E-Learning Module N:
Pharmacological Review

This Module requires the learner to have read Chapter 13 of the Fundamentals Program Guide and the other required readings associated with the topic.

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Please reference as follows:

GETTING STARTED

This e-Learning Module has been designed to consolidate key concepts from the required readings and provide an opportunity to begin applying these concepts through self-directed reflection, in preparation for the coaching sessions.
GETTING STARTED

In this module you will review the content highlights associated with Chapter 13 to prepare you for the coaching session.

It will be best if you have read Chapter 13 in advance and have the Program Guide with associated tools available for reference.

You may be prompted to write down your thoughts or ideas during this module. You can do so in the ‘notes’ section at the end of Chapter 13 in your Program Guide. These questions will be used by the CAPCE Coach to guide discussion during your final coaching session.
TOPICS COVERED

✓ The Nurse’s Role
✓ Understanding the Principles of Pharmacology
✓ Understanding the Principles of Pharmacology: Pharmacokinetics
✓ Basic Principles of Symptom Management
✓ Choosing Appropriate Analgesics: The WHO Ladder
✓ Short-Acting Opioid Formulations
✓ Long-Acting Opioid Formulations
✓ Routes of Opioid Administration
✓ Tolerance, Physical Dependence and Addiction
THE NURSE’S ROLE

The College of Nurses of Ontario Medication Standards for RN’s and RPN’s provides nursing standards to ensure the safe, effective and ethical administration of medications. The application of these standards requires knowledge, technical skills and judgment.

Critical thinking skills are an essential competency for nurses in ensuring effective management of symptoms.

The nurse’s assessment of whether a certain medication is providing a beneficial effect on the person’s pain or any other distressing symptom is essential to facilitating a positive change in the illness experience.
UNDERSTANDING THE PRINCIPLES OF PHARMACOLOGY

Knowledge and understanding of the basic principles of pharmacology are essential components of nursing practice that will ensure safe practice.

Pharmacology refers to the study of drug actions within the body. It is important for the nurse to understand and assess for the benefits and harm that drugs may do to the body.
UNDERSTANDING THE PRINCIPLES OF PHARMACOLOGY: PHARMACOKINETICS

Pharmacokinetics (what the body does with a drug) can be broken down into four phases:

1. Absorption: the movement of the medication into the bloodstream
2. Distribution: the movement of the medication from the bloodstream into the cells
3. Metabolism: the breakdown of the medication into the by products also known as metabolites
4. Excretion: the way the body disposes of the metabolites
UNDERSTANDING THE PRINCIPLES OF PHARMACOLOGY: PHARMACOKINETICS

Understanding the following pharmacological properties will enable the nurse to use opioid analgesics effectively for pain management.

**Drug half-life:** The time it takes for half of the drug to be metabolized and eliminated from the body.

**Steady state:** The time it takes for the drug to be absorbed into the blood stream, distributed to the cells, metabolized and then excreted via the kidneys or the bowel.
UNDERSTANDING THE PRINCIPLES OF PHARMACOLOGY: PHARMACOKINETICS

For example, the half-life (the time it takes for ½ of the drug to be excreted) of oral morphine is approximately 4 hours. It takes about 20 hours (roughly 1 day) or 5 half-lives for the morphine to reach steady state (the time it takes for the drug to go through the process of absorption, distribution, metabolism and excretion). This will take even longer in a person with compromised kidney or liver function.

- Think about half-life and steady state. Why is this important? Write down some of your thoughts.
Understanding the pharmacokinetics of an opioid is important.

It takes approximately one day for an oral or parental opioid to reach steady state, and at least another day to assess its efficacy at steady state. After this the drug dose increases are usually made at a minimum of every 2 to 3 days.

Note that Methadone takes approximately 4 – 5 days to reach steady state and fentanyl transdermal takes about 72 hours to achieve steady state.
BASIC PRINCIPLES OF SYMPTOM MANAGEMENT

The Program Guide outlines the basic principles of symptom management.

- In your current role, write down three challenges you experience as it relates to applying these principles to persons in your care.
CHOOSING APPROPRIATE ANALGESICS: 
THE WHO LADDER

Pain is a common symptom requiring pharmacological intervention. Pain is screened using the ESAS-r. The OPQRSTUV acronym supports further assessment once pain is identified as an issue.

One way to consider what is the appropriate analgesic is to use the World Health Organization (WHO) Ladder in your Program Guide.
CHOOSING APPROPRIATE ANALGESICS: THE WHO LADDER

Step 1: If a person rates his or her pain as mild, the WHO recommends the use of non-opioid analgesics such as Aspirin, acetaminophen and non-steroidal anti-inflammatory (NSAIDs).

Keep in mind that the non-opioid analgesics that characterize Step 1 all have a great risk of severe adverse side effects. For example GI toxicity is a severe side effect with the use of NSAIDs.
CHOOSING APPROPRIATE ANALGESICS: 
THE WHO LADDER 

Step 2: If person’s pain is rated as moderate or the analgesics in Step 1 have not had a beneficial effect, the WHO recommends the use of weak opioids such as codeine and tramadol.

Codeine combinations such as Tylenol #3 have a ceiling dose due to the acetaminophen component of the drug. Codeine is not metabolized as an analgesic in some of the population so this may be why you might hear a person say, “Codeine does nothing for me”.
CHOOSING APPROPRIATE ANALGESICS: THE WHO LADDER

Step 3: If the person’s pain is rated as severe or not responsive to the analgesics in Step 2, the use of strong opioids such as morphine, hydromorphone, oxycodone, fentanyl or methadone are recommended.

Opioid analgesics are used to treat acute and chronic pain as well as malignant and non-malignant pain.
CHOOSING APPROPRIATE ANALGESICS:
THE WHO LADDER

At each of the 3 steps of the WHO Ladder, the selection of specific adjuvants (drug enhancing agents) should be considered depending on the specific type of pain. For example, neuropathic pain is not totally opioid sensitive so an anticonvulsant drug such as gabapentin could be used as an adjuvant to the opioid.
SHORT-ACTING OPIOID FORMULATIONS

Most opioids are available in both short-acting (IR) and long-acting (LA) or sustained release formulations.

Short-acting or immediate release opioids are generally taken every 4 hours. They are recommended when:

✓ Starting an opioid-naïve person on an opioid regime
✓ Pain is unstable and not well managed
✓ An opioid switch is indicated

Short-acting formulations are also used to manage break-through pain.
SHORT-ACTING OPIOID FORMULATIONS

A variety of short-acting formulations are available; they are:

▪ Morphine or Statex
▪ Codeine (plus codeine combinations such as Tylenol 1, 2, 3, 4 or AC&C 15, 30)
▪ Hydromorphone or Dilaudid
▪ Oxycodone
▪ Oxycodone & Acetaminphen combinations such as Percocet, Oxycocet, Endocet
▪ Oxycodone & ASA combinations such as Percodan, Oxycodan, Endodan, Supeudol (oxycodone suppositories)
LONG-ACTING OPIOID FORMULATIONS

Most long-acting (LA), sustained or controlled release formulations are administered every 12 hours; however some formulations are now available as a 24-hour release formulation (e.g. long-acting morphine called Kadian).

Long-acting formulations are designed to be swallowed whole to prevent rapid absorption. The exception to this is the long-acting morphine known as M-Eslon or Kadian. It is in capsule form and can be pulled apart so that granules can be placed in food.

This means that it is safe to administer a short-acting breakthrough dose simultaneously with the long-acting dose of the opioid.
LONG-ACTING OPIOID FORMULATIONS

There are numerous long-acting (LA) formulations of the various opioids. Examples of these are:

- MS Contin, M-Eslon, and Kadian are long-acting morphine formulations
- HydromorphContin is a long-acting hydromorphone formulation
- OxyNeo is a long-acting oxycodone formulation
The routes of administration will affect the rate of absorption into the blood stream, metabolism (i.e. the breakdown of the medication into the byproducts), and the excretion of the medication.

The Program Guide describes the various routes of administration of opioids.

- Review the routes described and document the routes of administration used most frequently in your practice. Provide a rationale for why these routes are chosen.
ROUTES OF OPIOID ADMINISTRATION

When an opioid is given orally, per rectum or per feeding tube the following occurs:

1. The opioid is absorbed into blood supply of GI tract
2. It goes to the liver via the portal vein, where it is metabolized. In this process $\frac{1}{2}$ of the analgesic affect of the opioid is lost
3. The amount of drug actually available as an analgesic is called bio-availability
4. This is called the process of First Pass

Why is this important to understand?
When considering routes of administration, it's important to understand that an opioid given by parenteral route (IV or SC) does not undergo first pass through the liver. Therefore an opioid given by SC injection or per IV should be calculated as ½ the oral/rectal route.
What is wrong with the following order?

Hydromorphone 4 mg PO or SC q4hr

☐ Record your answer in your notes.
TOLERANCE, PHYSICAL DEPENDENCE AND ADDICTION

When implementing a pain management regime using opioids, the nurse has a responsibility to be able to distinguish the difference between tolerance, physical dependence and addiction.
TOLERANCE, PHYSICAL DEPENDENCE AND ADDICTION

Tolerance: This is a normal physiological response when opioids have been used over an extended period of time in which increasing doses of the drug are required to produce the same level of analgesia. Significant tolerance is uncommon and the need for increasing doses is often related to disease progression.
TOLERANCE, PHYSICAL DEPENDENCE AND ADDICTION

Physical Dependence: This is a normal physiological response to long-term opioid therapy that manifests withdrawal symptoms when the opioid is stopped abruptly or if the dose is significantly reduced. The withdrawal symptoms are characterized by any of the following: nausea, vomiting, sweating, anxiety, agitation.
Addiction: This is a pathological response characterized by a compulsion to take a drug despite harm and for a psychic effect. The majority of people taking opioids for pain management will not be addicted provided the appropriate doses are used to treat physical pain.
BRINGING IT TOGETHER

The information provided in this e-Learning Module and your Program Guide is an introduction to some of the components of pain management.

The role of the nurse is to advocate for change in treatment plan when pain relief is inadequate. Knowledge and understanding of pain assessment, possible interventions, both pharmacological and non-pharmacological and expected outcomes of various treatment options are essential components of nursing practice.
WHAT HAPPENS NEXT

This concludes the e-Learning Modules for the Fundamentals Enhanced program. You will have an opportunity to apply what you have learned at the final Coaching Session.