1.9: Examining Effect

Onset, Peak, and Duration

Dosing considerations play an important role in understanding the effect that a medication may have on a patient. During administration, the nurse must pay close attention to the desired effect and therapeutic patient response, as well as the safe dose range for any medication. The nurse should have an understanding of medication **efficacy** in order to ensure its appropriateness. If a nurse is provided different medication choices according to a provider’s written protocol, the nurse should select the option with the anticipated desired therapeutic response. Additionally, the nurse must be aware of the overall **dose-response** based on the dosage selected.

Three additional principles related to the effect of a medication on a patient are onset, peak, and duration.

**Onset**: the onset of medication refers to when the medication first begins to take effect

**Peak**: the peak of medication refers to the maximum concentration of medication in the body, and the patient shows evidence of greatest therapeutic effect

**Duration**: the duration of medication refers to the length of time the medication produces its desired therapeutic effect

Consider this patient care example and apply the principles of onset, peak, and duration: A 67-year-old female post-operative patient rings the call light to request medication for pain related to the hip replacement procedure she had earlier that day. She notes her pain is “excruciating, a definite 9 out of 10.” Her brow is furrowed, and she is grimacing in obvious discomfort. As the nurse providing care for the patient, you examine her post-operative medication orders and consider the pain medication options available to you. In reviewing the various options, it is important to consider how quickly a medication will work (onset), when the medication will reach maximum effectiveness (peak), and how long the
pain relief will last (duration). Understanding these principles is important in effectively relieving the patient’s pain and constructing an overall plan of care.

**Critical Thinking Activities 1.9**

1. At 0500, your patient who had a total knee replacement yesterday rates his pain while walking as 7 out of 10. Physical therapy is scheduled at 0900. The patient has acetaminophen (Tylenol) 625 mg ordered every four hours as needed for discomfort. What should you consider in relation to the administration and timing of the patient’s pain medication?

2. Your patient is prescribed NPH insulin to be given at breakfast and supper. As a student nurse, you know that insulin is used to decrease blood sugar levels in patients with diabetes mellitus. During report, you hear that the patient has been ill with GI upset during the night, and the nursing assistant just informed you he refused his breakfast tray. While reviewing this medication order, you consider the purpose of the medication and information related to the medication’s onset, peak, and duration. When reviewing the drug reference, you find the NPH insulin has an onset of about 1 – 3 hours after medication administration. What should you consider in relation to the administration and timing of the patient’s insulin?

Note: Answers to the Critical Thinking activities can be found in the “Answer Key” sections at the end of the book.

**Duration and Dosing**

Now let’s consider the implication of duration and dosing. Remember the duration of medication is correlated with the elimination. If a medication has a short half-life (and thus eliminated more quickly from the body), the therapeutic effect is shorter. These medications may require repeated dosing throughout the day in order to achieve steady blood levels of active free drug and a sustained therapeutic effect. Other medications have a longer half-life (and thus longer therapeutic duration) and are only given once or twice per day. For example, oxycodone immediate release is prescribed every 4 to 6 hours for the therapeutic effect of immediate relief of severe pain, whereas oxycodone ER (extended release) is prescribed every 12 hours for the therapeutic effect of sustained relief of severe pain.