CHAPTER 7

Patient-Controlled Analgesia and Neuraxial Opioid Therapy

INTRODUCTION

In this chapter, we will explore more advanced methods of treating pain—specifically, PCA and neuraxial (epidural, IT) opioid administration. Much of neuraxial opioid administration comes under the purview of a specialist such as an anesthesiologist, but practitioners "in the trenches" often inherit patients receiving these therapies and need an understanding of them.

OBJECTIVES

After reading this chapter and completing all practice problems, the participant will be able to:

1. Calculate, monitor, and adjust patient-controlled analgesia (PCA) opioid therapy for acute and chronic pain management, with and without a continuous opioid infusion.
2. Convert a patient between parenteral PCA therapy and an oral opioid regimen.
3. Using the limited evidence available, recommend a conservative strategy to convert a patient between epidural or intrathecal (IT) opioid therapy and other opioid regimens.

PATIENT-CONTROLLED ANALGESIA

Patient-controlled analgesia is a precise and convenient method of providing opioid therapy to patients with moderate-to-severe acute or chronic pain. The convenience aspect is the patient's ability to decide when he or she needs a dose of opioid, without having to rely on the nurse to administer it. A PCA system uses a computerized pump that has a syringe, cartridge, or infusion bag that contains the opioid, which may be secured (locked) inside the pump. The PCA pump can be configured in different ways (with or without a continuous infusion of opioid), but it generally has the capability for a patient to self-administer a small dose of opioid frequently. When we say a *small dose*, this means relative to an "every 4 hours" dose.[1]

There are several features that you need to be familiar with regarding PCA pumps. Pump nomenclature differs among manufacturers, but all have the capability for the following:

- The pump needs to be programmed for the drug concentration in the cartridge, syringe, or infusion bag. In other words, we tell the pump what volume is available for infusion or bolus dosing, and the concentration of the opioid solution (e.g., mg/mL).
- We must also program the rate of the continuous opioid infusion, if applicable; the PCA bolus dose (the amount of drug the patient receives when the bolus button is pushed); the delay interval, also known as the lockout period (the period of

time during which no additional bolus doses will be administered despite the patient pushing the demand bolus dose button); and the 1- or 4-hour limit (the total amount of opioid the patient can receive in 1 or 4 hour(s) by PCA bolus plus basal infusion).

- We can also retrieve historical information from the PCA pump, including the number of PCA bolus attempts the patient has made, the number of PCA bolus doses given, the volume given, and the volume remaining in the syringe, cartridge, or infusion bag.

Wow—that sounds complicated! While it's not rocket science, it can get confusing, and PCA pump therapy is an error-prone, high-risk source of medication errors.

PCA therapy is usually administered via intravenous (IV) infusion, but it can be administered via subcutaneous (sub-Q) or epidural routes, as well. Let's first consider the use of PCA therapy post-operatively using the sub-Q or IV route of administration.[1]

PATIENT-CONTROLLED ANALGESIA POST-OPERATIVELY

Although PCA therapy has been shown to be beneficial for acute pain (postoperatively and other) and chronic pain (cancer and noncancer), we must ensure the patient is an acceptable candidate. Patients must have sufficient cognitive functioning to use the infusion pump. For example, children who are 7 years or older are likely to be successful with PCA therapy, and in some cases, children as young as 5 years old are appropriate candidates.[2] Advanced age is not a contraindication if the patient has adequate cognitive functioning. Patients who do not understand how to activate the PCA demand bolus would not be good candidates. Patients with comorbid conditions that increase the risk of respiratory depression may not be good candidates, such as those with obstructive sleep apnea and/or obesity. Some institutions use the *STOP-BANG* questionnaire (which evaluates several patient variables including **s**noring, **t**ired, **o**bserved (apnea during sleep), blood **p**ressure, **B**MI (body mass index), **a**ge, **n**eck circumference, and **g**ender).[3] Risk assessment may help respiratory therapists and pulmonologists determine precautions such as breathing assistance.[4] Chronic obstructive pulmonary disease, hypoxemia, head injury, or respiratory failure are also risk factors for therapeutic misadventure with PCA therapy.[1,2,4] Underlying renal or hepatic impairment may result in opioid accumulation, increasing the risk of respiratory depression.

Most patients who receive PCA therapy postoperatively are opioid-naïve. In opioid-naïve persons, generally practitioners use standardized dosing unless there is a compelling clinical reason to use a different dosing strategy. For example, standard orders are typically for 1 mg of morphine or its equivalent (0.2 mg hydromorphone or 20 mcg fentanyl) every 10 minutes (8 minutes for fentanyl) (see Table 7-1).[2,5,6] These doses should be reduced for frail or elderly patients, patients with less than severe pain, or patients at high risk for respiratory depression. When beginning PCA therapy in the immediate postoperative period, the patient will likely be in pain. In this case, the clinician (e.g., recovery room nurse or anesthesiologist) would administer one or more loading doses (a *clinician loading dose*) of the opioid to get the patient comfortable. This may be given every 10 minutes