Letters

Maximum daily dose of hydrocodone

Opioid analgesics are a well-established treatment for acute and chronic cancer-related pain, end-of-life care, and chronic noncancer-related pain.[1] Because of intrapatient variability in physical dependence, opioid tolerance, subjectivity of pain, and biopsychosocial influences, exact opioid dosing with consistently accurate equivalency tables (for conversion among opioids) are lacking. Accordingly, opioids have no well-defined maximum dosage to achieve appropriate therapeutic benefit. Dosage escalation is commonly used until adequate pain relief is achieved or adverse effects preclude further escalation. One panel has stated that a "reasonable definition for high dose opioid therapy is >200 mg daily of oral morphine [sulfate] (or equivalent), based on maximum opioid doses studied in randomized trials,"[1] yet certain resources list 60 mg as a maximum daily dose of hydrocodone bitartrate.[2,3] This communication examines existing conflicts among hydrocodone-dosing references and clarifies how to transition patients to or from hydrocodone therapy. Defining a maximum daily dose of hydrocodone does not take into account the fact that all hydrocodone products marketed in the United States contain other drugs, such as acetaminophen, ibuprofen, or atropine alkaloids. Suppose a surgical patient has been receiving extended-release morphine sulfate tablets at a dosage of 60 mg three times a day for chronic low back pain. Postoperatively, the neurosurgeon prescribes tablets containing hydrocodone bitartrate 10 mg and acetaminophen 325 mg at a dosage of two tablets four times a day, with a maximum daily dose of eight tablets. The dispensing pharmacist might question the appropriateness of this prescription because some sources list the maximum daily hydrocodone bitartrate dose as 60 mg. In this example, the daily dose of acetaminophen is well within acceptable dosage limits.

The most commonly prescribed short-acting opioids share nearly identical pharmacokinetic profiles.[4,5] Oxycodone shares a dehydroxylated phenanthrene structure with hydrocodone and has a similar adverse-effect profile. Oxycodone's dosage corresponds well with hydrocodone's, making it an appropriate choice for dosage comparison. Oxycodone is available in combination with acetaminophen, as a single drug in an immediate-release formulation, and in an 80-mg extended-release tablet. The availability of that 80-mg tablet suggests that the maximum limits placed on hydrocodone are not reasonable.

Although many of the commonly prescribed short-acting opioids have similar properties, they can differ in frequency of prescribing, potency, solubility, and patient preference. In 2008, hydrocodone–acetaminophen products were the second and third most commonly dispensed medications in the United States, while oxycodone–acetaminophen was the 25th most frequently dispensed opioid.[6] Hydrocodone is the only Schedule III opioid not available in the United States as a single agent and is classified as a Schedule II drug only in the pure powder form for extemporaneous compounding. Codeine is available in combination with acetaminophen as a Schedule III medication and commercially available as a Schedule II single agent in tablet and liquid forms. The remaining opioids labeled for analgesia are Schedule II substances, with the exception of propoxyphene and pentazocine, both of which are Schedule III and available without acetaminophen.[2]

Package information for the brand-name hydrocodone–acetaminophen products Lortab,[7] Norco,[8] Vicodin,[9] and their generic counterparts[10] lists the total 24-hour tablet dose not to be exceeded but fail to mention a maximum daily dose of hydrocodone.

Indeed, when the recommended 24 hour dose is calculated, the hydrocodone bitartrate content of these medications

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does not exceed 60 mg; however, there is no evidence to support that hydrocodone bitartrate doses exceeding 60 mg daily is inappropriate. A clear disparity exists in that daily dose limits are not listed for other opioid analgesics, such as oxycodone, hydromorphone, oxymorphone, and morphine. In our experience, drug resources expressing a maximum daily dose of hydrocodone have caused reluctance among pharmacists to fill prescriptions exceeding 60 mg of hydrocodone bitartrate daily.[2,3] After we communicated with representatives of the Clinical Pharmacology online database, they removed from their hydrocodone–acetaminophen monograph a statement specifying 60 mg as a maximum daily dose of hydrocodone bitartrate.

There is no reason to suspect that the maximum daily dose of hydrocodone should be limited any differently than other similar phenanthrene opioids, with the proviso that the products are dosed to effect, patients are monitored for adverse effects, and the dosage does not exceed dosing limitations of the secondary agent, which most often is acetaminophen.

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Characteristics of patients with morbid obesity at an academic medical center

Obesity is an epidemic in the United States, and its associated complications on health and health care utilization have been well described.[1-6] Obese patients are hospitalized longer once admitted to the hospital,[5,7] and morbid obesity is associated with even larger increases in health care utilization.[8]

Caring for morbidly obese patients (body mass index [BMI] of >40 kg/m2) presents many clinical dilemmas, but of particular interest to pharmacists are the implications of morbid obesity on medication administration, use, and dosing. Information in the literature on this inpatient population is limited.

We hypothesized that the hospitalization rate for morbidly obese patients is increasing, particularly among the medically ill (nonsurgical populations), and that the use of medications dosed according to body weight or with narrow therapeutic ranges occurs at a significant rate. We conducted a retrospective evaluation at our academic medical care center to identify trends in hospitalizations among morbidly obese patients in both surgical and nonsurgical populations and to describe the underlying reasons for hospitalization and identify key medication use.

Patients' electronic records from 2002 through 2007 were queried at Barnes-Jewish Hospital in St. Louis, Missouri, a 1200-bed, urban, academic medical center. All adult patients with a BMI of >40 kg/m^2 were included. This study was approved by the Washington University in St. Louis School of Medicine Human Studies Committee, and the requirement for informed consent was waived. Data regarding demographics, admitting service, survival status at discharge, medication use, and associated *International Classification of Diseases, 9th Revision* (*ICD-9*) codes were collected and assessed. Statistical comparisons were conducted using SPSS, version 10.1.3 (SPSS Inc., Chicago, IL), and longitudinal trends were assessed using linear regression. The a priori level of significance was 0.05.

A total of 9508 patients were identified, with a mean ± S.D. weight of 133.8 ± 31.8 kg. BMI was 40–50 kg/m^2 in 64% of patients, 50–60 in 25%, 60–70 in 8%, and >70 in 3% of those identified. The absolute number of patients with morbid obesity increased 39% from 2002 (1272 admissions/year) to 2007 (1768 admissions/year). There was a linear increase in proportion of patients with