Pain associated with surgery to the chest (e.g., repair of congenital heart defects, chest trauma) or abdominal regions (e.g., appendectomy, cholecystectomy, splenectomy) may result in pulmonary complications. Pain leads to decreased muscle movement in the thorax and abdominal area and leads to decreased tidal volume, vital capacity, functional residual capacity, and alveolar ventilation. The patient is unable to cough and clear secretions, and the risk for complications (such as, pneumonia and atelectasis) is high. Severe postoperative pain also results in sympathetic overactivity that leads to increases in heart rate, peripheral resistance, blood pressure, and cardiac output. The patient eventually experiences an increase in cardiac demand and myocardial oxygen consumption and a decrease in oxygen delivery to the tissues.

The basis for good postoperative pain control in children is preemptive analgesia (Michelet, Andreu-Gallien, Bensalah, et al, 2012). Preemptive analgesia involves administration of medications (e.g., local and regional anesthetics, analgesics) before the child experiences the pain or before surgery is performed so that the sensory activation and changes in the pain pathways of the peripheral and central nervous system can be controlled. Preemptive analgesia lowers postoperative pain, lowers analgesic requirement, lowers hospital stay, lowers complications after surgery, and minimizes the risks for peripheral and central nervous system sensitization that can lead to persistent pain.

A combination of medications (multimodal or balanced analgesia) is used for postoperative pain and may include NSAIDs, local anesthetics, nonopioids, and opioid analgesics to achieve optimum relief and minimize side effects. Opioids (see Tables 5-5 to 5-7) administered ATC during the first 48 hours or administered via PCA are commonly prescribed (see Table 5-8). Perioperative NSAID administration is shown to reduce opioid consumption and postoperative nausea and vomiting in children (Michelet, Andreu-Gallien, Bensala, et al, 2012). Scheduled acetaminophen is supported as the preferred medication in children after tonsillectomy; codeine is not recommended due to the risk of children who may experience ultra-rapid metabolizers caused by abnormal function of the CYP2D6 enzyme (Yellon, Kenna, Cladis, et al, 2014).