretide 500/50 Accuhaler – dose 1 puff bd.

Combination inhalers should be prescribed by brand in line with health board guidance in order to reduce the risk of dispensing errors.

Note - The Scottish Medicines Consortium has advised (February 2008) that Seretide 500 Accuhaler® is not recommended for use within NHS Scotland for chronic obstructive pulmonary disease in patients with a forced expiratory volume in 1 second (FEV1) less than 60% and greater than 50% of the predicted normal value, with significant symptoms despite regular bronchodilator therapy, and a history of repeated exacerbations. BNF 61 (March 2011).

Be aware of the potential risk of developing side effects (including non-fatal pneumonia) in people with COPD treated with inhaled corticosteroids and be prepared to discuss with patients (NICE clinical guideline 101, 2010).

If symptoms were persisting at this stage then offer LAMA in addition to LABA+ICS to people with COPD who remain breathless or have exacerbations despite taking LABA+ICS, irrespective of their FEV1.

Pulmonary rehabilitation should be made available to all appropriate people with COPD including those who have had a recent hospitalisation for an acute exacerbation (NICE clinical guideline 101, 2010). The NICE clinical guideline on chronic obstructive pulmonary disease (CG101) is available at http://guidance.nice.org.uk.CG101
## Problem

**Stopped smoking 2 years ago.**

Encouraging patients with COPD to stop smoking is one of the most important components of their management. All COPD patients still smoking, regardless of age, should be encouraged to stop, and offered help to do so, at every opportunity (NICE clinical guideline 101 COPD – 2004, updated June 2010). It is important to keep Isabel motivated and encourage her to stay off cigarettes.

### Action

- **Inhaler technique may be affected by Parkinsonian symptoms**
  - Check inhaler technique and rationalise inhaler devices to as few as possible. Provide advice about relevant compliance aids, such as spacer devices, to help Isabel use her inhaler. Counsel on importance of correct inhaler technique and monitoring of signs and symptoms of COPD. If necessary, recommend an alternative inhaler device such as breath actuated inhalers or dry powder inhalers.

- **Compliance**
  - Check and monitor inhaler technique. Compliance may improve following discontinuation of other inhalers.

- **Salbutamol may be exacerbating Parkinsonian symptoms such as tremor**
  - Suggest inhaled salbutamol as when required use only or if using Turbohaler for other devices consider Terbutaline Turbohaler.

- **Lack of improvement in COPD symptoms following steroid treatment**
  - It is possible that the steroid treatment hasn’t been received because of poor inhaler technique. Discontinue beclometasone inhaler. If steroid treatment is required change to one of the licensed combination inhalers. Carry out spirometry testing and check for improvement in objective measures.

- **Beclometasone causing adverse effects (oral thrush)**
  - The risk of oral candidiasis can be reduced by using a spacer device with the corticosteroid inhaler; rinsing the mouth with water (or cleaning teeth) after inhalation of a dose may also be helpful. Antifungal oral gel or oral suspension can be used to treat oral candidiasis without discontinuing therapy.

### If FEV1 ≥ 50% predicted

- Either long-acting beta-2 agonist (LABA): formoterol or salmeterol or long acting muscarinic antagonist (LAMA): tiotropium 18mcg via handihaler (inhale the contents of one capsule once daily) or respimat 5mcg (2 puffs once daily).

### If FEV1 < 50% predicted

- Either LABA with an inhaled corticosteroid (ICS) in a combination inhaler: Symbicort 200/6 – dose 2 puffs bd; Symbicort 400/12 – dose 1 puff bd; Seretide 500 Accuhaler – dose 1 puff bd, or LAMA: tiotropium 18mcg via handihaler (inhale the contents of one capsule once daily) or respimat 5mcg (2 puffs once daily).

### If still symptomatic

- Offer LAMA in addition to LABA+ICS to people with COPD who remain breathless or have exacerbations despite taking LABA+ICS, irrespective of their FEV1.
Case study 7 review

Combined therapy of a thiazide diuretic (bendroflumethazide) and a beta-blocker (atenolol) is appropriate hypertensive therapy in this patient. Following the publication of the combined NICE/BHS guidelines for the treatment of hypertension, beta-blockers are no longer recommended at this step due to an increased risk of diabetes (see www.nice.org.uk). However, as the patient’s blood pressure appears to be well controlled there is no immediate reason to change the patient’s therapy. Both doses are within the normal ranges for older patients. However, as hypertension is usually an asymptomatic condition, the most important method used to monitor the outcome of treatment is the measurement of blood pressure. To ensure that Irene’s therapy is controlling her hypertension adequately, regular monitoring of blood pressure needs to be performed. The BHS guidelines recommend that, in older people, blood pressure should be checked when sitting and standing.

It is probable that Irene's knee pain and impaired manual dexterity are as a result of osteoarthritis, which has been getting progressively worse over the past few years. This is common in such patients as nearly 50% of community dwelling patients over the age of 70 years report symptoms of arthritis. She has been taking paracetamol to ease the pain but Irene has reported that even the maximum dose of 8 tablets in 24 hours has not been providing adequate analgesia. Combination analgesics that contain an opioid drug such as co-codamol (paracetamol and codeine) are commonly prescribed. However, the adverse effects of the opioid drug may be more prominent and therefore, these are not appropriate. This may worsen her already pre-existing constipation and may cause sedation which would prevent Irene from driving her car. Therefore, they may not be the most suitable medicine for Irene. Non-pharmacological treatment such as weight reduction, physiotherapy to improve joint strength and movement and occupational therapy should also be considered for Irene.

NICE clinical guideline 59 (the care and management of osteoarthritis in adults) advocates exercise as a core treatment for people with osteoarthritis, irrespective of age, comorbidity, pain severity or disability. Additionally, NICE recommend that paracetamol and/or topical non-steroidal anti-inflammatory drugs (NSAIDs) should be considered ahead of oral NSAIDs, cyclooxygenase 2 (COX-2) inhibitors or opioids.

NSAIDs may be particularly useful in Irene as she is reporting some swelling and redness of the joints in the fingers. This indicates an inflammatory aspect to her disease. When NSAIDs are indicated in older people, drugs with short half-lives, such as ibuprofen, should be used first-line. Analgesic effects should be seen within a week, whereas anti-inflammatory effects are not seen until after three weeks of therapy. Therefore, it is important that an adequate trial of NSAIDs is attempted before drugs are stopped due to lack of efficacy. However, try to avoid long-term use.

Before treatment with oral NSAIDs is recommended, the potential risks of NSAID therapy in the elderly patients must be considered because of the greater risk of NSAID toxicity (gastro-intestinal and renal) in this patient group. Oedema and worsening hypertension are also potential complications of NSAID use in older patients. Therefore, NSAID use should be limited in those patients with prior ulcer
disease, previous NSAID-related symptoms, or pre-existing renovascular disease with hypertension or diabetes. If NSAIDs remain the most effective treatment despite being contra-indicated due to pre-existing disease, co-prescribing of gastro-protective agents such as misoprostol, H2-receptor antagonists or proton pump inhibitors is recommended. PPIs are routinely used as they have the best documented evidence. This is probably the best approach for Irene. Following the initiation of the new drug therapy, the patient should be closely monitored, both for changes in blood pressure and side-effects to the NSAIDs.

Irene takes Gaviscon liquid for occasional dyspepsia. This is probably prescribed on a repeat basis: one 500 ml glass bottle at each dispensing. Similarly lactulose, which is being taken to relieve constipation, is probably dispensed in 500 ml bottles. As Irene is complaining that she is having difficulty lifting heavy objects, such as glass bottles, it may be appropriate to substitute the Gaviscon liquid with tablets, for example, Gastrocote tablets.

As Irene is also having difficulty opening containers, medicines should be supplied with non-child resistant closures where possible. This change will necessitate counselling to inform her of the change and also the importance of keeping the medicines out of reach of children. Many other aids are available to help arthritic patients perform their daily tasks and these are available from some pharmacies. Advice on increasing fibre in her diet and drinking lots of fluid should also be given to Irene to help her constipation. Similarly, lactulose may be substituted with a bulk-forming laxative such as ispaghula.

### Action plan

<table>
<thead>
<tr>
<th>Problem</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient presenting with signs and symptoms of an untreated medical condition (osteoarthritis)</td>
<td>Assess patient and consider non-pharmacological therapy, such as weight reduction, physiotherapy to improve strength in joints etc. as an adjunct to drug therapy.</td>
</tr>
<tr>
<td>Ineffective self-treatment of symptoms using paracetamol</td>
<td>Consider treatment with NSAID as there is evidence of an inflammatory aspect to the osteoarthritis.</td>
</tr>
<tr>
<td>Contra-indications to NSAID use (previous peptic ulcer and existing hypertension)</td>
<td>Recommend co-prescribing of a gastro-protective agent and short-acting NSAID. Monitor blood pressure to ensure present anti-hypertensive therapy is effective and that addition of an NSAID does not adversely affect blood pressure control.</td>
</tr>
<tr>
<td>Difficulty opening containers and bottles; strength decreased</td>
<td>Ensure all medication is dispensed in non-child resistance caps. Consider substituting Gaviscon liquid and lactulose solution with alternatives available in more appropriate dosage forms.</td>
</tr>
<tr>
<td>Constipation</td>
<td>Counsel on increase in fibre in diet and importance of drinking plenty of fluids and provide general lifestyle advice (see Section 4).</td>
</tr>
</tbody>
</table>
Case study 8 review

Diuretics and ACE inhibitors are the mainstay of treatment for heart failure. Further guidance on the management of heart failure (and information relating to beta-blockers) can be found in the COMPASS therapeutic notes and NICE clinical guidelines (chronic heart failure). Loop diuretics, such as furosemide, are prescribed to reduce fluid overload, thereby reducing oedema and pulmonary congestion; ACE inhibitors are now prescribed routinely in patients with heart failure as they have been shown to reduce mortality and reduce progression of the disease. The doses prescribed are within the recommended doses for treatment of heart failure. It may be assumed that Hugh’s non-compliance with his furosemide tablets may be contributing to his sudden worsening of symptoms such as leg oedema and breathlessness.

Furosemide causes diuresis within approximately one hour and its effect can last approximately six hours, although it may be longer in older people. Hugh has admitted to only taking approximately half the prescribed dose of furosemide. Intentional omission of doses by older patients when they are going out is a common occurrence. In this instance, Hugh should be counselled on the importance of taking the prescribed amount of medicine as omitting doses will result in sub-therapeutic concentrations and may lead to development of signs and symptoms of heart failure. His dose of furosemide could be moved to lunch time so that diuresis does not occur when he is at the day centre. To help with compliance there is no reason why all of his medicines could not be taken at lunchtime (synchronisation of dosing schedule).

Digoxin is a positive inotrope and as such increases the force of contraction in the myocardium and causes a reduction in the conductivity. Digoxin is indicated as an adjunct to diuretic and ACE inhibitor treatment in heart failure, particularly when there is evidence of atrial fibrillation. Digoxin has a very narrow therapeutic index and may cause particular problems in older patients as there are many pharmacokinetic changes with age. It has a reduced volume of distribution due to a decrease in lean body mass, which results in higher serum concentrations of digoxin in older people. In addition, it has a prolonged elimination half-life because renal function in older people is slightly impaired. Hugh is experiencing nausea and vomiting, the typical signs of digoxin toxicity. The dose of digoxin is at the upper level of the dose range although there is no standard dose of digoxin for older patients and it is usually started low and titrated according to symptom control. He had not complained of symptoms of digoxin toxicity before and it is possible that toxicity has developed because of Hugh’s weight loss and possible decline in renal function with age. His serum digoxin concentrations should be measured 6 hours after dosing (normal therapeutic range 1-2 micrograms/l) and his dose of digoxin adjusted accordingly.

Possible drug interaction between furosemide and digoxin may also be contributing to Hugh’s suspected digoxin toxicity. Furosemide can cause loss of potassium (hypokalaemia), which, if uncorrected, can increase the sensitivity of the heart to the effects of digoxin, predisposing to toxicity. It should be recommended that Hugh’s serum potassium is monitored to determine if
hypokalaemia is occurring. A recent study has shown that, in situations such as Hugh’s, spironolactone improves mortality. Encouraging consumption of potassium-rich foods (bananas, orange juice) may also help in this case.

Weight loss in older men is common following the death of their wife. Although weight loss may have been beneficial to his congestive heart failure as he was overweight, there is concern that he may not be eating a healthy diet. Hugh must be encouraged to try and eat a proper meal every day, with plenty of fruit and vegetables. It may be necessary to prescribe some multivitamins.

### Action plan

<table>
<thead>
<tr>
<th>Problem</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-compliance with furosemide</td>
<td>Counsel on importance of taking medicines as prescribed. Move doses of medication to lunchtime so that attendance at day centre is not affected by diuresis.</td>
</tr>
<tr>
<td>Drug interaction between digoxin and furosemide.</td>
<td>Check serum potassium, urea and creatinine concentration. If hypokalaemia is identified, then either prescribe potassium replacement therapy or co-prescribe a potassium-sparing diuretic, e.g. spironolactone.</td>
</tr>
<tr>
<td>Potentia to cause hypokalaemia and lead to digoxin toxicity</td>
<td>Reduction in digoxin dose may be necessary as weight loss may have affected pharmacokinetic parameters leading to an increase in serum digoxin concentrations. Recommend measuring serum digoxin and alter dose as appropriate.</td>
</tr>
<tr>
<td>Toxicity with digoxin</td>
<td>Reduction in digoxin dose may be necessary as weight loss may have affected pharmacokinetic parameters leading to an increase in serum digoxin concentrations. Recommend measuring serum digoxin and alter dose as appropriate.</td>
</tr>
<tr>
<td>Poor eating habits</td>
<td>Stress the importance of healthy eating and consider prescribing multi-vitamins.</td>
</tr>
<tr>
<td>Number of tablets to be taken</td>
<td>Could change enalapril to a similar agent with once daily dosing, e.g. lisinopril or perindopril or ramipril. Thus only taking 1 tablet instead of 2.</td>
</tr>
</tbody>
</table>
Several potential drug-drug interactions may occur:

- Clarithromycin and warfarin: risk of increased anticoagulant effect
- Clarithromycin and ciclosporin: risk of increased concentrations of ciclosporin and nephrotoxicity
- Calcium carbonate and levothyroxine: decreased absorption of levothyroxine if given at the same time
- Gingko biloba and warfarin: increased risk of haemorrhage
- Donepezil, ciclosporin and losartan: substrates of CYP3A4 and potential risk of interaction
- Losartan and gliclazide: substrates of CYP2C9 and potential risk of interaction
- Clarithromycin is an inhibitor of CYP3A4.

Drug-disease interactions include:

- Prednisolone in a patient with diabetes
- Prednisolone in a patient with congestive heart failure.
Introduction

Patients are becoming increasingly involved in self-diagnosis and treatment of common illnesses and, consequently, there is a greater awareness and encouragement of self-care. This is due in part to the influence of the media and internet as sources of information. As would be expected, the over-the-counter (OTC) medication market has experienced rapid expansion due to the formulation of new preparations and the deregulation of existing agents. Indeed, in the ten years up to 2002, around fifty medicines were reclassified from prescription only medicines to pharmacy medicines. The Government has recently stated that the range of medicines that can be provided without prescription will continue to expand as part of the drive towards a National Health Service that promotes self-care and greater public choice of when, where and how to get medicines. A target of ten deregulations per year has been set. OTC medications are widely used by older people, often as an addition to prescription drug therapy or sometimes as an alternative. A literature review concluded that the most frequent self-treatment practices of older people are in response to: fever, runny nose, sore throat, cough, nausea, diarrhoea, constipation, indigestion, headache and muscle or joint pain. The most commonly used groups of OTC drugs are analgesics, gastro-intestinal preparations, nutritional supplements and medication for coughs and colds.

While OTC medication can be useful for the short-term management of self-limiting conditions, patients may continue taking or using these products unnecessarily. There is also the possibility that self-medication may not be appropriate for the patient in view of pre-existing medical conditions or because of interactions with prescription or other non-prescription medicines. This reinforces the importance of pharmacists taking a thorough medication history before recommending treatment. Older people use more prescription drugs than any other age group and have many chronic disorders that affect drug response. Additionally, they are at increased risk of adverse effects with certain drugs, several of which can be found in over-the-counter medication. There is also concern that older people may have difficulty reading directions on OTC packaging, which may result in inappropriate use of the medication.

As more medications are made available OTC, and as the population of older adults continues to increase, a need arises to ensure these products are used appropriately. This section will review three of the main non-prescription medication categories (analgesics, gastro-intestinal preparations, medications for coughs and colds) used by older people, focus on criteria for appropriate selection and highlight possible problems to be aware of in terms of adverse effects, excessive duration of use and drug-drug interactions.

Learning outcomes

Following completion of this part of the course you should be able to:

- **List** the main minor ailments that are prevalent in older people
- **Identify** problem areas in which self-treatment is not appropriate and initiate appropriate referral
- **Provide** advice and suitable treatment options to patients with a number of self-limiting conditions.
Minor ailments in older people

A minor ailment can be defined as “a condition requiring little or no medical intervention and thus can be treated using non-prescription medication bought over-the-counter.” Minor ailments can include athlete’s foot, hayfever, cold sores etc. Due to both physiological and sociological changes associated with ageing, some minor ailments are more prevalent in older people.

List THREE minor ailments that are more likely to occur in older people than in any other age group.

1. 
2. 
3. 

While these minor ailments may be more prevalent in older patients, the treatment options over-the-counter are essentially the same as for other patients.

In addition to certain minor ailments being more prevalent in older people, others have associated complications for older patients, requiring referral to the doctor rather than over-the-counter management. Many over-the-counter products for such conditions are not licensed for use in older people.

Below are examples of OTC medications not licensed for use in older people or requiring caution in use. In each case state what complications are associated with the condition with reference to older patients only.

Imigran™ Recovery

Zantac™ 75

Canesten Oral Capsule

Compare your response to the comments made in the exercise review.
Management of pain

Until recently, it had been widely believed that older people were less sensitive to pain, and that the latter is a normal, expected consequence of ageing and thus, not amenable to treatment. However, there is evidence to suggest that a majority of older people experience pain that may interfere with normal functioning. There have been reports of an age-related increase in the prevalence of persistent pain, joint pain and fibromyalgia\textsuperscript{13}. Osteoarthritis is also associated with advancing age and can affect up to one-third of people aged over 65\textsuperscript{6}. The appropriate treatment of pain is based on our ability to adequately assess it. Pain is a multi-dimensional experience with sensory, affective and cognitive-evaluative components, each of which interacts and contributes to the final pain response. Age may have an effect on each of these dimensions and ultimately on the pain experienced. What will also complicate the treatment of pain in an older person is the presence of other medical conditions and the consumption of other non-prescription and prescription medications.

Non-prescription analgesics currently available include paracetamol, aspirin, other NSAIDs, e.g. ibuprofen, diclofenac and compound analgesic preparations containing codeine or dihydrocodeine. These are all classified in the BNF as non-opioid analgesics and compound analgesics and are discussed below. See Figure 8 for examples of analgesic products currently available over-the-counter.

\textbf{Figure 8:} Examples of analgesics currently available over-the-counter
Section Four

The Use of Non-Prescription Medicines in Older Patients

Paracetamol

Paracetamol has a low risk of adverse effects, no significant drug interactions and is suitable for most people with concomitant conditions. It should be recommended as first-line choice for older people as it is the safest analgesic. The main concern with paracetamol would be the risk of exceeding the maximum daily dose due to consuming multiple paracetamol-containing products. Paracetamol is found in many products, including painkillers and cold remedies bought through other retail outlets such as supermarkets and petrol stations, and so it is important to consider this and advise people appropriately.

Aspirin

Aspirin is indicated for headache, transient musculoskeletal pain and pyrexia. In inflammatory conditions most physicians prefer anti-inflammatory treatment with another NSAID, which might be better tolerated and more convenient for the patient. Gastric irritation and potential for interaction usually limit such use of aspirin in older people.

In addition to buying aspirin for its analgesic effects, some patients may enquire about purchasing the 75mg preparation for primary prevention of cardiovascular disease. Currently, the available evidence does not justify the routine use of low-dose aspirin for the primary prevention of cardiovascular disease (CVD). This is because of the potential risk of serious bleeds and lack of effect on mortality.

The Medicines and Healthcare products Regulatory Agency (MHRA) recommends that, if aspirin is used in primary prevention, “the balance of benefits and risks should be considered for each individual, particularly the presence of risk factors for vascular disease…and the risk of “gastrointestinal bleeding”.

Additionally, it is worth remembering that aspirin is not licensed for the primary prevention of vascular events. BNF states that “the combination of a NSAID and low-dose aspirin can increase the risk of gastro-intestinal side-effects; this combination should be used only if absolutely necessary and the patient should be monitored closely.”

NSAIDs

Ibuprofen has been available orally without a prescription since 1983 and in 2008, diclofenac potassium 12.5mg tablets (Voltarol Pain-eze®) and in 2011 Voltarol Pain-eze® Extra Strength tablets (diclofenac potassium 25mg) were deregulated from prescription only status to pharmacy (P) medicine for the short term relief of headache, dental pain, period pain, rheumatic pain, muscular pain and backache and the symptoms of colds and flu, including fever. Voltarol® Joint Pain tablets (diclofenac potassium 12.5mg) are now available and are indicated for the short-term relief of rheumatic pain, muscular pain and backache. Naproxen 250mg tablets (Feminax® Ultra) are also available over-the-counter but this product will never be an option for the management of pain in older people as it is indicated for the treatment of primary dysmenorrhoea in women aged 15 to 50 years. Currently other NSAIDs eg ketoprofen, are only available over the counter as topical preparations. In single doses, oral NSAIDs have analgesic activity that is comparable to that of paracetamol, but the latter is still preferred, particularly in older patients. This is partly because of the concerns associated with NSAID-induced side-effects such as gastro-intestinal bleeds, which are more common in older people and more likely to have a fatal or serious outcome. NSAIDs are also hazardous in patients with cardiac disease, which again may place older patients at high risk. There is also antagonism by NSAIDs of antihypertensive therapy and a risk of hyperkalaemia and potentiation of renal failure when ACE inhibitors are co-administered. NSAIDs should also be used with caution in patients taking thiazides as they cause sodium and water retention that antagonises the diuretic effect. It is also important to consider the advice from the US Food and Drugs Administration that ibuprofen can interfere with the anti-platelet effect of low-dose aspirin, potentially rendering aspirin less effective when used for cardioprotection and stroke prevention.
It is also worth noting that the Summary of Product Characteristics (SPC) for Voltarol Pain-eze®, Voltarol Pain-eze® Extra Strength and Voltarol® Joint Pain tablets state that ‘caution is indicated in the elderly. In particular, it is recommended that the lowest effective dose be used in frail elderly patients or those with a low body weight.’

Over the past ten years the number of topical NSAID products available without prescription has greatly increased. There is evidence of effectiveness for topical NSAIDs. A recent systematic review of forty-seven studies concluded that when topical NSAIDS (for example, diclofenac, ibuprofen and ketoprofen) are used to treat acute musculoskeletal conditions, they can provide good levels of pain relief without the systemic side-effects associated with oral NSAIDS. However, as with oral products, some topical products are not recommended in various conditions. See examples given in Table 9.

### Table 9: Examples of precautions and contra-indications to the use of topical NSAIDs

<table>
<thead>
<tr>
<th>Product</th>
<th>Active ingredient</th>
<th>Precautions</th>
<th>Contra-indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ibuleve™ maximum strength gel</td>
<td>Ibuprofen 10% w/w</td>
<td>Oral NSAIDs, including ibuprofen, can sometimes be associated with renal impairment, aggravation of active peptic ulcers, and can induce allergic bronchial reactions in susceptible asthmatic patients. Although systemic absorption of topically applied ibuprofen is less than for oral dosage forms, these complications can occur in rare cases. For these reasons, patients with an active peptic ulcer, a history of kidney problems, asthma or intolerance to aspirin or ibuprofen taken orally should seek medical advice before using the gel.</td>
<td>Not to be used if allergic to any of the ingredients, or in cases of hypersensitivity to aspirin, ibuprofen or related painkillers (including when taken by mouth), especially where associated with a history of asthma, rhinitis or urticaria. Not to be used on broken or damaged skin. Not to be used in pregnancy or breast-feeding.</td>
</tr>
<tr>
<td>Voltarol® Emugel P</td>
<td>Diclofenac-diethylammonium 1.16% w/w</td>
<td>Consult your doctor before use if you suffer from asthma, have ever had a stomach or duodenal ulcer, or are taking any prescribed medicines.</td>
<td>Do not use if allergic to, or ever had an asthma attack, wheezing, urticaria (hives) or a runny nose after taking aspirin or other NSAID pain/anti-inflammatory medicine, or if sensitive to diclofenac or any other ingredient. Not to be used if pregnant or breast-feeding or are taking oral diclofenac, aspirin, ibuprofen or other NSAID medicines. Do not apply to cuts, wounds, sunburned skin or other area where the skin is abnormal, or near the eyes or nasal area. Do not cover with a bandage or plaster.</td>
</tr>
</tbody>
</table>
Compound analgesic preparations

Compound preparations containing a simple analgesic (such as aspirin or paracetamol) with an opioid component (codeine and dihydrocodeine) are available over-the-counter. In most cases, the dose of codeine is 8 mg and dihydrocodeine is 7.46 mg. Despite the popularity of such products with patients, they are not considered to be advantageous in the management of pain. The benefits of such products have not been substantiated, and despite the low dose of opioid, patients can experience side-effects such as constipation. In addition, complications in treating overdosage can occur. Combination products with 10 mg or 12.8 mg of codeine are available but again the benefits to older patients are outweighed by the possibility of increased drowsiness as well as the other opioid side-effects such as constipation. Caution should be exercised with combination products as they are associated with misuse and abuse. Misuse may arise when products are purchased on a continuous basis, and as tolerance develops, the individual may take progressively higher doses to obtain the same effects.

Legal requirements exist for OTC codeine and dihydrocodeine to minimise the risk of overuse and addiction. Further information can be found on the MHRA website.28

Choosing a suitable formulation of analgesic

When recommending or selling a product for an older patient it is also important to consider the formulation in relation to its sodium content. Certain OTC medicines, in particular analgesics, can contain significant amounts of sodium. In 1994, the Committee on Medical Aspects of Food and Nutrition Policy (COMA) considered the relationship between salt and blood pressure and recommended a target reduction of salt intake in adults to 6 g per day. The actual required amount (the reference nutrient intake) of sodium for adults is 1.6 g daily, which equates to about 4 g of salt (sodium chloride). The daily limit of 6 g of salt therefore corresponds to approximately 2.4 g or 100 mmol of sodium. Most soluble paracetamol and co-codamol preparations contain more than 14 mmol of sodium per tablet. A person taking the maximum daily dose (eight tablets) would exceed their recommended daily sodium allowance without allowing for their dietary intake. This amount may be particularly detrimental in people with hypertension or renal impairment or who are on a salt-restricted diet. In comparison, the amount of sodium in non-soluble analgesics is insignificant and therefore may be the most suitable choice in older patients. The BNF gives further guidance on formulation of medicines and swallowing difficulties in the frail elderly with particular reference to avoiding ulceration by taking their medication whilst in an upright position with plenty of fluid or taking a liquid if available.

Glucosamine supplements

People may ask about glucosamine supplements in relation to joint pain and osteoarthritis. It is worth noting that NICE do NOT advocate the prescribing of glucosamine on the NHS. However, NICE recommends that people who want to buy glucosamine over-the-counter should use glucosamine sulfate 1500 mg once daily (as 500 mg three times a day appears to be ineffective). Additionally, people should be told to expect only a mild or modest reduction in pain and should evaluate their pain before starting glucosamine and review it 3 months after to assess the benefits.29
Case study 10

Mrs AG, a 67 year old woman, is helped into your pharmacy by her neighbour. She tripped on a step two days ago and her son, a physiotherapist, confirmed her ankle was sprained. She wants something to ease the pain.

Her Patient Medication Record (PMR) is shown below:

She asks for some of those ‘fizzy’ Paracodal tablets. Explain why these would not be appropriate for Mrs AG.

Which OTC oral analgesic would be most suitable for Mrs AG and why?
Management of coughs and colds

Following the introduction of the Selected List (“Black List”) in 1985, the management of coughs and colds has largely become the realm of the community pharmacist. There are few preparations now available on the NHS (some cough products, decongestants and throat products), and most branded products must be purchased (See Figure 9, examples of cough & cold preparations). Therefore, although older patients are exempt from prescription charges, they still purchase many cough and cold remedies. As with many non-prescription products, their use in older patients is not without risk and therefore a comprehensive medication history should be gathered by all health professionals involved in the care of these patients. It should be noted that, with increasing age, conditions such as bronchitis, pneumonia and carcinoma become more prevalent.

There are several active ingredients of cough and cold remedies that will not be suitable for older patients. Many of the potential side-effects that may arise from the use of these products result from their pharmacological action and the concomitant use of prescription medication in older patients in treating long-term medical conditions.

**Cough expectorants**

These are used when the cough is described as productive or ‘chesty’. They include guaifenesin (see product examples, Table 10), squill and ipecacuanha. In relation to expectorants, the only one with any evidence of efficacy is guaifenesin and even at that, the evidence is limited. In terms of a treatment option for older patients, it should be noted that there is little risk of adverse effects and no documented drug interactions with guaifenesin.
Cough suppressants

These are used when the cough is described as non-productive, dry or tickly. Examples include dextromethorphan, codeine and pholcodine (see product examples, Table 10). In general, there is limited evidence to support the use of cough suppressants in the management of acute cough in adults. Dextromethorphan is a non-sedating opiate and is an ingredient in many OTC cough remedies. The British Thoracic Society (BTS) ‘Recommendations for the Management of Cough in Adults’ concluded that dextromethorphan has been shown to suppress acute cough in a single meta-analysis although the recommended dosage is probably subtherapeutic. They also state that pholcodine and codeine, the opiate antitussives, have no greater efficacy than dextromethorphan but have a much greater adverse side-effect profile (causing constipation, drowsiness and respiratory depression; particularly codeine) and are therefore not recommended. Codeine has the added disadvantage over pholcodine in that it tends to be abused.

Despite being less applicable to older adults, it is important to remember that over-the-counter oral liquid medicines containing codeine should no longer be used to treat cough in children <18 years.

List SIX over-the-counter products that contain dextromethorphan and are licensed for use in cough in adults.

1.

2.

3.

4.

5.

6.
Table 10: Product* examples currently available over-the-counter

<table>
<thead>
<tr>
<th>Product</th>
<th>Current March 2009</th>
<th>Decongestant</th>
<th>Antihistamine</th>
<th>Cough suppressant</th>
<th>Cough expectorant</th>
<th>Analgesic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold/Flu Single Ingredient Preparations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Drowsy Sudafed Decongestant Tablets</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Drowsy Sudafed Decongestant Elixir</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Drowsy Sudafed Decongestant Nasal Spray</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beechams Powders</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Combination Cold/Flu Preparations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-Action Actifed Tablets</td>
<td></td>
<td>*</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Drowsy Sinutab Tablets</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nurofen Cold &amp; Flu</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Chesty Cough Preparations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult Meltus For Chesty Cough And Catarrh</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benylin Chesty Coughs (Non Drowsy)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robitussin Chesty Cough Medicine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry Cough Preparations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robitussin Dry Cough Medicine</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pavacol-D</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CombinAtion Cough And Cold Preparations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Drowsy Sudafed Linctus</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-Action Actifed Dry Coughs</td>
<td></td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Covonia Night Time Formula</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Non-Drowsy Sudafed Expectorant</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Night Nurse Capsules</td>
<td></td>
<td></td>
<td>*</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day Nurse Capsules</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Information correct at time of publication.
**Antihistamines**

These are included in cough medicines (see product examples, Table 10) because they are thought to suppress the cough reflex and also their sedative properties may be an important factor as they will help the patient to sleep. According to BTS recommendations, they may be a suitable treatment option for nocturnal cough. However, the risks associated with their use must be considered. They give rise to anticholinergic side-effects such as dry mouth, blurred vision, urinary retention, constipation, palpitations and increased intra-ocular pressure. They should not be recommended to patients with glaucoma, prostate problems or epilepsy. They can cause drowsiness and confusion in older adults making them at an increased risk of falling and potentially hurting themselves. They are implicated in a number of drug interactions, particularly resulting in additive sedative effects.

**Menthol**

BTS recommendations concluded that Menthol by inhalation suppresses the cough reflex. Menthol can be sold as menthol crystals BP or in the form of proprietary capsules.

**Demulcents**

These theoretically reduce irritation by coating the pharynx and therefore prevent coughing; they are pharmacologically inert. Examples of demulcents include Simple Linctus, BP and Glycerin, honey & lemon. They have an excellent safety profile in relation to adverse effects and interactions.

**Decongestants**

Oral decongestants available in OTC products include pseudoephedrine and phenylephrine. These cause vasoconstriction resulting in an increase in the lumen of the nasal passages, which in turn facilitates breathing and draining of mucus. They also cause bronchodilation, which helps to relieve upper respiratory tract symptoms and for this reason these drugs are also found in cough preparations (see product examples, Table 10). Importantly, side-effects associated with these products include insomnia, increased blood pressure, increase in heart rate, and they may affect glucose metabolism and thus should be avoided in patients with hypertension, coronary heart disease, diabetes and hyperthyroidism. They interact with monoamine oxidase inhibitors (MAOIs), which can result in a fatal hypertensive crisis. They should not be used within 2 weeks of stopping treatment with an MAOI. Because of these effects, it is recommended that systemic decongestants be used only when symptoms have become intolerable.

Topical decongestants, often available as a spray or drop formulation, include phenylephrine and ephedrine (short-acting) and xylometazoline and oxymetazoline (longer-acting). They act by causing local vasoconstriction leading to a reduction in the thickness of the nasal mucosa. Rapid relief of symptoms is provided with topical application and the local effect minimises the systemic side-effects. They are considered to be safer than oral decongestants. They should be used with caution in those patients who are at risk from sympathomimetic side-effects as small amounts of drug that are swallowed while using nasal drops can cause problems in susceptible patients. Like oral decongestants, they must be avoided in patients taking MAOIs. Use should be limited to seven days due to the possibility of rebound congestion, a phenomenon known as rhinitis medicamentosa.
The benefit of topical decongestants must outweigh the risks associated with their use in older people. Evidence from a systematic review in 2000 (no longer available) indicated that decongestants relieve nasal congestion in the short term, but this effect does not extend past a few days and the benefit is relatively small\(^{16}\).

From 1 April 2008 it became unlawful to sell or supply a product or products containing more than 720mg of pseudoephedrine salts or more than 180mg ephedrine base (or salts) to a person at one time (ie, in one transaction). Provided the total amount supplied does not exceed the above limit, sale or supply without a prescription may be of more than one product containing only one of these substances. However, it is unlawful to sell or supply a pseudoephedrine product at the same time as an ephedrine product in one transaction. OTC cold and flu products containing pseudoephedrine and ephedrine will remain as pharmacy (P) medicines, following an assessment of the controls introduced to minimise the misuse of these ingredients in the illegal manufacture of methylamphetamine (crystal meth). A Public Assessment Report presents a review of the impact of the legal measures from 2010 -2011. As with previous reviews, the 2011 review concluded that the measures are continuing to effectively manage the risk of misuse of pseudoephedrine- and ephedrine-containing medicines\(^{31}\).

### Analgesics

Paracetamol or ibuprofen should be used to treat symptoms of the common cold. This recommendation is based on historical use and evidence from randomized controlled trials and is consistently reiterated in the majority of guidelines\(^{17}\). As discussed previously in this chapter, aspirin, ibuprofen and diclofenac should not be routinely recommended in older people as they are more likely to cause serious adverse effects. This means that paracetamol would be the first-line choice for older patients with symptoms such as high temperature, headache, aches and pains.

A Cochrane review\(^{32}\) was recently conducted to investigate oral antihistamine-decongestant-analgesic combinations for the common cold. This review concluded that antihistamine-analgesic-decongestant combinations have some general benefit in adults and older children (but no evidence of effectiveness in young children). However, the authors cautioned that benefits must be weighed against the risk of adverse effects. Therefore, as previously stated (in relation to analgesics, antihistamines and decongestants), adverse effects and the potential for drug interactions may limit the use of such products in older people.

### Antihistamines for rhinorrhoea

These include diphenhydramine, promethazine and triprolidine (see product examples, Table 10). Antihistamines used in cold preparations reduce mucus production, thus drying up a runny nose. They also reduce post-nasal drip, which irritates the pharynx and causes coughing. Nonsedating antihistamines are not present in cough and cold remedies as they are ineffective. Side-effects are identical to those listed for antihistamines used in cough preparations and the same cautions should be noted. The risk of adverse effects outweighs any benefits and so their use for rhinorrhoea in older people is limited.

### Steam

There is not enough evidence to support steam inhalation for the common cold\(^{33}\).

### Practical advice for cough and cold management

- In general, the patient should be advised to rest, increase fluid intake and be reassured that symptoms will resolve in time although any cough lasting for longer than 3 weeks requires referral to the doctor.
- Illogical combinations of active ingredients, for example, combinations of expectorants and suppressants, are always best avoided regardless of the patient’s age.
- Preparations with multiple ingredients have a very limited role to play in the OTC management of coughs and colds in older people.
- It is always important to address the issue of smoking cessation when appropriate in all patient groups who present with a cough; older people are no exception.
- The NHS recommends that everyone aged 65 years or over should have an annual flu injection.
The guidance on smoking cessation and annual flu vaccination is also addressed in the National Service Framework (NSF) for Older People Standard 8: Promoting a Healthy Life. Better Health in Old Age, Department of Health, describes how specific campaigns have improved the uptake of flu vaccination and support for stopping smoking. This document can be accessed via the Department of Health’s website: www.dh.gov.uk.

Managing gastro-intestinal problems

Many minor gastro-intestinal conditions that arise in primary care can be adequately treated using non-prescription medication, but it is important for both the patient and the pharmacist to be aware of the limitations of treatment.

Constipation

It is generally accepted that the frequency of defaecation in a healthy adult varies from two or three times a day to two or three times a week. A useful definition of constipation is the passage of hard stools less frequently than the patient’s own normal pattern. Therefore, change in normal pattern is the significant factor. Prevalence of constipation in the general population is reported as 2-27% (depending on diagnostic criteria), although most estimates are 12-19%. Prevalence of constipation is higher among older people and it is more common in women than in men, with a ratio of 2:1. A study reported that 20-30% of patients over the age of 65 use some form of laxative therapy. It must also be remembered that healthy older people are no more likely to be constipated than younger ones; the increased prevalence most likely results from the combination of risk factors and predisposing conditions.

Write down THREE common factors that predispose older people to constipation.

1.

2.

3.

Compare your response to the comments made in the exercise review

It is important to consider these causes of constipation before advising older patients on drug treatment. Steps can be taken to prevent constipation and to treat an existing condition. It is important that this is sensitively handled by practitioners, as a number of older patients may be embarrassed by their condition.
Advice relating to diet, fluid intake and mobility is the first stage in the management of constipation in older people. A varied fibre-rich diet, for example fruit, vegetables, cereals, pulses, can reduce the need for laxatives. In conjunction with this, adequate fluid intake is also important. A minimum of 18 g and up to 30 g fibre and 2 l of fluid daily is recommended for adults. It is also important to note that fluid increase is contra-indicated in some people, for example those with heart or renal failure. Keeping active should be encouraged within the limits of the individual. However, it should be recognised that there are some older patients who may be house-bound or in a nursing home and thus would still benefit from some drug intervention.

The BNF lists five main groups of laxatives (and two additional categories, namely peripheral opioid-receptor antagonists and 5HT4 receptor agonists). Give two examples of each type that can be bought over-the-counter under the headings below:

**Bulk-forming laxatives:**
1. 
2. 

**Stimulant laxatives:**
1. 
2. 

**Osmotic laxatives:**
1. 
2. 

**Faecal softeners:**
1. 
2. 

**Bowel cleansing solutions:**
1. 
2.
General advice relating to diet and exercise is useful for all older adults and is also documented in the National Service Framework for Older People Standard 8: Promoting an active healthy life. Local councils and the NHS have been asked to work together (with additional partners) to develop a plan for healthy and active life for older people. The Department of Health document entitled ‘Better Health in Old Age’ describes various initiatives to encourage physical activity in older adults. This document can be accessed via the Department of Health’s website: www.dh.gov.uk.

PRODIGY recommends that short duration constipation in adults should initially be managed with a bulk-forming laxative but if stools remain hard, an osmotic laxative should be added or used as an alternative\textsuperscript{18}. However, the need to maintain good fluid intake when taking bulk-forming laxatives, can be an issue, especially in frail older people. In frail older people macrogols may be a suitable alternative as they are effective, well-tolerated and do not interact with other medications. Stimulant laxatives should be reserved for second-line treatments because of their adverse effects (such as hypokalaemia). Older people may require enemas to avoid faecal impaction. Glycerol suppositories may be used to avoid straining when passing stools, and can be useful in people who are changing their lifestyle to managing their constipation\textsuperscript{18}. Frequent use of enemas, laxatives and stool softeners may lead to increased constipation in older adults. See Figure 10 for examples of laxatives currently available over-the-counter.

![Figure 10: Laxatives currently available over-the-counter](image)

PRODIGY give recipes for natural laxatives (with evidence of effectiveness from randomized controlled trials) and useful advice for adults about toileting routines with many aspects being very relevant to older patients\textsuperscript{34}.

While PRODIGY recommends that oral laxatives can be offered if dietary measures are ineffective, or while waiting for them to take effect. The advice in the BNF differs slightly in that it states that laxatives should generally be avoided except where straining will exacerbate a condition (for example, angina) or increase the risk of rectal bleeding as in haemorrhoids.
Case study 11

A care home has just opened in the vicinity of the local health centre and community pharmacy. The owner of the home has contacted the GP, practice nurse and pharmacist to ask advice about the most appropriate management of constipation in older residents. She explains that constipation was a major problem in other homes where she has worked and feels that it is an area of care in which optimal management can make a real difference to residents’ lives.

What recommendations would you give the owner with regard to drug therapy and practical advice on the management of constipation?
She wants to ensure that the residents receive a fibre-rich diet but is unsure about the fibre content of various foods; what do you suggest?

She asks you to review the residents’ medication records to investigate drug-induced constipation. Give examples of (a) drugs and (b) medical conditions known to cause constipation.

Compare your response to the comments made in the case study review.
Diarrhoea

The incidence of diarrhoea is not well documented although it is a common illness of diverse aetiology in older people.

There are various factors that predispose older patients to diarrhoea as below.

- The ageing process affects immune and non-immunological defences increasing vulnerability to enteric pathogens.
- Medical conditions that are common in older patients and cause diarrhoea include faecal incontinence, diverticular disease, carcinoma of the colon, irritable bowel syndrome and ischaemic colitis.
- Radiation therapy for malignancies and surgery on the GI tract.
- Medicines that commonly cause diarrhoea include magnesium-containing antacids, broad spectrum antibiotics, NSAIDs, high-dose digoxin, proton pump inhibitors and thiazide diuretics, colchicine.
- Hospitalisation and institutionalisation.

Dehydration is the main complicating factor and therefore any older patient showing signs of dehydration should be referred. It is important to be aware of the possibility of Clostridium difficile infection in older people who may have had recent hospital admission or antibiotic treatment. Diarrhoea of duration longer than two to three days should also be referred. In terms of management, oral rehydration therapy can be used as first-line therapy in older patients as it has no adverse effects or drug interactions. Kaolin and morphine can be popular, particularly with older people. It has no evidence of effectiveness and should never be recommended. It is important to remember that depending on the cause, the management of diarrhoea in an older person may be beyond the remit of the pharmacist.

List THREE clinical features associated with dehydration.

1. 
2. 
3. 

Compare your response to the comments made in the exercise review.
**Indigestion**

As the incidence of uncomplicated dyspepsia decreases as a person gets older, it is important to refer any patient who presents with new or recently changed symptoms of indigestion or unintended weight loss to eliminate a more sinister cause. This message is reiterated in the patient information leaflets of several over-the-counter medications, for example, the H₂-receptor antagonists (ranitidine 75 mg, famotidine 10 mg) and proton pump inhibitor (omeprazole 10 mg, pantoprazole 20 mg and rabeprazole) licensed for OTC use. Additionally, several OTC products should be avoided in many older patients due to their adverse effects. Antacids containing aluminium salts can cause constipation. Magnesium-containing salts can cause diarrhoea. Several products for indigestion are high in sodium; this may be particularly detrimental in people with hypertension or renal impairment or who are on a salt-restricted diet. The BNF gives details on the sodium content of many antacids and makes reference to those with low sodium levels.

**Nutrition**

Nutrition is becoming an increasingly important area within health. A poor diet is now being linked with the development of a number of cancers and the impact of a high-fat diet on the cardiovascular system is well-known. The nutritional needs of older people are similar to those of the rest of the population. That many older people are malnourished can be attributed to reasons such as:

- loss of appetite
- living alone
- poverty
- being house-bound
- physical disabilities such as poorly fitting dentures or dysphagia
- recent bereavement and depression.

The NSF for older people recognised the need to improve nutrition in this age group and resulted in a plan for healthy and active life for older people; improved nutrition and reducing social isolation were key aspects of this plan (Better Health in Old Age, Department of Health). In general, older people should be encouraged to adhere to a healthy well-balanced diet that includes plenty of fruit and vegetables. Fluid intake and fibre are also important and have already been discussed in this section. If older patients are not eating well, reasons for this should be explored before suggesting a vitamin supplement. If such a product is recommended, it is important that the patient is advised that vitamin and mineral supplements should not be consumed indefinitely; no improvement in the patient’s condition would warrant referral for further investigation. Adverse effects from long-term use can result; for example, iron supplements can cause gastric upset and constipation, which may result in further self-medication to overcome these effects. Importantly, the use of certain prescription and non-prescription drugs can also result in drug-nutrient interactions in older people, which may be compounded by poor nutrition.
Misuse and abuse of OTC medication

The promotion of self-care and greater personal responsibility for health has many positive aspects, but patients may unwittingly use non-prescription medications in excessive doses for prolonged periods of time. This is described as “misuse” as opposed to abuse which has been defined as the use of a product for a non-medicinal purpose, for example to experience its mind-altering effects or to achieve weight loss. With older patients, misuse is much more common and often involves drugs that have been included in the previous sections.

Research has shown that opioids, laxatives and antihistamines are associated with misuse and abuse and consequently, the use of products containing these drugs should be closely monitored. In the case of opioids, which may be present in both analgesic and cough/cold preparations, tolerance may develop to the analgesic and antitussive effects, resulting in the individual taking progressively higher amounts; this may be particularly dangerous if the opioid is in combination with paracetamol.

In the case of antihistamines, these agents are found in many cough and cold remedies, but they are also the active agent in a number of products that aid temporary sleep disturbance, for example Nytol® and Sominex®. These should be used on a short-term basis only. The underlying reason for insomnia should be explored and alternative management strategies such as education should be considered. Sleep duration normally decreases with age and hence, patients should be reassured about this. It is also important to remember that each patient’s sleep requirement is quite different and thus, 8 hours should not be considered essential.

With laxatives, excessive use is often associated with the mistaken belief that the passage of one stool per day is required. Patient education is an important component of the management of constipation and lifestyle changes such as diet and exercise are more acceptable ways of dealing with this condition. Chronic use of laxatives by older people has been linked with several clinical disorders, including diarrhoea, an increased risk of faecal incontinence, hypermagnesaemia, hyperphosphataemia and hypoalbuminaemia. If constipation still persists after implementation of advice and the short-term use of an appropriate laxative, referral and further investigation is required.
Summary points

- Several minor ailments (conditions that potentially can be managed with OTC medication) are more prevalent in older people than younger adults or children. Examples include insomnia, ear wax impaction and corns & calluses.

- When recommending OTC medication for older patients it is important to be aware of products that are not licensed for use in older people or are to be used with caution.

- Older patients use more drugs than any other age group and have many chronic disorders that affect drug response. Older people are at increased risk of adverse effects with certain drugs, several of which can be found in over-the-counter medication. Examples of OTC medication categories requiring caution when used in older patients include opioids, sedating antihistamines, NSAIDs, laxatives and decongestants.

- Before recommending any OTC product, it is important to take an appropriate medication history to avoid potential drug interactions with concurrent medication.

- All patients may unwittingly use OTC medications in excessive doses for prolonged periods of time. Examples include laxatives, opioids and antihistamines.

Having completed your study of The Use of Non-Prescription Medicines in Older Patients you should now be able to:

**List** the main minor ailments that are prevalent in older people

**Identify** problem areas in which self-treatment is not appropriate and initiate appropriate referral

**Provide** advice and suitable treatment options to patients with a number of self-limiting conditions.

If you are not able to do all of these, go back and review the section again.
References


Section Four
The Use of Non-Prescription Medicines in Older Patients


33. Singh M, Singh M. Heated, humidified air for the common cold. Cochrane Database of Systematic Reviews 2011, Issue 5. Art. No.: CD001728. DOI: 10.1002/14651858.CD001728.pub4


Further reading/bibliography


**Compass Therapeutic Notes.** Accessible via www.nicpld.org

**Department of Health.** http://www.doh.gov.uk.

**Electronic Medicines Compendium.** www.emc.medicines.org.uk.

**Farley, D.** 1997, label literacy for OTC drugs. FDA Consumer, 31 (4), 6-11.

**Health Protection Agency.** www.hpa.org.uk.

**Medicines and Prescribing Centre at NICE** http://www.nice.org.uk/mpc

**PRODIGY** http://prodigy.clarity.co.uk


**The National Institute for Health and Clinical Excellence (NICE).** http://www.nice.org.uk/.


**UK Medicines Information Network.** http://www.ukmi.nhs.uk/.

**World Health organisation (WHO).** http://www.who.int/env.
Section Four
The Use of Non-Prescription Medicines in Older Patients

Exercise and case study reviews

Exercise 11 review

Minor ailments that are more prevalent in older people include:

**Dry eye:**
This condition has been associated with increasing age, especially in women. One theory for this is age-related hormonal changes.

**Ear wax impaction:**
As individuals age, a stiffening of the cilia in the ear and atrophy of the cerumen glands causes cerumen to become drier. In addition, the presence of hearing aids can impede the normal movement of cerumen out of the ear. As a result, impacted cerumen can cause dizziness, pain, itching and loss of hearing.

**Insomnia:**
This is more prevalent with increasing age although it should be said that sleep requirements also tend to decrease with increasing age. There are a number of reasons for insomnia including the death of a relative, a change in residence (care home or hospital), medical conditions (including those causing physical discomfort) and adverse effects from medication and alcohol. Psychosocial influences, for example, alterations in work status and finances after retirement may cause anxiety and depression with resultant insomnia. Napping during the day may further increase the problem; the drive for sleep at bedtime is reduced which results in delayed sleep onset and a further decrease in the duration of night time sleep.

**Corns and calluses:**
Tend to be seen more often in older people, partly as a result of a lower rate of epidermal cell production and decreased mean epidermal cell size.

**Oral thrush:**
The very young and the very old are most likely to suffer from oral thrush partly due to a reduction in immune function.

Exercise 12 review

Imigran™ Recovery is not licensed to be used in people over 65 years of age as experience of its use is limited in this age group. However, migraine is not common over the age of 50 and so anyone who presents with migraine-like symptoms for the first time at this age should be referred. In general, adults over 50 years presenting with any new or severe headache should be referred. The likelihood of a secondary cause is increased in these cases. Pain at the side of the head, which is tender to touch, should be viewed with caution as it may
be indicative of temporal arteritis, which is most commonly seen in older women. Urgent referral is needed to prevent potential blindness.\(^\text{11}\)

Zantac™ 75 is not indicated in patients of middle age or older with new or recently changed symptoms of indigestion without seeking their doctor’s or pharmacist’s advice. Similarly Zanprol™ carries a precaution for use in over 45 yrs with new or recently changed symptoms. As the incidence of dyspepsia decreases as a person gets older, middle-aged people with new or recently changed symptoms must be referred to the doctor as a specific pathological condition is more likely.\(^\text{6}\)

Canesten® Oral Capsule is recommended for the treatment of candidal vaginitis, acute or recurrent. It can also be used for the treatment of partners with associated candidal balanitis. Like many other products in the Canesten range, it is not recommended in patients aged over 60 years. Women over 60 years of age presenting with symptoms suggestive of vaginal thrush must be referred to eliminate other conditions, for example, atrophic vaginitis.

Whilst some products for cystitis are licensed for use in older people, the rate of complications associated with cystitis such as secondary incontinence, confusion, anorexia, high temperature, or shock are higher in older women.\(^\text{6,12}\) and such patients are best referred.

**Exercise 13 review**

**Examples include:**

Covonia® Original Bronchial Balsam: levomenthol 2.5 mg and dextromethorphan hydrobromide 7.5 mg / 5 ml.

Covonia® Night Time Formula: dextromethorphan hydrobromide 6.65mg and diphenhydramine hydrochloride 10 mg / 5 ml.

Benylin® Dry Coughs (Non-drowsy): dextromethorphan hydrobromide 7.5 mg / 5ml.

Benylin® Dry Coughs (Original): dextromethorphan hydrobromide 6.5 mg, diphenhydramine hydrochloride 14 mg and levomenthol 2 mg / 5 ml.

Robitussin® Dry Coughs: dextromethorphan hydrobromide 7.5 mg / 5 ml.

Non-Drowsy Sudafed® Linctus: dextromethorphan hydrobromide 10 mg and pseudoephedrine hydrochloride 30 mg / 5 ml.

Adult Meltus® Dry Coughs with Congestion: dextromethorphan hydrobromide 10 mg and pseudoephedrine hydrochloride 10 mg / 5 ml.

This information was correct at the time of publication but product formulations are subject to change so always check the latest information available.
Section Four

The Use of Non-Prescription Medicines in Older Patients

Common factors that predispose older people to constipation include:

**Lack of dietary fibre intake:**
Fibre intake is positively associated with increased frequency of bowel movements and reduced symptoms of constipation.

**Reduced fluid intake**
Poor fluid intake results in slowed colonic transit time and reduced frequency and weight of bowel movements. Poor fluid intake is common in older people.

**Reduced mobility**
Constipation is more prevalent in people who have an inactive lifestyle, and is particularly common in those who are chairbound or bedbound. There may also be embarrassment at having to use commode/bedpan.

**Adverse effects of drugs**
The following drugs commonly cause constipation: aluminium antacids, antidepressants (phenelzine, isocarboxazid, tricyclics), antiepileptics (carbamazepine), antipsychotics (clozapine, quetiapine), antispasmodics (dicycloverine, hyoscine), calcium supplements, diuretics (indapamide), iron supplements, opioids (codeine, buprenorphine), verapamil, antimuscarinics used in parkinsonism (benzatropine, orphenadrine, procyclidine)\(^{18, 19}\) and for urinary incontinence.

**Pre-existing disease states** examples include intestinal obstruction, coeliac disease, tumours, anal conditions (e.g. anal fissure, haemorrhoids), metabolic conditions (e.g. hypothyroidism, hypercalcaemia, hypokalaemia, diabetes mellitus) and neurological conditions (dementia, depression and Parkinson’s disease) and stroke\(^{18, 19}\).

Laxatives that are normally available for purchase at pharmacies largely fall into the first three categories.

**Bulk-forming laxatives** include bran, ispaghula husk, methylcellulose and sterculia. They come in a variety of formulations and act by a number of mechanisms. By drawing water into the colon, they expand and soften the faeces, which stimulates peristalsis. Adequate fluid intake must be maintained to avoid intestinal obstruction. Examples: Senokot\(^{®}\) Hi-Fibre Orange/Lemon (ispaghula husk 3.5 g/sachet), Celevac\(^{®}\) (methylcellulose ‘450’ 500 mg) and Normacol\(^{®}\) (sterculia 62%).
**Stimulant laxatives** include bisacodyl, senna, glycerol and docusate sodium. These agents increase intestinal motility and often cause abdominal cramping. They should not be used in anyone with intestinal obstruction. Prolonged use can lead to atonic non-functioning colon and hypokalaemia. Examples: Dulco-Lax® tablets (bisacodyl 5 mg), Senokot® tablets (senna, standardised, 7.5 mg), Glycerol suppositories, BP and Docusol® (docusate sodium 50 mg / 5 ml).

**Osmotic laxatives** retain fluid in the bowel by osmosis or by changing the water distribution in the faeces. Examples in this category include lactulose, macrogols and magnesium salts. Side-effects include flatulence and cramps. Magnesium salts should not be used in hypophosphataemia. Examples: lactulose solution, Movicol (macrogol ‘3350’ 13.125 g/ sachet), magnesium hydroxide mixture, BP and Dulcobalance® (macrogol 4000 10mg/sachet).

**Faecal softeners** include liquid paraffin; this is no longer recommended due to adverse effects including anal seepage of paraffin, lipoid pneumonia and interference with the absorption of fat-soluble vitamins. Others laxatives with softening properties include docusate sodium and glycerol.

**Bowel cleansing solutions** are not treatments for constipation. They are used before various procedures to ensure the bowel is free of solid contents. Examples: Citramag® and Klean-prep®.

---

**Exercise 16 review**

<table>
<thead>
<tr>
<th>Clinical features</th>
<th>Mild &lt;5%</th>
<th>Moderate 5-10%</th>
<th>Severe &gt;10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mouth</td>
<td>Moist</td>
<td>Dry</td>
<td>Very dry</td>
</tr>
<tr>
<td>Tears</td>
<td>Normal</td>
<td>Normal to absent</td>
<td>Absent</td>
</tr>
<tr>
<td>Eyes</td>
<td>Normal</td>
<td>Sunken</td>
<td>Very sunken and dry</td>
</tr>
<tr>
<td>Level of consciousness</td>
<td>Well, alert</td>
<td>Restless, irritable</td>
<td>Lethargic, unconscious, floppy</td>
</tr>
<tr>
<td>Skin pinch</td>
<td>Goes back quickly</td>
<td>Goes back slowly</td>
<td>Considerable decrease</td>
</tr>
<tr>
<td>Tachycardia</td>
<td>Normal</td>
<td>Moderate increase</td>
<td>Major increase</td>
</tr>
<tr>
<td>Urine output</td>
<td>Slight decrease</td>
<td>Moderate decrease</td>
<td>Major decrease</td>
</tr>
</tbody>
</table>
Case study 10 review

Mrs AG, a 67 year old woman, is helped into your pharmacy by her neighbour. She tripped on a step two days ago and her son, a physiotherapist, confirmed her ankle was sprained. She wants something to ease the pain.

Her Patient Medication Record (PMR) is shown below:

She asks for some of those ‘fizzy’ Paracodal tablets; explain why these would not be appropriate for Mrs AG.

By ‘fizzy’ Paracodal Mrs AG means Paracodal effervescent tablets. These are not suitable for several reasons. Firstly in terms of the formulation, most effervescent co-codamol preparations contain more than 14 mmol of sodium per tablet. A person taking the maximum daily dose (eight tablets) would exceed their recommended daily sodium allowance without allowing for their dietary intake. This amount may be detrimental to Mrs AG as she has hypertension. In comparison, the amount of sodium in non-soluble analgesics is insignificant. Secondly, in relation to the active ingredients (paracetamol 500 mg / codeine 8 mg); the strength of codeine is not considered to be advantageous in the management of pain. According to the BNF, the benefits of such products have not been substantiated, and despite the low dose of opioid, patients can experience side-effects such as constipation. Constipation is already a problem for Mrs AG so an opioid combination analgesic should not be recommended in this case.

What OTC oral analgesic would be most suitable for Mrs AG and why?

Paracetamol has a low risk of adverse effects, no significant drug interactions and is suitable for most people with concomitant conditions. It should be recommended as first-line choice for older people as it is the safest analgesic. There are additional factors that would eliminate other analgesia in this case: NSAIDs should be used with caution in patients taking thiazides as they cause
sodium and water retention that antagonises the diuretic effect (although this is unlikely to be significant if the NSAID is only used for a few days).

NSAIDs and aspirin can cause GI disturbances and would not be recommended over-the-counter for anyone already on omeprazole.

Case Study 11 review

What recommendations would you give the owner with regard to drug therapy and practical advice on the management of constipation?

This scenario represents an opportunity for the GP, nurse and community pharmacist to work together to draw up guidelines for best practice in the management of constipation in a specific older population.

Advice relating to diet, fluid intake and mobility is the first stage in the management of constipation in older people. A varied fibre-rich diet, for example fruit, vegetables and cereals, pulses, can reduce the need for laxatives. In conjunction with this, adequate fluid intake is also important. Residents should be encouraged to participate (within their capabilities) in gentle exercise; confinement to chairs or beds (immobility) can lead to constipation. However, it should be recognised that some older residents will require drug intervention.

PRODIGY recommends that short duration constipation in adults should initially be managed with a bulk-forming laxative but if stools remain hard, an osmotic laxative should be added or used as an alternative. However, the need to maintain good fluid intake when taking bulk-forming laxatives, can be an issue, especially in frail older people. In this group macrogols may be a suitable alternative as they are effective, well-tolerated and do not interact with other medications. Stimulant laxatives should be reserved for second-line treatments because of their adverse effects (such as hypokalaemia). Older people may require enemas to avoid faecal impaction. Glycerol suppositories may be used to avoid straining when passing stools, and can be useful in people who are changing their lifestyle to managing their constipation. Frequent use of enemas, laxatives and stool softeners may lead to increased constipation in older adults.

It may be beneficial for the pharmacist to develop a basic laxative formulary, including non-prescription drugs, which can be included as part of the home’s simple remedies. Examples from each of the major categories of laxatives could be discussed. This could also be extended to encompass those prescription-only laxatives that are licensed for patients who are terminally ill, for example, dantron.
She wants to ensure that the residents receive a fibre-rich diet but is unsure about the fibre content of various foods; what do you suggest?

**Fibre content of various types of food**

Further information about fibre content of food can be obtained from: http://www.npc.co.uk/merec/therap/other/resources/merec_bulletin_vol14_no6_suppl.pdf

A minimum of 18g and up to 30g fibre and 2l of fluid daily is recommended for adults. It is also important to note that fluid increase is contra-indicated in some people, for example those with heart or renal failure.

She asks you to review the residents’ medication records to investigate drug-induced constipation. Give examples of (a) drugs and (b) medical conditions known to cause constipation.

(a) Drug-induced constipation should always be a consideration and regular medication reviews should be carried out. Examples of drugs known to cause constipation include anticholinergics (antiparkinsonian drugs, antipsychotics, tricyclics used for depression and for urinary incontinence), verapamil, opiate analgesics, aluminium-containing antacids, iron, sucralfate.
(b) Examples of medical conditions known to cause constipation in the elderly include hypothyroidism, colorectal cancer, depression, Multiple sclerosis, Parkinson’s disease and diabetes mellitus\textsuperscript{18, 19}.

The pharmacist should review laxative prescribing at this home to prevent inappropriate or unnecessary use of laxatives and educate the care home staff accordingly.

For further information on constipation, see PRODIGY clinical topics (constipation), available at http://cks.clarity.co.uk/constipation and The COMPASS therapeutic notes on the management of chronic constipation in primary care (published January 2012).
Section Four

The Use of Non-Prescription Medicines in Older Patients
Introduction

Older people are the largest consumers of prescribed medication, with many taking more than one medicine. This, coupled with the complex alterations in physical, mental and social factors that also take place, increase the potential for not taking medicines appropriately.

This section reviews the problems and causes of medicine non-compliance in older patients and suggests ways in which healthcare professionals can take an active role in the identification and management of this problem.

Learning outcomes

Following completion of this part of the course you should be able to:

- Define compliance in respect of medication
- Demonstrate the cost implications of medication non-compliance
- Identify the factors that may contribute to medication non-compliance
- Provide appropriate interventions to encourage and improve medication compliance.

Definition of compliance

Within the literature relating to compliance there has been some debate on terminology. Traditionally, the term for following a recommended treatment regimen has been compliance. Adherence has also been used to describe the process of taking medicines appropriately. However, as with the term compliance, there is the underlying expectation that patients should ‘follow the doctor’s orders’ and that ‘the doctor knows best’ with failure to take the medicines appropriately being blamed on the patients.

Despite there being no agreed terminology, there is a consensus that the need for patients to be involved in making decisions about their own health must be recognised by healthcare professionals. In 1997 the Royal Pharmaceutical Society of Great Britain acknowledged this and adopted the term ‘concordance’. Within this proposed model, patient autonomy is central, with the prescriber assisting the patient in making as informed a choice as possible about their diagnosis and treatment, thereby creating a stronger patient-prescriber relationship. Therefore, concordance denotes the extent to which medications are taken according to the regimen agreed between the prescriber and the patient. When patients do not take their medicines as directed and where there has been no agreement between prescriber and patient, they are generally described as being non-compliant. However, concordance is not a new term for compliance or adherence. For the purposes of this course we refer to compliance with medication regimens and thus use the term compliance throughout.
Types of medication non-compliance

Non-compliance can be categorised into two categories based on intentionality: intentional and unintentional.

Intentional

In this case, the patient makes a conscious effort not to take the medicine as recommended. Intentional non-compliance can be difficult to identify because as far as the patient is concerned, they have a completely valid reason for acting as they do. For example, side-effects caused by drugs may be perceived as a price not worth paying for the perceived benefits of taking the drugs, or there may be mistrust between the patient and the practitioner or the healthcare system as a whole. Deliberate intentional non-compliance of prescription drugs, in general, is relatively unusual in older patients.

Unintentional

Unintentional non-compliance is by far the most common type of non-compliance and also the type with which healthcare professionals can have most impact. In older patients unintentional non-compliance may be due to simple forgetfulness or may be linked to any of a large number of demographic, social, psychological or clinical variables.

Having reflected on the compliance to drug regimens of patients in your practice, do you consider people over 65 years of age to be:

A. more compliant than younger people?

B. less compliant than younger people?

C. as compliant as younger people?

What evidence do you have to support your answer?

Compare your response to the comments made in the exercise review.
Extent of non-compliance in older patients

It has been estimated that as many as 50% of patients suffering from chronic diseases do not take their medication in fully therapeutic doses and therefore do not derive the optimum benefits of treatment. Despite these high figures and the widespread view that older patients are less likely to take medicines compared with younger people, research has shown that age itself is a poor indicator of how a patient will comply with their medication. Studies that have compared medication compliance between younger and older patients have been generally non-conclusive. Some studies have shown that younger patients seemed less regular in the timing of their medicines, which may reflect their more varied daily activities, whereas older patients have a greater tendency to forget, which may reflect memory difficulties. However, older patients may be more susceptible to risk factors that may predispose them to non-compliance. Although most practitioners recognise that patients often fail to take their medicines as prescribed, they tend to think that this is a general problem and not one that is relevant to their daily practice.

Implications of non-compliance

The most important effect of non-compliance is in relation to the patient. Non-compliance, for a number of older patients, may lead to worsening of disease signs and symptoms, prolonged patient suffering, unnecessary hospitalisations or additional surgery visits. In addition, patients who do not take their medicines may perceive the therapy as ineffective, lose faith in the health service, which can affect the patient-doctor relationship.

Non-compliance constitutes two forms of wastage for the NHS:

- a minimising of the potential benefits of drug therapy and
- the extra cost of treating the avoidable consequent morbidity.

For example, the patient may return for several consultations for apparently unsuccessful treatment leading to a questioning of the initial diagnosis. It has been estimated that 28% of all medicines in the home are unused. From these figures it is suggested that only half of all patients continue taking their long-term medication in accordance with the prescriber’s instructions and with short courses of treatment one-quarter default. In the U.S, failure to adhere to medication regimens costs $100 billion per annum and a proportionate figure is likely to be found in the U.K.
Factors affecting compliance in older patients

Because of the many possible causes of non-compliance, it can be difficult to identify the specific factors involved in a particular patient. The reason for non-compliance may lie with the patient, general practitioner, pharmacist or care giver.

A number of factors have been investigated and attempts made to quantify their contribution to patient non-compliance. It is widely agreed, however, that there are as many reasons for patients not following prescription instructions as there are patients taking medicines. Each compliance problem is a result of a unique set of circumstances and, therefore, any strategy to improve medicine taking will require individual management.

Factors that affect compliance can be categorised as either patient-related or medicine-related factors. Table 11 summarises those factors that have been shown to influence compliance and those that have no effect in older patients.
Section Five
The Older Patient and Compliance

**Table 11: Summary of factors reported to influence compliance**

<table>
<thead>
<tr>
<th>Factors</th>
<th>Factors that have an effect on compliance</th>
<th>Factors that do not have an effect on compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient-related</td>
<td>Type of disease, Physical disability, Cognitive ability, Health beliefs, Marital status, Social circumstances, Prescriber-patient relationship, Access to medication (insurance, restrictive formularies), Previous non-compliance</td>
<td>Age, Gender, Education, Social class</td>
</tr>
<tr>
<td>Medicine-related</td>
<td>Type of drug, Dosage form and packaging, Polypharmacy, Dose frequency, Label instructions</td>
<td>Side-effects?</td>
</tr>
</tbody>
</table>

**Patient-related factors**
Age, gender, educational ability, current activities, number of people in the household and social class have been investigated for their effect on compliance. In general, no clear-cut association has been found. However, there are a number of factors that have been shown to negatively affect how an older patient takes their medicines.

**Type of disease**
It is generally accepted that acute, non-life-threatening diseases have a very low compliance, although this can be variable, e.g. antibiotics, where compliance with short-term courses has been reported as high as 90%\(^6\). Whereas chronic, high morbidity diseases attract a greater compliance value (epilepsy, 65%-86%)\(^3\). Subjects with greater illness severity may be more motivated to take medications as directed. This has been shown in patients with HIV although the literature also reports poor adherence with conditions such as heart failure or hypertension. Thus, a significant correlation between disease severity and compliance does not appear to exist. In addition, certain illnesses cause disabilities and can therefore affect compliance, for example, glaucoma (eyesight), rheumatoid arthritis (manual dexterity)\(^3\).
Section Five

The Older Patient and Compliance

Physical disabilities
The normal ageing process often leads to a decline in some of the attributes that are needed to take medicines correctly; older patients may have impaired vision, altered memory or an inability to understand instructions. In addition, many disease states that become more prevalent in older people can lead to disability. Hence, older patients may suffer from one or more of the following problems, which in turn can lead to poor compliance.

**Poor mobility**
Inability to get to the GP surgery or pharmacy due to its geographical location/physical layout or poor public transport may lead to erratic supplies of medicines

**Poor eyesight**
Problems reading leaflets and labels
Difficulty differentiating between containers and medications
Problems in administration, especially non-oral medication

**Hard of hearing**
Difficulty in hearing verbal information

**Manual dexterity**
Difficulty in handling large or small containers
Difficulty in reaching the affected part of the body
Difficulty in opening child-resistant closures

**Cognitive ability**
This is most often manifested as poor memory and it may lead to forgetting to take a medicine at the appropriate time. Patients may also have difficulty in retaining advice regarding their medication regimen. Patients with dementia will sometimes refuse to take medication because of confusion and fear.

**Health beliefs**
There is increasing interest in the role of health beliefs of patients in influencing compliance behaviour. Specific beliefs that have been explored are beliefs about the necessity of medication and concerns about side-effects. There are measurement scales that have been developed to measure such beliefs and research has shown that there is a correlation with medication compliance.

**Social circumstances**
Social isolation, such as being housebound or living alone, can affect compliance. Those older patients who live with a friend or relative are usually more compliant as they have help with getting medicines from the pharmacy and assistance with administration of their medicines and interpreting instructions.

**Practitioner-patient relationship**
As indicated previously, the patient must be a willing partner in his/her treatment and education and good communication on the part of the doctor and pharmacist will achieve this. The nature of the consultation and the information given to the patient is crucial to the patient's understanding and perception of the prescribed treatment. This reflects the move towards concordance. Therefore, the creation of an atmosphere that demonstrates the presence of genuineness, respect and empathic understanding has been identified as a factor that contributes significantly to good compliance. Good
compliance can only be created out of a good doctor/patient and pharmacist/patient relationship.

**Access to medication**
Although not a problem in the UK, a number of other countries do not provide comprehensive free prescription coverage to older patients who may have to make some contribution towards the cost of their medications. Again, some health systems operate restrictive formularies and a limited range of drugs will be available for prescribing.

**Past history of non-compliance**
Compliance problems in the past, which have never been addressed and rectified, are highly predictive of the patient being non-compliant in the future. Identifying and documenting this may help to prevent future non-compliance by the patient.

**Medicine-related risk factors**
A number of medicine-related factors that reduce compliance have been identified in the literature. Improving compliance by reducing or eliminating medicine-related risk factors is an important area where healthcare professionals can have a vital input.

**Type of drug**
The type of drug and the route of administration have an effect on compliance; long-acting parenteral drugs being much superior to other routes, but not all medications will be available in these types of formulations. Additionally, non-compliance may be associated with the drug class but there is no evidence to support this claim.

**Side-effects of drugs**
The relationship between side-effects of drugs and their effect on compliance is not clearly defined. Although it may be logical to assume that side-effects should affect compliance, studies have produced contradictory results. Clearly, some side-effects will cause patients to consult their GP or pharmacist for advice or change in therapy. Some commentators recognise the importance of intelligent con-compliance, i.e. to avoid adverse effects. Patients may alter the dose of medication to avoid adverse effects because the dose was excessive or therapy was inconvenient and yet obtained the desired therapeutic effect. Conversely, patients may tolerate side-effects if they believe the medicine is beneficial, for example, before the introduction of non-sedating antihistamines, patients came to expect drowsiness with antihistamine treatment.

**Dose form and packaging**
The ability of a patient to get the medicine out of the container and administer it orally is obviously of prime importance. In one study as many as 40% of older patients were unable to access their medicines. Many of the problems described in Table 12 are commonly experienced by older patients, although many think that they are too trivial to mention to a healthcare professional.
Section Five

The Older Patient and Compliance

Table 12: Non-compliance associated with dose form and packaging

<table>
<thead>
<tr>
<th>Factor</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packaging</td>
<td>Some containers may be too small or large for the older patient to handle</td>
</tr>
<tr>
<td></td>
<td>Child-resistant caps may be difficult to remove especially by arthritic patients</td>
</tr>
<tr>
<td></td>
<td>Unable to manage blister packaging</td>
</tr>
<tr>
<td>Liquids</td>
<td>May be easier to manage if a tablet is hard to swallow</td>
</tr>
<tr>
<td></td>
<td>Measuring of 5 ml spoonfuls may be difficult for some older people</td>
</tr>
<tr>
<td></td>
<td>(e.g. those with Parkinson’s disease)</td>
</tr>
<tr>
<td></td>
<td>Glass bottles may be heavy for frail older patients to lift</td>
</tr>
<tr>
<td>Palatability</td>
<td>If not palatable, the patient may not take medicine</td>
</tr>
<tr>
<td>Tablet size</td>
<td>If size is too small, the patient may have difficulty in picking it up</td>
</tr>
<tr>
<td></td>
<td>If size is too big, they may find it hard to swallow</td>
</tr>
<tr>
<td>Non-oral dosage forms</td>
<td>May not be as easy to administer, e.g. inhalers, eye drops, suppositories</td>
</tr>
<tr>
<td></td>
<td>May not be as acceptable to administer, e.g. suppositories</td>
</tr>
<tr>
<td>Change in appearance</td>
<td>Potential cause of non-compliance if not warned or counselled about change, e.g. different generic tablet</td>
</tr>
</tbody>
</table>

Polypharmacy

Increasing the number of medicines may cause compliance to fall. For example, in one study, the compliance rate of patients taking one medicine was 89% whereas patients taking five medicines had a rate of 74%. Additionally, if the medicine regimen is complex, it is likely that the patient will be less able to follow the instructions as intended. Making changes to therapy such as substituting generic drugs, changing the size or colour of medicines or modifying the dosing schedule can all affect compliance unless the patient is properly informed.

Dose frequency

The effect of frequency of dose has also been extensively studied. There is some evidence that compliance decreases as the frequency of dose increases. There is, however, no real difference in the compliance rates when taking a medicine twice daily versus once daily. Twice daily dosing may in fact be superior to once daily dosing since, if a patient misses a dose from a twice daily regimen, they will only miss out on 50% of the appropriate dose for that day, whereas if they miss a dose from a once daily regimen, they will have missed out on 100% of the required daily amount.

Label instructions

In general, over 50% of medicines dispensed for older patients are labelled “as directed” or “as before” and two-thirds of older patients wrongly interpret the meaning of the medicine label because it has been worded badly. All prescription labels must now be computer generated and, therefore, illegibility is no longer a problem. Indeed, inadequate and incomplete prescription instructions may be the single most important factor contributing to non-compliance. Instructions should be as clear as possible, with the use of simple and plain language.
Identifying patients with poor compliance

A perfect method of identifying and quantifying non-compliance would be valuable to health practitioners. However, to date, there is no simple way of reliably recognising patients who do not comply. Nonetheless, there are various methods of identifying patient non-compliance, which are outlined in Table 13.

Table 13: Methods of measuring patient compliance

<table>
<thead>
<tr>
<th>Direct</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood levels of drugs or markers</td>
<td></td>
</tr>
<tr>
<td>Urinary excretion of drug, metabolite or other marker</td>
<td></td>
</tr>
<tr>
<td>Indirect</td>
<td></td>
</tr>
<tr>
<td>Patient interview / carer interview</td>
<td></td>
</tr>
<tr>
<td>Prescription refill monitoring using electronic records</td>
<td></td>
</tr>
<tr>
<td>Therapeutic or preventative outcome assessment, e.g. is the patient’s medical condition well-controlled and if not, is this due to poor compliance?</td>
<td></td>
</tr>
<tr>
<td>Pill count</td>
<td></td>
</tr>
<tr>
<td>Electronic monitoring</td>
<td></td>
</tr>
</tbody>
</table>

Although direct methods are the most accurate for assessing compliance, the technical aspects of such tests make many of them impractical for general use in daily practice. Hence, indirect methods are more practical for practitioners to use in daily practice as an integral part of patient monitoring. A patient interview, combined with a pill count or a review of patient medication records may be a practical and useful approach. Some questions that can be useful in gauging patients’ compliance are: ‘Some people have difficulty taking medicines exactly as the doctor has ordered, e.g. they may take more medicine if feeling ill. In the last month, have you ever taken more than the prescribed amount?’ or ‘Some people have difficulty taking medicines exactly as the doctor has ordered, e.g. they may skip doses if they are feeling well or if they experience side-effects. In the last month, have you skipped any doses of your medicines?’
List THREE strategies that you could employ to improve compliance in a patient not taking their medication.

1. 
2. 
3. 

Compare your response to the comments made in the exercise review

Strategies to improve compliance

Once non-compliance has been identified, the task of healthcare professionals is to adopt a strategy to improve compliance. Looking at the main reasons why patients have been found to be non-compliant will illustrate how the intervention of a healthcare professional can help to reduce the problem. Strategies to improve non-compliance are discussed under the following headings:

- simplification of the drug regimen
- information to the patient
- containers
- labelling
- compliance aids
- understanding the patient’s perspective and health beliefs.

Simplification of drug regimen

Guidelines for prescribing in older patients emphasise that it is important to keep the dosage regimen as simple as possible and to avoid excessive numbers of doses or medicines. This is an important challenge for prescribing in older patients, using evidence-based guidelines. Methods of simplifying the patient’s drug regimen are discussed in Section 3 of this course and relate to regular review of the older patients by all healthcare professionals involved in caring for the older patient. Unnecessary drugs or those that may be responsible for side-effects should be discontinued, and an assessment of dosing frequency should be made.
Information to the patient

Educating patients about their medication can have a dramatic effect on their compliance. Here the focus is on explaining to the patient the reasons for taking the medicine, clarifying any problems, allaying any fears and consequently motivating the patient to take the prescribed course.

What EIGHT pieces of information regarding their medication would you provide to the patient, or their representative?

1.

2.

3.

4.

5.

6.

7.

8.

Compare your response to the comments made in the exercise review.

Ways to educate and motivate patients include verbal, written and audio-visual means. Verbal communication is preferred by the older patient because it fosters a bond between the healthcare professional and the patient. Unfortunately, it requires much more time and may be quickly lost from the patient’s memory. Therefore, it is best complemented by using reinforcement procedures (repeatedly encouraging patients to take their medicines properly) and written information, either patient or product information leaflets. The best way of communicating pharmaceutical information is via the label on the medicine bottle. The quality of prescription labels is, however, still poor. The wording on medicine labels has been criticised by the Plain English Campaign as a major cause of confusion. The pharmacist must be more flexible with his labelling terms to suit all patients. Words like “instil” and “two to be taken” are much easier understood if they are written as “put drops into” and “take two tablets”.

Section Five
The Older Patient and Compliance
Product information inserts have been criticised for causing confusion and giving information that the patient does not need. Indeed they are a problem if they contain information which is at odds with information given by the pharmacist or the doctor, and patients may find it difficult to interpret information about risk of side-effects. Currently, there is a concerted effort underway between academia and the pharmaceutical industry to try to improve the quality of information sheets so that they are more understandable for patients.

**Containers**

A good range of containers ensures that an appropriate size can be selected for patients with particular problems. Some older patients find small containers awkward to manipulate, while others find large containers too bulky. Using different sized bottles to distinguish between different medicines is sometimes useful for older patients who have difficulty getting the correct dose from the bottle.

Blister packs are particularly problematic for older patients, especially if they have poor manual dexterity. Pressing out tablets and placing them into another more suitable container that the patient can open (after first checking that the drug is stable within the new container) may improve the situation.

Child-resistant closures (CRC) may also prevent older patients from getting their medicines out of the container. Offering plain caps to older patients who are experiencing difficulties may resolve this problem. Special advice should be given regarding the safe storage of the medicine.

**Labelling**

The following should be remembered when creating labels on containers for older patients:

- give the appropriate information
- use language that the patient will understand, for example ‘take’ instead of ‘to be taken’. avoid using ‘daily’, instead specify the time, for example ‘in the morning’
- use a print size that the patient is able to see (at least 12 point, 14 is better)
- use high contrast dark print, using bold to emphasise important text
- if print is easily smudged, then cover label with transparent non-glare adhesive tape
- colour coding of labels to differentiate between medicines has been shown to aid compliance. use of yellows and reds is better than darker colours such as blue and green which are more difficult for older people to distinguish
- ensure that the message conveyed on the label is consistent with other information given to the patient
- other coding on the label such as letters or numbers can help the patient to remember which medicine is which. for example, ‘w’ for their ‘water tablets’ or ‘h’ for their ‘heart tablets’.
During counselling, the label on each container should be shown to the patient and he/she should be reminded of the most important instructions.

Compliance aids
Compliance aids generally fall into two categories, those which help patients to take medicines and those which help patients organise their medicines. There has been some debate as to whether these aids are effective in helping with compliance. They may be useful for patients who have carers who are responsible for administering the medications. These aids are not available on the National Health Service and the filling of these devices by a pharmacist does not always attract a payment.

Techniques to help patients take their medicines
The method by which a patient is taking his/her medicines can be as crucial as when they are being taken. Since tablets and capsules can stick in the gullet, patients should always be counselled on how to take oral dosage forms correctly. The correct way to take oral dosage forms is:

- fill a glass of water
- take the tablet/capsule while sitting upright or standing
- place the tablet/capsule in the middle of the tongue
- take a mouthful of water and look down while swallowing
- follow with the rest of the water.

For medicines that are not taken by the oral route, devices have been developed to assist patients in the administration of their medicines, for example, the Autodrop helps with aiming drops into the eye and the Autosqueeze helps with squeezing the bottle to expel drops. There are a range of breath-actuated inhaler formulations, which require minimal co-ordination and can assist with compliance. Additionally, some medicine bottles, especially those for pain or arthritis, have tops that are specially designed so that an arthritic patient can gain access to their medication without the need for much dexterity.

Calendar packs
Although it is claimed that they may be beneficial, research has provided very little evidence on the value of calendar packs. Some older people may have difficulty in removing the medicine from the packaging. However, this type of packaging has become increasingly common. Most patients need instruction on how the calendar pack works and on the benefits of using this system as an aide memoire.

Drug reminder charts
These provide individualised written information on the patient’s medicine. Such an approach helps to prevent patients from taking more than the prescribed doses of drugs and also alerts the patient when a dose is missed. Emphasis is placed on synchronising of doses throughout the day with medicine-taking being associated with a daily event in the patient’s life such as breakfast or lunchtime. Drug reminder charts are tailored to the individual and ideally should be prepared with the patient present.
Guidance on production of drug reminder charts
- Make sure the text is legible and large enough for the patient to read.
- Use ‘1 tablet’ instead of ‘1’ or ‘one tablet’ as this is easier for the patient to follow.
- As far as possible, group all those medicines that are taken in the morning and write them below each other; carry out the same procedure for twice/three times daily and at night. This makes the chart easier for the patient to follow and diminishes the chance of the patient missing doses.

Multidose compliance packs
There are a range of multidose compliance packs available commercially, for example, the Dosett and the Mediwheel. They can be purchased by the patient for use with tablets and capsules. Research has shown that the Dosett, providing that the number of drugs to be placed in it is not too large, is a good choice of device both in ease of filling/emptying and acceptability from the patient’s viewpoint. Multidose compliance packs are time-consuming to fill and not all drugs are suitable for inclusion in such devices. Stability of drugs is largely unresearched and drugs that are taken ‘as required’ or liquids are not suitable. Careful consideration is needed before medicines are dispensed in such a device.

The Pharmaceutical Society of Northern Ireland is in the process of developing new professional guidance in relation to the use of Monitored Dosage Systems (MDS) and have provided the following information: “Medicines compliance aids and monitored dosage systems can be useful but it has been noted that some patients are provided with them without a proper assessment taking place of whether they are the best way to meet the patient’s needs. Furthermore, potential patient safety risks from the use of MDS have been noted in a number of areas. These risks include, but are not limited to:
- reduced patient autonomy and adherence
- labelling difficulties
- risks of error in secondary dispensing
- medicines stability issues
- hygiene concerns associated with the use of reusable containers
- the potential for creating greater confusion with the patient’s understanding of their medicines regime.

Clearly the potential benefits to patient convenience and adherence that can be gained from medicines compliance aids and monitored dosage systems, must be balanced against the requirements of assuring patient safety and welfare.”
Understanding the patient’s perspective and health beliefs

There has been growing interest in the literature of the role of social cognitive models and psychological models of behaviour in compliance. Research in this area usually involves the identification of beliefs and cognitions that determine an individual’s behaviour. The models that have been investigated in the field of compliance include the Health Belief Model, Health locus of Control, Self-Efficacy theory, the Theory of Reasoned action and the Theory of Planned Behaviour. For example, with the Health Belief Model, which focuses on threat perception and behavioural evaluation, it has been concluded that patients are more likely to comply with doctors’ orders when they felt susceptibility to illness, believed the illness to have potential serious consequences in terms of both health and everyday functioning, and did not anticipate major obstacles such as adverse effects or cost. Personality traits have also been associated with behaviour. Conscientiousness may be the most accurate personality trait descriptor related to compliance. Conscientiousness has been interpreted as the ‘will to achieve’, ‘dependability’ and ‘self-control’. It may also reflect a highly purposeful, well-organised and self-disciplined style, all of which may promote good compliance. Assessment of a patient’s health beliefs or level of conscientiousness has not become a routine part of practice, but pharmacists should have an awareness that these factors are important in medicine-taking.

In January 2009 NICE, in conjunction with the RPSGB, produced a Medicines Adherence - Quick reference sheet for pharmacists. This provides a useful two page guide on how to involve patients in decisions about medicines and how to support adherence. It is available to download from www.rpsgb.org.uk/pdfs/NICEmedadhimplementguid.pdf.
Summary points

- Compliance denotes the extent to which medications are taken according to the regimen directed by a prescriber.
- Older patients may be more susceptible to risk factors that predispose them to non-compliance.
- Indirect methods such as direct patient questioning and review of refill rates are useful to identify patients who may be non-compliant with their medicines.
- Practitioners can improve compliance in older patients through patient education, simplification of drug regimen, changing containers, and providing compliance aids.
- There should also be an appreciation of a patient’s health beliefs and concerns about medication as these may also influence compliance.

Having completed your study of The Older Patient and Compliance you should now be able to:

Define compliance in respect of medication
Demonstrate the cost implications of medication non-compliance
Identify the factors that may contribute to medication non-compliance
Provide appropriate interventions to encourage and improve medication compliance.

If you are not able to do all of these, go back and review the section again.
References


10. **NICE Clinical Guideline 76.** Medicines Adherence-Quick reference sheet for pharmacists. RPSGB/NICE.


Further reading

**Over-the-counter medication.** British Medical Association, May 2005.


**Church C and Smith J.** How stable are medicines moved from original packs into compliance aids. Pharmaceutical Journal 2006: 276; 76-81


Exercise and case study reviews

Exercise 17 review

Despite the widespread view that older patients are less likely to take medicines compared with younger people, research has shown that age itself is a poor indicator of how a patient will comply with their medication. For further details please see text.

Exercise 18 review

Your answer could have included the following: type of drug, dosage form, packaging, number of drugs taken, dose frequency, labelling, health beliefs, type of disease, physical disability, cognitive ability, social circumstances, prescriber-patient relationship, access to medication, previous non-compliance.

Exercise 19 review

Strategies to improve compliance include: simplification of the drug regimen, providing the patient with information, usage of suitable containers and/or compliance aids and appropriate labelling.

Exercise 20 review

Your answer should have included the following: the name and purpose of the medicine. Why the medicine is being taken and why it must be continued to be taken. The dosage schedule. The method of administration. The nature of any recognisable side-effects, their management and relative seriousness. Storage requirements. Prescription refill information. Action to be taken in the event of a missed dose.
**Index**

<table>
<thead>
<tr>
<th>A</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Absorption, drug</td>
<td>16, 28, 29-31, 34, 37-38, 44, 98, 105, 129</td>
</tr>
<tr>
<td>ACE inhibitor and heart disease</td>
<td>46, 78, 96</td>
</tr>
<tr>
<td>ACE inhibitor and diabetes</td>
<td>87</td>
</tr>
<tr>
<td>ACE inhibitor and NSAIDs</td>
<td>104-105</td>
</tr>
<tr>
<td></td>
<td>13, 17-19, 29-33, 118, 142</td>
</tr>
<tr>
<td></td>
<td>31-34, 38, 47, 60, 120</td>
</tr>
<tr>
<td></td>
<td>59-60, 126</td>
</tr>
<tr>
<td></td>
<td>67</td>
</tr>
<tr>
<td>Ageing process</td>
<td>13, 17-19, 29-33, 118, 142</td>
</tr>
<tr>
<td>Albumin</td>
<td>31-34, 38, 47, 60, 120</td>
</tr>
<tr>
<td>Alcohol</td>
<td>59-60, 126</td>
</tr>
<tr>
<td>Allergy</td>
<td>67</td>
</tr>
<tr>
<td>Alpha receptor responsiveness</td>
<td>41</td>
</tr>
<tr>
<td>Alzheimer's disease</td>
<td>19, 80</td>
</tr>
<tr>
<td>Analgesics</td>
<td>19, 80</td>
</tr>
<tr>
<td>Anticholinergics</td>
<td>41, 56-58, 60, 89, 111, 132</td>
</tr>
<tr>
<td>Antihistamines</td>
<td>111-112</td>
</tr>
<tr>
<td>Appetite</td>
<td>120, 130, 132</td>
</tr>
<tr>
<td>Arthritis</td>
<td>149</td>
</tr>
<tr>
<td>Aspirin</td>
<td>149</td>
</tr>
<tr>
<td>Asthma</td>
<td>40, 68, 105</td>
</tr>
<tr>
<td>Atrophic vaginitis</td>
<td>127</td>
</tr>
<tr>
<td>Autoimmune disorders</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>64, 80, 98, 128</td>
</tr>
<tr>
<td>Balance</td>
<td>41</td>
</tr>
<tr>
<td>Benign prostatic hypertrophy</td>
<td>72, 89</td>
</tr>
<tr>
<td>Benzodiazepines</td>
<td>41, 56-60, 89</td>
</tr>
<tr>
<td>β2-agonists</td>
<td>91-93</td>
</tr>
<tr>
<td>Beta-blockers</td>
<td>58, 68, 94, 96</td>
</tr>
<tr>
<td>Bladder</td>
<td>16, 41</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>16, 41, 57, 76, 87-88, 94-95, 106, 111</td>
</tr>
<tr>
<td>Brain sensitivity</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>51, 67-68, 142, 147</td>
</tr>
<tr>
<td>B</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>72, 89</td>
</tr>
<tr>
<td></td>
<td>41, 56-60, 89</td>
</tr>
<tr>
<td></td>
<td>91-93</td>
</tr>
<tr>
<td></td>
<td>58, 68, 94, 96</td>
</tr>
<tr>
<td></td>
<td>16, 41</td>
</tr>
<tr>
<td></td>
<td>16, 41, 57, 76, 87-88, 94-95, 106, 111</td>
</tr>
<tr>
<td></td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>51, 67-68, 142, 147</td>
</tr>
<tr>
<td>C</td>
<td>64, 80, 98, 128</td>
</tr>
<tr>
<td>Calcium</td>
<td>47, 59</td>
</tr>
<tr>
<td>Calcium channel blockers</td>
<td>16, 119</td>
</tr>
<tr>
<td>Cardiovascular system</td>
<td>52, 57, 65, 67, 70, 72, 88-89, 114, 116, 126, 131-133</td>
</tr>
<tr>
<td>Care homes</td>
<td>53, 66-67, 85, 89, 145, 149</td>
</tr>
<tr>
<td>Carers' involvement</td>
<td>74, 91-93</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease (COPD)</td>
<td>94, 103, 106, 109, 128, 130</td>
</tr>
<tr>
<td>Codeine</td>
<td>51, 67-68, 142, 147</td>
</tr>
<tr>
<td>Communication issues</td>
<td>51, 67-68, 142, 147</td>
</tr>
</tbody>
</table>
Compliance
23, 54-55, 63, 66-67, 90-91, 93, 96-97, 135-151, 154

Concordance
137, 142

Confidentiality
22

Confusion
40-41, 47, 53, 55-57, 58, 60-61, 66, 89, 111, 127, 142, 147-148, 150

Confusion and hospital admission
58

Congestive heart failure
38, 46, 78, 80, 97

Constipation

Containers
76, 95, 142-144, 146, 148, 149, 154

Cough expectorants
108

Cough suppressants
109

D
Decongestants
108, 111-112

Dehydration
15, 56-57, 118

Delirium
58

Dementia
17, 19, 67, 128, 142

Demulcents
111

Depression
12, 17, 72, 86, 89, 109, 119, 126, 128, 132-3

Diabetes
37-38, 56, 68, 70, 80, 87-88, 95, 98, 111, 128, 133

Diarrhoea
101, 118, 119-120

Diazepam
32, 33, 34, 44-45

Digoxin
32, 33, 37-39, 46, 59, 61, 66, 78, 80, 96-97, 118

Dihydrocodeine
103, 106

Diltiazem,
59

Dimensions of ageing
13-19

Dimensions of health
12-13

Distribution of drugs
28, 30, 31-34, 38, 46, 96

Diuretics
46-47, 56-57, 66, 78, 86, 94, 96-97, 104, 118, 128, 131

Drug absorption
see Absorption, drug

Drug distribution
see Distribution of drugs

Drug excretion
28, 30, 35, 37-38, 46, 145

Drug metabolism
16, 28-30, 35-37, 38, 45-46, 58-59, 89

Drug monitoring
15, 56, 61-62, 68, 145

E
Electrolyte disturbances
46, 56

Epilepsy
40, 47, 111, 141

Excretion
28, 30, 35, 37-38, 46, 145

Exercise
16, 46, 94, 115, 120, 131

Eyesight
141-142, 148

F
Falls
55, 57, 60-61, 70, 87-89, 111

Fluid intake
90, 95, 114-115, 119, 128, 131-132
Index

G
Gastric acid 16, 29-30, 44
Gastrointestinal tract 28-30
Glaucoma 111, 141
Glomerular filtration 16, 37, 46
GMS contract 68-69
Glyceryl trinitrate 35

H
Health beliefs 121, 141, 142, 146, 151, 154
Hearing 15, 126, 142
Heart failure 37-38, 41, 46-47, 56, 78, 80, 96-97, 114, 132, 141
Homoeostasis 15
Homoeostatic mechanisms 27, 41
Hospital admission 38, 52, 55, 58, 62, 67-68, 78, 80, 118
Hospitalisation 46, 52, 92, 118, 139
Hydration 31, 41, 118
Hyperkalaemia 104
Hypertension 37, 40, 47, 53, 56-57, 70, 76, 86-87, 94-95, 106, 111, 119, 130, 141
Hyperthyroidism 111
Hypnotics 53, 56, 67, 89
Hypokalaemia 96-97, 115, 128-129, 131
Hyponatraemia 56, 89
Hypotension 41, 55, 57, 87-88
Hypothermia 41
Hypothyroidism 128, 133

I
Immune system 16, 118, 126
Immunisation 69
Impaired vision see Vision, impaired
Incontinence 41, 56, 61, 72, 118, 120, 127-128, 132
Indigestion 101, 119, 127
Influenza 69, 104, 110, 112-113
Inhalers 74, 90-93, 144, 149
Iron 30, 57, 119, 128, 132
Ischaemic colitis 118

K
Kidneys 16, 28, 35, 37, 46, 105

L
Labelling 54, 63, 141-142, 144, 147, 148-149, 154
Levodopa 91
Levothyroxine 80, 98
Lifestyle 17, 53, 95, 115, 120, 128, 131
Lithium 37, 66
Liver 16, 34-35, 36-38, 46
Liver disease 37
Low dose aspirin 104
<table>
<thead>
<tr>
<th>Index</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>M</strong></td>
</tr>
<tr>
<td>Management of coughs and colds</td>
</tr>
<tr>
<td>Management of pain</td>
</tr>
<tr>
<td>Managing gastro-intestinal problems</td>
</tr>
<tr>
<td>Medication review</td>
</tr>
<tr>
<td>Medicine management</td>
</tr>
<tr>
<td>Menthol</td>
</tr>
<tr>
<td>Metabolism/metabolised</td>
</tr>
<tr>
<td>Metformin</td>
</tr>
<tr>
<td>Minor ailments</td>
</tr>
</tbody>
</table>

| **N** |
| NSAIDS | 53, 56, 58-59, 66, 86, 94-95, 103, 104-105, 118, 130-131 |
| NSF standards | 57, 63, 66, 113, 119 |
| Nutrition | 23, 31, 41, 60, 101, 106, 119 |

| **O** |
| Opioids | 56-57, 94, 106, 120, 128, 130 |
| Osteoarthritis | 53, 94-95, 103, 106 |
| Osteoporosis | 15, 57 |

| **P** |
| Pain | 52, 72, 76, 89, 94, 101, 103-107, 112, 126, 130, 149 |
| Paracetamol | 56, 58, 70, 72, 76, 88, 94-95, 103, 104, 106, 110, 112, 120, 130 |
| Parkinson’s disease | 58, 60, 74, 91, 93, 128, 133, 144 |
| Patient confidentiality | see Confidentiality |
| Peptic ulcer | 76, 95, 105 |
| Pharmacodynamics | 27, 34, 41, 59-60, 69 |
| Pharmacokinetics | 27, 28, 34, 37, 41, 58-60, 69, 96-97 |
| Polypharmacy | 11, 51-52, 55, 57, 64, 67, 87, 141, 144 |
| Postural hypotension | 41, 55, 57, 87-88 |
| Potassium | 16, 96-97 |
| Prostate | 15, 89, 111 |

| **R** |
| Renal failure | 38, 41, 46, 104, 114, 132 |
| Renal function | 37-38, 46, 56, 87, 96 |
| Renal impairment | 37, 46, 105-106, 119 |
| Renal blood flow | 16, 37 |
| Retinopathy | 87 |
| Rheumatoid arthritis | 141 |

<p>| <strong>S</strong> |
| Salt | 106, 119 |
| Selective Serotonin re-uptake inhibitors (SSRIs) | 56, 58-59, 89-90 |
| Serum drug concentrations | 29, 96-97 |</p>
<table>
<thead>
<tr>
<th>Index</th>
<th>Page Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sleep</td>
<td>41, 72, 89-90, 111, 120, 126</td>
</tr>
<tr>
<td>Smoking</td>
<td>36, 74, 93, 113</td>
</tr>
<tr>
<td>Smoking cessation</td>
<td>113</td>
</tr>
<tr>
<td>Spacers (for inhalers)</td>
<td>91, 93</td>
</tr>
<tr>
<td>Statins</td>
<td>58-59</td>
</tr>
<tr>
<td>Stroke</td>
<td>13-14, 23, 47, 54, 104, 128</td>
</tr>
<tr>
<td>Sulphonylureas</td>
<td>46, 87</td>
</tr>
<tr>
<td>Temperature, body</td>
<td>41</td>
</tr>
<tr>
<td>Temperature, high</td>
<td>112, 127</td>
</tr>
<tr>
<td>Theophyllines</td>
<td>36, 45, 58-59</td>
</tr>
<tr>
<td>Thiazide diuretics</td>
<td>46-47, 94, 104, 118, 130-131</td>
</tr>
<tr>
<td>Thirst</td>
<td>41</td>
</tr>
<tr>
<td>Tricyclic antidepressants</td>
<td>41, 58, 89, 128, 132</td>
</tr>
<tr>
<td>Ulcers</td>
<td>76, 94-95, 105-106</td>
</tr>
<tr>
<td>Verapamil</td>
<td>35, 59, 128, 132</td>
</tr>
<tr>
<td>Vision, impaired</td>
<td>15, 111, 142</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>64, 80</td>
</tr>
<tr>
<td>Warfarin</td>
<td>33, 34-35, 41, 44-45, 58-59, 61, 66, 80, 98</td>
</tr>
<tr>
<td>Weight reduction</td>
<td>46, 94-95</td>
</tr>
<tr>
<td>Weight loss</td>
<td>78, 97, 119-120</td>
</tr>
</tbody>
</table>