

2nd Edition

MEDICINES MANAGEMENT

FOR NURSING ASSOCIATES

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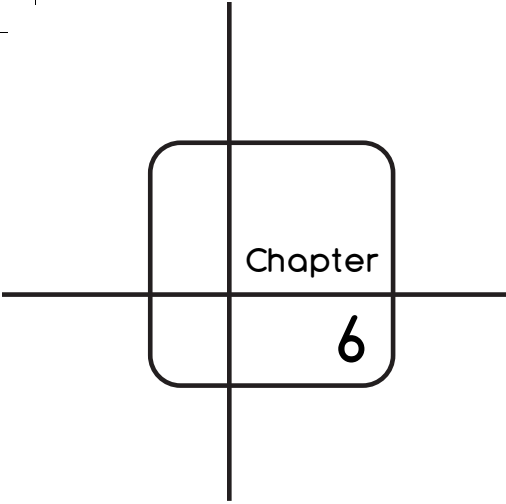
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Chapter

6

Medication management in the modern age

NMC STANDARDS OF PROFICIENCY FOR NURSING ASSOCIATES

This chapter will address the following platforms and proficiencies:

Platform 2 Promoting health and preventing ill health

- 2.9 protect health through understanding and applying the principles of infection prevention and control, including communicable disease surveillance and antimicrobial stewardship and resistance.

Platform 3 Provide and monitor care

- 3.3 recognise and apply knowledge of commonly encountered mental, physical, behavioural and cognitive health conditions when delivering care
- 3.12 demonstrate the knowledge and skills required to support people with commonly encountered symptoms including anxiety, confusion, discomfort and pain
- 3.13 demonstrate an understanding of how to deliver sensitive and compassionate end of life care to support people to plan for their end of life, giving information and support to people who are dying, their families and the bereaved. Provide care to the deceased.

Platform 4 Working in teams

- 4.9 discuss the influence of policy and political drivers that impact health and care provision.

Chapter aims

After reading this chapter, you will be able to:

- identify some of the future threats to our population's health and understand the challenges for healthcare professionals;
- identify opportunities in healthcare related to medicines optimisation and pharmacological innovations.

Introduction

Case Study: Silvi

You are shadowing a district nurse on a home visit. You visit Silvi who is 46 years old who lives with her husband and two children, Jacob who is 20 and has additional learning needs and Aida who is 6 years old. Silvi has been receiving palliative treatment for breast cancer with lymph and bone metastases. During the assessment Silvi informs you she has been having trouble sleeping. The GP has recently increased her dose of slow and immediate release morphine for regular and break through pain as her pain was not being managed effectively. She asks if there are any alternative medications or options available, she can try as she is finding some of the side effects including nausea and insomnia hard to manage.

A green paper presented to Parliament suggests that there are a number of opportunities and challenges ahead for the NHS in order to deliver health and social care in the twenty-first century (Department of Health and Social care [DHSS], 2019a). This has added meaning in the aftermath of the COVID-19 pandemic, which happened shortly after publication, the consequences of which continue to unfold globally. The consultation paper suggests that care needs to be personalised, with lifestyle advice and support targeted at the individual. Patients are no longer passive recipients of care, rather co-creators of their own health. The challenge for healthcare professionals and the government is to ensure that individuals have the skills, knowledge and confidence to achieve this.

Silvi's case study raises several issues you may encounter and an understanding of medicine management in the modern age will allow you to discuss and address some of the contemporary health concerns in your practice area. It will allow you to explore strategies for supporting your service users at all stages of life, managing their needs, promoting self-care and providing choice of both medicinal and non-pharmaceutical interventions.

Activity 6.1 Critical Thinking

Consider what some of Silvi's biopsychosocial needs are, what assessments you might utilise and what potential interventions may be needed to address her current symptoms and presenting complaints.

A short answer will be included at the end of the chapter.

As this case study demonstrates there is a need to have a clear understanding of strategies available to you to manage service users' symptoms, both physical and psychological and we will discuss these first.

Symptoms and their management

Acute pain has a protective function as the response to injury or disease. It results when tissue damage causes the stimulation of sensory, known as **nociceptive**, nerve endings

found throughout the body. The initial cause of the pain, like a bee sting, results in a local release of chemicals which act on the nerve endings. In addition, **prostaglandins** are released as part of the inflammatory response. This inflammatory response includes the effects on the blood vessels resulting in tissue engorgement, the redness and swelling, and the proliferation of white cells as the immune response, known as **neurogenic inflammation**. Peripheral pain fibres run into the spinal cord and synapse with spinal cord neurons which allow for the transmission of, or stopping of, more intense pain signals to the brain. This progressing or stopping of signals describes the **gate control theory of pain** (Melzack and Wall, 1965). The brain can 'shut this gate' by the release of chemicals such as serotonin and other subjective, but less well-understood mechanisms. The sensation of pain is thought to be located in the **thalamus** and moderated by the **cerebral cortex**, but the exact physiology and function and mode of action of pain-relieving substances are still being researched.

Under normal circumstances, the sensory system returns to a normal state after healing has taken place. However, if features of sensation persist, and by definition for a period of greater than 6 months, it may manifest as chronic pain. **Chronic pain** is characterised by the abnormal state and function of the neurons in the spinal cord which become hyperactive. This is a result of increased transmitter release by neurons and an increased responsiveness of the receptors. In addition, there is the loss of function of inhibitory neurons which would usually moderate the pain. Genetic and environmental factors can contribute to this hypersensitivity leading to permanent structural changes in the area of the brain responsible for nociceptor regulation. Treatment aims to decrease the intensity of acute pain and therefore reduce or prevent the permanent changes to the nervous system which may result in chronic pain. Therapies including appropriate combinations of medications and adjuvants are used.

Palliative care, the treatment, care and support for people with life-limiting illness often involves the need to control pain as well as other distressing symptoms such as nausea, breathlessness and agitation in order to promote quality for remaining life. Regardless of the type and source of pain, the treatment aim is to alleviate or reduce the sensation of pain which requires assessment and treatment with analgesics and/or non-pharmaceutical methods. The World Health Organisation (1986) proposed the analgesic ladder – 'by the clock, by the mouth, by the ladder' as a means of ensuring timely, least invasive and sequential strength of medicated response to alleviate pain.

Within your practice environments you will encounter a number of assessment tools which will allow your service user to communicate their level of pain, these can be adapted for use with children and adults with intellectual disabilities, or those with cognitive decline and allow for an appropriate response from you.

Aspirin and paracetamol are the most common analgesics taken for pain management for adults. Their exact modes of action are unknown, but they have been found to benefit headache, muscle pains and arthritis but are ineffective for visceral pain. They have a weak non-steroidal anti-inflammatory (NSAID) effect and a number of toxic and advisory notices (BNF, 2023).

NSAIDs, like ibuprofen, are used for the management of moderate pain due to tissue inflammation. NSAIDs vary in both analgesic and anti-inflammatory potency and in the severity of side effects which they all share, including gastro-intestinal perforation and haemorrhage, acute renal failure and asthma exacerbation. As always there is the need to review the BNF before they are administered.

Morphine and diamorphine are the strongest analgesics known. Pharmaceutical companies have synthesised other less effective products, including codeine, pethidine, fentanyl, buprenorphine and others. As **opiates** these medications are thought to work in the mid-brain and cerebral cortex causing feelings of wellbeing and tranquility, known as

euphoria, and allow for the closing of the pain gate by inhibiting pain receptors. The range of opiates are used for a variety of clinical situations and generally share the same range of side effects and the potential for misuse. Opiates are lethal in overdose. The drug naloxone may be used as a competitive antagonist for the opiate receptors which prevents the binding of the opiate to its receptor therefore reversing its effect.

There are a range of circumstances which may result in **nausea and vomiting** for your patient. Including as a side effect of other medication, as in the case study. Targeted care will include not only the symptom management but also investigation of the underlying cause. The most commonly prescribed include those which encourage peristalsis and speed up gastric emptying like metoclopramide and domperidone. Others include the antihistamines like cyclizine and the 5-HT₃ receptor antagonists, for example, ondansetron. As with all medications notable contra-indications and cautions exist. Metoclopramide may be associated with extrapyramidal neurological symptoms, cyclizine with euphoric and psychoactive effects and ondansetron with cardiac implications. Therefore, safe administration requires the scrutiny of the BNF for specific concerns.

For abnormal bowel function, as with all patient care, the priority for treatment will include the investigation of underlying causes. For **diarrhoea**, the restoration and maintenance of hydration and electrolyte balance along with the restoration of normal bowel function is required. Rehydration treatments may include the over-the-counter product dioralyte along with the encouragement of increased oral fluid intake. **Antimotility** medications slow down bowel peristalsis (see chapter 2). They allow increased water absorption to allow for normal stool formation and can be given short term for the comfort of your patients; they include codeine phosphate and loperamide as examples. Medications to relieve **constipation** are known as **laxatives** and include bulk-forming, osmotic, stimulant and faecal softeners. Their mode of action is complex and include fybogel, movicol, lactulose, senna, glycerol and arachis oil as examples. Constipation is a commonly encountered complaint and along with investigating cause you will need to be sympathetic to your patient's perceptions of a normal bowel habit and as always review the BNF for specific concerns.

Dyspepsia, or indigestion, has a variety of causes including obesity, food intolerance, smoking, high alcohol intake and a variety of medical conditions and their treatments. It is characterised by discomfort in the upper abdomen known as heartburn. It may be associated with the symptoms of bloating, belching, nausea and anorexia. Treatments depend largely on the cause of the dyspepsia and include antacids which may be bought over the counter, such as gaviscon, which neutralises and prevents acid reflux providing relief. Further treatments include histamine antagonists which block the histamine receptors in the stomach so preventing the release of gastric acid. Proton pump inhibitors, for example, omeprazole, prevent the pumping of hydrogen ions into the stomach preventing gastric acid formation. Vigilance and close monitoring of your patients will ensure that serious gastro-intestinal pathology such as gastric cancer is not missed during symptom management of dyspepsia.

Inflammatory symptoms include several features.

- **Pyrexia** is a natural immune response which results in a high core body temperature, otherwise known as a fever, and is a mechanism aimed to reduce bacterial and viral multiplication. The hypothalamus responds to the presence of substances called **pyrogens** which are released into the circulatory system from injured tissues or from the presence of micro-organisms. Antipyretics including paracetamol and NSAIDs may be used for symptom relief, but an awareness of contraindications and interactions is required. In many circumstances, non-medication symptom relief, like tepid bathing for example, is advocated.

- **Urticaria**, a condition characterised by the appearance of itchy weals on the skin, is the result of a hypersensitivity reaction. Investigation to the cause is required and from a medicine management perspective an assessment and review of all recently administered medicines is required. Acute life-threatening adverse reactions require an appropriate emergency response (see Chapter 4).
- **Pruritus** or itching can occur. This is thought to be the result of stimulation of the subepidermal nerve plexus by proteolytic enzymes that are released from the epidermis as a result of a primary irritation. It can be generalised or systemic, the result of a skin condition or a feature of a systemic disorder. Where possible the underlying cause should be treated. Emollients may assist with symptom control where the pruritis is associated with dry skin. Treatment including topical agents like hydrocortisone cream 1 per cent or betnovate-RD may be used to relieve symptoms and suppress signs of the disorder when other measures like emollients are not effective (BNF, 2023).

As well as acute physical symptoms your service users may be affected by psychological symptoms. **Affective disorders** are characterised by disturbances of mood and can be the result of anxiety, depression and conditions like dementia.

For **anxiety**, the anxiolytics and hypnotic medications may be used, although the NICE, (2019b) guideline recommends psychosocial rather than medicinal treatments. Sleep disturbances can be treated with benzodiazepines, for example, temazepam and nitrazepam, in the short term due to their high degree of tolerance and dependence. Non-benzodiazepines which function at the same receptors may also be prescribed, an example being zopiclone.

Depression can be associated with symptoms such as insomnia, altered appetite, social withdrawal and suicidal ideation. The most used antidepressants, and recommended by NICE (2019c), are the selective serotonin reuptake inhibitors (SSRIs) as generally they are associated with less side effects. They work by blocking serotonin, a neurotransmitter, from returning to the neuron, increasing its action. Monoamine oxidase inhibitors are used less frequently as they are associated with more interactions with certain foods and can affect blood pressure. Antidepressant medication usually takes at least three weeks to have an effect. The medications amitriptyline, sertraline, mirtazapine and venlafaxine are effective for many service users, although not all and approaches such as cognitive behavioural therapy in combination with medication, or on its own, are recommended to maximise the benefit of treatment (BNF, 2023).

Dementia can be associated with a wide range of symptoms including cognitive impairment, thought to be as a result of degeneration of neurons in the amygdala and can be treated with cholinesterase inhibitors including donepezil, galantamine and rivastigmine (NICE, 2018).

Acute psychotic episodes may result in distressing symptoms for your service users. Medications, sometimes described as neuroleptics, with a wide variety of structures have anti-psychotic effects. Broadly they work by blocking dopamine receptors, as a dopamine antagonist, and have varying severity in adverse effects. Individual responses remain idiosyncratic and the best treatment for an individual may be subject to trial and error. Examples include chlorpromazine, fluphenazine, haloperidol and clozapine. Community treatments often include long-acting oily depot injections for maintenance therapy which may increase the incidence of movement disorders. Treatment adherence is a major clinical issue, however, impacting on areas such as safety, relapse and long-term prognosis. The effectiveness and side effects have a major impact on concordance.

Having explored common symptom management with medicine administration, it is important to remind ourselves that non-pharmaceutical options and alternative therapies may be used.

Complementary and alternative medicines

Complementary and alternative medicines (CAMs) refer to a diverse group of therapies and disciplines that are not considered part of mainstream healthcare. They include health-related therapies which have roots in historical, cultural or religious practices; their philosophies being fundamentally holistic and individualistic.

There has been a significant increase in the use of CAMs in recent years. This rise in popularity may have been influenced by a rise in consumer knowledge and people becoming disenchanted with dominant healthcare treatments. These therapies have been classified by the House of Lords (2000) into three broad categories. Within these classifications, some CAMs have well-developed regulatory structures and have begun to build an evidence base while others are fragmented practitioners with little agreement about regulation (See Table 6.1).

Table 6.1 House of Lords Select Committee on Science and Technology report (2000)

Group	Description	Examples
1	Most established form of CAM that have diagnostic method and are most advanced in terms of regulated practice. Have greatest evidence for efficacy – often referred to as 'big five' therapies.	Osteopathy, chiropractic, acupuncture, herbal medicine and homeopathy
2	Normally used to compliment conventional medicine. Do not claim to make diagnosis.	Aromatherapy, alexander technique, massage, counselling, stress therapy, hypnotherapy, reflexology, shiatsu and meditation
3a	Offer therapeutic as well as diagnostic service. Involve a philosophy which does not relate to conventional medicine – 2 subgroups	a) Traditional Chinese and Ayurvedic medicine
3b	Number of disciplines which lack evidence base	b) Crystal therapy, dowsing and kinesiology, iridology and radionics

As a nursing associate you need to be aware of the debate surrounding benefits and pitfalls of CAMs and the contraindications and conflicts between them and mainstream healthcare. Many of your patients will be accessing these therapies for either an acute condition or end of life prognosis and you will have a responsibility to support your service users to access reliable evidence to allow them to make informed choices about their care. Since a variety of therapies and disciplines exist, you are encouraged to access appropriate literature on specific CAMs if accessing them yourself or for your patients, relying on good quality evidence to inform your practice. In the case study at the beginning of this chapter you would need to assist Silvi to access evidence-based information to enable an informed decision on whether reflexology or aromatherapy could aid her in her insomnia for example.

Complementary and alternative medicines are often accessed by service users to alleviate both acute and chronic symptoms of discomfort and regardless of efficacy are seen to have a psychological impact, giving people hope for the alleviation of their symptoms. This beneficial effect which cannot be attributed to the medicinal or therapy properties is described as the placebo effect. It is a result of the patient's belief in that treatment. Placebo effects can be attributed to both CAMs and conventional medical therapies.

Social prescribing

Non-pharmacological treatment can be utilised with referral to 'activities' or services in the community instead of offering only medical solutions. Social prescribing is being recognised as a way of reducing polypharmacy (DHSS, 2019a; RPS, 2013) and can complement or replace pharmacological treatments. It enables GPs, nurses and other health and care professionals to refer people to a range of local, non-clinical services as a key component of universal personalised care. If Silvi requires more support, she may benefit from a social prescribing link worker who could develop a personalised care plan to promote her wellbeing and that of her family. This could include physical activity and rehabilitation prescriptions to promote quality of life.

As access to CAMs and social prescribing is often for symptom management, activity 6.1 asks you to reflect on your current knowledge of commonly encountered symptoms.

Activity 6.2 Reflection

Think of examples of symptoms you have had reported in practice. What pharmaceutical, social or innovative prescribing therapies have you observed being used to alleviate distress.

As this answer is based on your own observation and reflection, there is no outline answer at the end of this chapter.

You may wish to discuss this reflection with colleagues and retain the information in a personal portfolio.

Challenges for healthcare

Having explored strategies for symptom management, we are now going to review some of the challenges healthcare professionals face in modern medicines management.

Antimicrobial resistance

Antimicrobial resistance (AMR) is a worldwide challenge which requires a global response to antibiotic stewardship. AMR occurs when microorganisms such as bacteria, viruses, fungi and parasites adapt and mutate in ways that render medications used to cure the infections they cause ineffective (WHO, 2017a). AMR occurs naturally, through the transfer of genetic material, but is facilitated by the inappropriate use of antibacterial medicines, for example, the use of antibiotics to attempt to treat viral infections and the overuse of broad-spectrum

antibiotics. **Antimicrobial stewardship** is therefore required and is defined as, ‘an organisational or healthcare-system-wide approach to promoting and monitoring judicious use of antimicrobials to preserve their future effectiveness’ (NICE, 2015a, p2).

Before selecting an antibacterial, the prescriber must consider both the individual and the likely causative organism. Local policies often limit the antibacterial that may be used to achieve reasonable economy consistent with adequate cover and to reduce the development of resistant organisms (BNF, 2023).

NICE (2019d) antimicrobial prescribing guidelines have been developed to promote prudent prescribing of antibiotics as well as justifying whether antibiotics are needed to support a clinician’s decision-making. Shorter courses of treatment are also recommended to reduce resistance. This is also likely to increase concordance.

The use of broad-spectrum antibiotics is discouraged for antibiotic stewardship and for clinical reasons; there is evidence that their use is associated with increased rates of *Clostridium difficile* (NICE, 2015b). This is because the antibiotic action of killing or preventing bacteria from replicating will influence the normal, healthy gut microbiome (see Chapter 2) and allow for the infiltration of pathogenic bacteria. This is the reason why gastric side effects are often associated with antibiotic use.

There are occasions when broad spectrum antibiotics are indicated, however. In the case of sepsis, broad-spectrum antibiotics are necessary to treat a wide range of possible microorganisms that may be causing the systemic infection (Nutbeam & Daniels on behalf of UK Sepsis Trust, 2019). Sepsis is defined as the association of non-specific inflammatory responses with evidence, or suspicion, of a microbial origin. When accompanied by evidence of reduced perfusion or dysfunction of at least one organ system, this becomes severe sepsis. Where severe sepsis is accompanied by hypotension or need for vasopressors, despite adequate fluid resuscitation, the term septic shock applies (Nutbeam & Daniels on behalf of UK, Sepsis, 2019). Increasing severity correlates with increasing mortality.

Worldwide sepsis affects 48.9 million people with 11 million deaths accounting for 20 per cent of all global deaths. In 2017, almost half of these cases were among children with 2.9 million deaths in children under five years of age (WHO, 2020). Thus, sepsis is a medical emergency. Awareness and recognition are key and as a nursing associate you will need to be aware of the sepsis pathways and treatment regimes in your area of practice. The urgency of treatment of adult and paediatric patients with suspected sepsis is based on National Early Warning Scores in secondary care (NEWS2 for adults, PEWS for children) combined with clinical and laboratory assessments of severity, urgency and probability of infection – see NICE guideline NG 51 (2022). The treatment framework allows sufficient time to make an informed clinical judgement with antimicrobial treatment being accompanied by source identification, control and antimicrobial stewardship (Academy of Medical Colleges, 2022)

Before proceeding it would be a good idea to familiarise yourself with your own organisations’ policies and procedures in the event of caring for an individual with sepsis, and activity 6.3 invites you to do this.

Activity 6.3 Work-based learning

Review your organisations’ policies and procedures for identifying and responding to service users with sepsis.

This answer is based on your own observation; there is however an answer outlining the ‘sepsis six’ at the end of this chapter.

Now that you have reviewed your organisations' policies for identifying and treating those individuals with sepsis, let us continue to explore the challenges associated with antibiotic administration.

In January 2019, the UK Government published a 20-year vision and 5-year national action plan for how the UK will contribute to containing and controlling AMR. This is to ensure current antibiotics stay effective, reduce the numbers of resistant infections, support appropriate prescribing practices and to encourage the pharmaceutical industry to take more responsibility (DHSS, 2019b). In 2022, WHO additionally stated its intention to continue collaborative strategies for AMR alongside preparedness for pandemic initiatives.

As trainees and registrants, you will have a responsibility to educate service users about when antibiotics are needed and how to ensure correct use. You will have a role and responsibility to promote infection control and reduce hospital and healthcare acquired infections as an **antibiotic guardian**. You will also need to understand your role in identifying and responding to service users with the life-threatening condition of sepsis.

Immunisation and public perception

Vaccination against disease is one of the most cost-effective interventions in healthcare. It protects the general population, and through herd immunity, allows for the protection of vulnerable groups. Herd immunity describes how a population is protected from a disease after vaccination by stopping the microorganism responsible for the infection being transmitted between people. In this way, individuals who cannot be vaccinated can be protected. Many parents are reluctant to have their children immunised against childhood diseases for fear of side effects of the immunisation itself, however. This followed a widely publicised 1998 study by a UK Dr Wakefield who suggested that the MMR vaccine might cause autism. This claim has since been retracted by his co-authors, but immunisation rates are still to recover fully and this was not before outbreaks had resulted in thousands of cases of measles, hundreds of hospitalisations and at least three deaths (Quick and Larson, 2018).

Vaccine hesitancy has been identified within the WHO's (WHO, 2019) 5-year strategic plan as one of the 10 issues that will demand attention from WHO and health partners. They suggest that the reluctance or refusal to vaccinate against vaccine-preventable diseases while being a complex issue is largely a result of complacency, inconvenience in accessing vaccines and lack of confidence. This was demonstrated clearly with the recent COVID-19 pandemic and re-iterates the importance of drawing on evidence base for your practice.

Activity 6.4 Reflection

Consider how you would approach a vulnerable patient who has been influenced by media accounts and is declining routine vaccinations.

As the answers are based on your own observation and reflection, there are no outline answers at the end of this chapter. You may wish to discuss this reflection with colleagues and retain the information in a personal portfolio.

Potential for drug misuse

Drug dependence occurs when the body's systems adapt to the repeated exposure to a medicine and only functions normally in the presence of that medicine. When the drug is

withdrawn, several reactions occur, these can be physical and psychological. Known as the withdrawal syndrome, the reactions vary from the mild to life threatening. The individual may take the substance again to avoid the physiological and psychological distress associated with the withdrawal syndrome. A variety of substances may incur a dependence, from caffeine in food and drink, nicotine in cigarettes, analgesics taken to relieve acute pain, like opioid medication, and sedatives taken to aid sleep. There is also the potential for abuse of non-dependence-producing substances (WHO, 2018b). This is defined as repeated and inappropriate use of a substance which, though the substance has no dependence potential, is accompanied by harmful or psychological effects, or involves unnecessary contact with health professionals. A variety of medicines may be involved, including over-the-counter medicines, prescribed and herbal remedies. These substances while they do not have the potential for dependence in the sense of their pharmaceutical effects, they can produce a psychological dependence.

Drug misuse is defined as the use of a substance for a purpose not consistent with legal or medical guidelines (WHO, 2018b). It is associated with a range of harms including poor physical and mental health and sociological effects such as relationship breakdown unemployment and homelessness and therefore has a negative impact on health and functioning. It may take the form of drug dependence or be part of a wider spectrum of problematic or harmful behaviour.

When considering the case study, however, in palliative care, pain and symptom control should be your primary concern and not the dependence of substances as your aim is to alleviate pain and distress in terminal illness.

Changing political agenda

A further challenge is the impact politics has on medicines management. Under Brexit, the United Kingdom entered a new era for the pharmaceutical industry. The UK Trade and Cooperation Agreement with the EU came into effect in 2021. This attempts to ensure smooth trade between EU and the UK as jurisdiction and legal obligations have separated. The MHRA now independently regulates for England, Scotland and Wales. At the time of writing, there are still a number of challenges and concerns for the industry to address. Throughout your career as a nursing associate, you will be influenced by the political agenda of the time for all aspects of healthcare, including medicines management and an awareness and understanding of implications for you and your service users will be essential to help you fulfill your role.

Global threats to health

A final consideration is the global challenge associated with epidemics, pandemics and the required international response. The COVID-19 pandemic is a recent example of this. The race to identify effective treatments to combat threats is challenging but allows for opportunities and innovations in public health provision and medicines management.

Opportunities for healthcare

New medicine development

A major opportunity for the future of disease and symptom control is the development of new medicines to prevent, treat or reduce severity of illnesses. The starting point for this is research into disease processes at a molecular and cellular level. Through better understanding of disease development, a specific gene or protein instrumental to the progression of the disease

may be identified which a new medicinal product could have an effect on. An example of this would be the development of a product that blocks an essential receptor. Historically this search would have been among natural substances in plants and animals, but in modern times synthetic substances are often computer generated and formulated. The start of a long and detailed trial and testing process is then required. Product safety and efficacy tests are conducted using computerised models, simulation and preclinical trials. Many new products do not make it past this initial testing phase. In the UK, approval for the next stage of clinical trial is required from the Medicines and Healthcare products Regulatory agency (MHRA). If they consider that enough preliminary research has been conducted, they will allow closely controlled testing on healthy volunteers. Many products do not make it through this stage either, because they turn out to be ineffective, have safety concerns or unacceptable side effects. Those that do get through can be trialled on a larger section of the population. In England and Wales, these new products need to be recommended by the National Institute of Health and Care Excellence (NICE) to allow prescribers to have access to them on the NHS. The decision to allow access depends on the determined benefit to the general population. Prescribing guidelines are then based on the best available evidence to ensure safe and effective care. This is known as clinical effectiveness and once this is established, cost effectiveness is considered. Finally, many countries, including the UK, will require pharmacovigilance, the surveillance of the new products, to monitor the medicine once it is in general use (see Chapter 4).

As well as new medications, trials can be undertaken with current licensed medications to discover new benefits. During the pandemic, research such as the Recovery trial tested a range of already licensed medications for the treatment of COVID-19. Certain drugs such as dexamethasone were found to reduce deaths by 30 per cent in patients with severe illness (Recovery, 2020). This treatment has now been embedded in NICE clinical guidelines for treating COVID-19 (NICE, 2022).

Innovative medicine delivery and diagnostic systems

As well as new medicines, innovative approaches to treatment delivery mechanisms are being investigated. For example, the Massachusetts Institute of Technology (MIT) have developed a pill coated with many tiny needles that could be used to inject medicines like insulin and antibiotics into the lining of the stomach or small intestine. They are also researching the possibility of electronic pills which can release drugs in response to smart phone commands (MIT, 2021). Additionally, a clinical trial has been exploring whether the Cytosponge TFF3, a sponge on a string pill test can help detect early signs of Barrett's oesophageal cancer. Results have shown that this quick and easy to use pill can detect 10 times the amount of abnormalities in comparison to treatment as usual (NIHR, 2022). These experimental but innovative means of aiding diagnosis and delivering medicines to service users with long-term conditions offer a range of opportunities for better medicine management and optimisation. They are aligned to the WHO's commitment to virtual interventions, the increase of self-care and self-testing innovations (WHO, 2022).

Genomics

It has been known for some time that genetic factors play a role in our individual health. The human genome, our DNA within our 23 chromosome pairs, defines how we develop, maintain homeostasis and ultimately defines our differences from one another. By investigating and sequencing DNA, known as the science of **genomics**, it is possible to identify individuals at risk from specific disease processes. Early diagnosis in this way allows

individuals to make lifestyle changes which may prevent disease or lessen its impact, lead to more effective prescription medicines and focussed health interventions. Statins, also known as HMG-CoA reductase inhibitors, as an example, could lower serum lipids and reduce illness and mortality in those who are at risk of cardiovascular disease. This is a further WHO (2022) innovation commitment. They have advocated a range of tools and funding processes to make genomic technology more affordable for less-resourced countries so that all may benefit.

Artificial intelligence

The NHS Long Term Plan outlined its vision for the future of the NHS, drawing on innovations in technology to enhance all aspects of service provision (NHS England, 2019b). A National Artificial Intelligence lab was created to look at ways of using technology to improve healthcare through enhancing screening processes, developing algorithms to improve patient safety and using digital tools to assist with diagnosis and treatment. In 2022, the WHO and the International Digital Health and AI Research Collaborative (I-DAIR) have signed a memorandum of understanding outlining their joint efforts to advance the use of digital technologies globally.

The use of smart devices for health benefits is a growing phenomenon. Artificial intelligence (AI) allows healthcare professions to create models of care from anonymised clinical data obtained from smart devices worn by service users to inform treatment regimens. Public Health England (PHE) and the NHS have through the UK Biobank, been able to build a record of data from volunteers to plan both targeted public health messages and to begin to inform policy (DHSS, 2019a). There are challenges that will need to be overcome to optimise these innovations. This includes developing the current technological infrastructure to enable digital capabilities, such as having integrated digital care records across all settings as well as ensuring new technology complies with data protection and privacy regulations (see Chapter 1).

Amongst the innovations within this area is the potential to use these strategies to promote self-management and healthy lifestyles.

Supporting healthy lifestyle choices

As a nursing associate you will be aware of the impact lifestyle has on your patients' health. With both the choices service users make and the environmental and economic factors affecting their health and wellbeing. Poor lifestyle choices and circumstances represent one of the largest challenges to health in developed countries and we will briefly explore some of the main opportunities for intervention next.

Smoking cessation

Smoking has a well-known impact on the respiratory and other body systems. Nicotine dependence is the most common drug dependence in the UK and the biggest cause of avoidable premature deaths (DHSS, 2019a). The use of health promotion education and supportive cessation products, including medications like nicotine replacement patches are essential to assist smokers to quit. Additionally, e-cigarettes, as an alternative, are being assessed as a way to deliver nicotine as a safer alternative to tobacco smoking (Independent Committee on Toxicity, 2017; PHE, 2019). There are also claims that heated tobacco products could be less harmful than smoking and help smokers quit. The DH (2019a) still recommend that smokers quit rather than moving onto e-cigarette or heated tobacco products.

Maintaining a healthy weight

Obesity, as a result of poor lifestyle choices is well recognised as a challenge for current and future healthcare services. Only a third of adults in UK are a healthy weight with 1 in 3 children aged 10–11 overweight. Obese children we know are 5 times more likely to become obese adults (DHSS, 2019a) and this reduces life expectancy by average of 9 years (PHE, 2017).

Medication can be used in combination with lifestyle advice. In 2023, NICE recommended a weight-loss drug be made available in specialist NHS services (TA875). This once-a-week injection from a pre-filled syringe containing semaglutide has been shown to suppresses appetite (NICE, 2023).

Social prescribing

As a non-pharmacological treatment, social prescribing can be utilised with referral to ‘activities’ or services in the community instead of offering only medical solutions. Social prescribing is being recognised as a way of reducing polypharmacy (DHSS, 2019a; RPS, 2013) and can complement or replace pharmacological treatments. Otherwise it is acknowledged that the NHS will continue to be treating the symptoms of problems rather than addressing the causes.

Reducing alcohol consumption

High alcohol consumption has a known impact on physical health and associated psychological and sociological effects (DHSS, 2019a). Abstinence with supportive counselling can be helped by medication, such as disulfiram, which inhibits removal of alcohol metabolites inducing the unpleasant effects of sweating, nausea and vomiting. Replacement of thiamine (vitamin B1) may be required additionally as alcohol inhibits its uptake from the GI tract. Benzodiazepines maybe required to prevent seizure associated with alcohol withdrawal.

Maintaining mental health

Additionally, one of the developing challenges for modern healthcare is the recognition that mental health must be given equal priority to physical health (NHS England, 2018). This ‘Parity of esteem’ was enshrined in UK law in 2012 and demands equal access, availability and resources for both physical and mental health services. Social prescribing is one way in which services are addressing this.

Addressing inequality of health outcomes

There are a number of service user groups who have poorer outcomes when engaging with services and this has been identified as a key challenge for modern healthcare globally.

Refugees and migrants

Displacement is known to be a key factor in health and wellbeing and poorer health outcomes are apparent in migrant and refugee populations (WHO, 2022).

Gender

Gender norms, roles and relations impact on health-related behaviours and outcomes. Appropriate health sector responses are key. The Global action for Trans Equality (GATE) recognises the vulnerability of marginalised individuals to Human Immunological Virus (HIV), viral hepatitis and sexually transmitted diseases (WHO, 2022). Global health strategies are required to ensure equality of access to diagnosis and treatments.

Learning disability

Individuals who are unable to communicate effectively are at greater risk of poor health service outcomes. As a nursing associate you have a moral, ethical and professional obligation to advocate for all individuals (NMC, 2018b). A number of tools and resources are available to assist in assessment of specific issues. People with learning disability are four times more likely to be suffering from a mental illness, for example, and require tailored medication responses. They are also prone to syndromes associated with difficult to control seizures (Gates et al, 2015).

Consider for a moment, Jacob in the case study, he may not fully understand the implications of his mother's illness and may need additional support around this time. An advanced care plan can include the needs of family members as well as documentation of conversations around end-of-life planning, preferences and wishes.

Understanding the theory: Medicine management in the modern age

While the complete understanding of the challenges and opportunities for healthcare may seem complex when you first consider it, it will be something you have been aware of already in your daily practice. You have cared for service users in line with up-to-date organisation's policies. You will have discussed the political agenda and new healthcare discoveries and been aware of recent changes in healthcare provision. In addition, you will be familiar with the general feelings towards health and healthcare within the population, printed and social media. All of these will have acknowledged some of the current challenges and opportunities within healthcare and medicine management. We all encounter these opportunities and threats within our daily practice which will evolve over time as will our responses to them. The use of evidence-based organisational policies and having an awareness of healthcare-related media coverage and the current political agenda and how these impact on healthcare provision allow us to deliver the highest standards of care. Anyone working within modern healthcare is familiar with change, its impact on the service user and the need to keep up to date. This is an example of you putting the theory into practice.

Now that you have explored and recognised some of the challenges and opportunities within modern healthcare, take some time to reflect on what you have learnt which will additionally allow you to apply to it your practice. Activity 6.5 will help you with this.

Activity 6.5 Critical thinking

1. List some of the opportunities available for improved medicines management.
2. Explain your role in assisting service users to choose pharmaceutical and non-pharmaceutical therapies for symptom management.
3. Give some examples of lifestyle choices which may affect health and medicines management.
4. How do you define sepsis and how would you respond as a nursing associate?
5. Write down at least 3 ways you can be an antibiotic guardian within your everyday practice.

There are no sample answers to these questions.

Where you are not confident in your knowledge of a topic, you may find it necessary to re-read sections of this chapter or view the further reading and websites listed at the end of this chapter to assist you. Information for Question 1 can be found in the first section of this chapter. Question 2 in the complementary and alternative therapies section, question 3 in the lifestyle and implications for health table, question 4 and 5 in the last section of this chapter exploring some of the challenges for modern healthcare.

Chapter summary

You have discovered from this chapter that medicine management in the modern age needs to address some of the contemporary health concerns and threats to our population's health and embrace the opportunities for innovation in healthcare. This chapter has outlined some of those opportunities including new medicine development, the use of technology, AI and precision medicine. This chapter has outlined complementary therapies and has discussed some of the commonly encountered symptoms for your service users. In addition, the challenges associated with antibiotic resistance and stewardship have been explored and sepsis defined. Other challenges including immunisation hesitancy, drug misuse and the effect of poor lifestyle choices have been examined. Finally, the need to be aware of the current political agenda has been highlighted. The activities within this chapter asked you to reflect on your knowledge of commonly encountered symptoms and to consider the medicinal, alternative and innovative therapies to alleviate distress which you have observed in use. In addition to demonstrate your understanding of sepsis and your role in recognising and treating this life-threatening condition.

Activities brief outline answers

Activity 6.1: Critical thinking

Consider what some of Silvi's biopsychosocial needs are, what assessments can you utilise and what potential interventions may be needed to address her current symptoms and presenting complaints?

- A range of pain assessments – analgesics, non-pharmacological pain interventions such as CAMs, social prescribing
- Assessment of nausea and vomiting – antiemetics, peppermint water, CAMs
- Medication review
- Vital signs
- Mental health assessment – antidepressants, talking therapies or a combination
- Social support including the children and how they are coping – social prescribing
- Consideration of financial implications – social prescribing
- Mobility assessment – mobility aids, rehabilitation, physiotherapy, CAMs, social prescribing
- Nutritional status – supplements
- Conversations around end-of-life (EOL) care decisions, legalities including DNAR and power of attorney and documenting wishes and preferences in EOL
- Silvi and her family need a holistic assessment of their needs, including consideration of wider social, financial, cultural and psychological factors (GSF, 2022). Advanced care planning is one way of enabling personalised care that is tailored to the individual, enabling them to have control and choice over their own care.

Now that you have had a chance to reflect on how opportunities and challenges impact you in practice, you can see from the following summary that you have in fact explored a large amount of theory and been able to link this to your own practice.

Further reading

The following books are recommended for this chapter.

Ashelford, S, Raynsford, J and Taylor, V (2024) *Pathophysiology and Pharmacology for Nursing Students* (3rd edn). London: SAGE.

This textbook introduces the core concepts of key pathophysiological processes useful for the further understanding of symptom management. Chapter 2 explains the way the body responds to injury and infection; Chapter 3 informs the reader of the main infectious micro-organisms; Chapters 6 and 7 focus on pain and nausea, and vomiting mechanisms.

Levy, M, Evans, L and Rhodes, A (2018) The Surviving Sepsis campaign bundle: 2018 update. *Intensive Care Medicine*, 44(6): 925–8.

This article explores the evidence behind the Sepsis Six bundle and explains the rationale behind the assessments, treatment and necessity of a timely response when sepsis is suspected.

Neal, MJ (2020) *Medical Pharmacology at a Glance* (9th edn). Chichester: Wiley Blackwell.

This illustrated text written for medical students offers a concise introduction to medicines pharmacology and includes examples of commonly prescribed treatments with mechanisms of action and cautionary advice.

Spires, A and O'Brien, M (2011) *Introduction to Medicines Management in Nursing*. Exeter: Learning Matters.

Chapter 4 offers alternative approaches to medicines in nursing and describes the history of CAMs, an overview of some regularly encountered techniques, as well as explores factors that affect patient choice. Chapter 6 examines medicines management in field-specific care environments and is useful to further explore symptom management.

Useful websites

The following websites are resources to aid your understanding.

BNF Publications: www.bnf.org

This website allows you to search for specific medicine information and guides for symptom management.

National Institute for Health and Clinical Excellence: www.nice.org.uk

The NICE (2019b) guidance includes information on treatment options for service users with anxiety and depression, NICE (2018) guidance on dementia care and NICE (2018) the impact of antimicrobial resistance.

Specialist Pharmacy Service: www.sps.nhs.uk/

This website offers professional medicines advice, including antimicrobial resistance networks.

The UK Sepsis Trust: <https://sepsistrust.org/https://sepsistrust.org/wp-content/uploads/2020/01/Sepsis-Acute-12-1.3.pdf>

The UK Sepsis Trust exists as a resource to stop preventable deaths and support those affected. Includes guidance treatment pathways for in-patient and community settings. The Sepsis Trust has recently updated their screening tool and clinical guidance, which is a very useful resource for both trainee nursing associates and qualified staff to ensure safe and timely care for patients with suspected sepsis.

Antibiotic Guardian: <https://antibioticguardian.com/>

This is a Public Health England campaign that started in 2014 to raise awareness about the growing public health problem of antibiotic resistance. There are quizzes and crosswords to test your knowledge in this area as well as leaflets for healthcare professionals and the general public on how to tackle this global issue.

Health Matters: Antimicrobial resistance (Public Health England, 2015): www.gov.uk/government/publications/health-matters-antimicrobial-resistance/health-matters-antimicrobial-resistance

Health Matters: Antimicrobial resistance (Public Health England, 2015) provides an overview of this growing problem and how we all have a role in reducing antimicrobial resistance. This document signposts to other useful resources and where to get further information.

Royal College of Nursing: www.rcn.org.uk/clinical-topics/public-health/self-care/social-prescribing

A Royal College of Nursing resource explaining what social prescribing is, how it works and examples of where it is making a positive impact on communities.

Healthy Homes. Accommodating an Ageing Population: <http://allcatsrgrey.org.uk/wp/download/housing/imeche-healthy-homes-report.pdf?platform=hootsuite>

An interesting read about the use of artificial intelligence in our service users' homes to assist with monitoring safety, and to optimise health and maintain independence, particularly in the older population.

Genomics England: <https://www.genomicsengland.co.uk/>

A UK genomics database that is gathering genomic sequencing information to inform NHS care and practices.

National Institute of Healthcare Research: <https://www.nihr.ac.uk/>

Improving the health of the nation through health and social care research. Discover new and current clinical trials and how this research is informing and improving practice.

Social Prescribing around the World: <https://socialprescribingacademy.org.uk/media/1yeo ktid/social-prescribing-around-the-world.pdf>

This document outlines social prescribing developments and innovations across the world to improve health and wellbeing.