



DRUG Watch

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Nursing Information on Acetaminophen Overdosage

Knowing the dangers and new regulations can save lives.

The level of acetaminophen that causes toxicity doesn't differ greatly from the therapeutic dose (a phenomenon referred to as a narrow therapeutic index). The recommended maximum 24-hour dosage of acetaminophen in an adult is 4,000 mg (4 g). Taking the maximum standard adult dose of 650 mg every four hours yields a daily dose of 3,900 mg (3.9 g). According to POISINDEX, a subscription-based compendium of poison control information from Thomson Reuters, more than 150 mg/kg or more than 7.5 g (whichever is less) constitutes a toxic dosage in an adult. In a pediatric patient, toxicity is likely with more than 200 mg/kg or 10 g (whichever is less; the upper limit recommended for children is 10 to 15 mg/kg every four hours, to a maximum of 60 mg/kg per day).

In mild-to-moderate toxicity, according to POISINDEX, the patient may initially exhibit nausea, vomiting, and abdominal pain or even be asymptomatic. Within 24 hours of ingestion of the toxic dose, liver enzymes—which are measured using serum transaminase (alanine aminotransferase and aspartate aminotransferase) levels—will begin to rise and can become markedly elevated (greater than 10,000 international units per liter), even though other signs or symptoms of liver damage may not be evident. Liver enzyme levels generally peak two to three days after ingestion. In cases of severe toxicity from overdosing, so many hepatocytes are damaged that acute liver failure, including coagulopathy and hepatic encephalopathy, will occur. Patients may require liver transplantation as a result of severe acetaminophen toxicity. They may also have renal injury related to the cyclooxygenase-2 inhibitory effects of acetaminophen. A massive overdose (an initial serum concentration greater than 500 micrograms per milliliter) can produce coma, hyperglycemia, and lactic acidosis.

Some patients are more susceptible to acetaminophen overdosage and may experience toxicity after taking doses at or just above the recommended maximum daily limit; patients with alcoholism or preexisting liver disease are especially at risk for acute liver damage from overdosage because their liver function is already compromised.

How acetaminophen overdosage occurs. Most acetaminophen overdosage is unintentional. The use of combination products is especially risky because the amount of acetaminophen they contain may not be clearly displayed on the label. Patients may take more than is recommended of a combination analgesic product in an effort to relieve uncontrolled pain. Patients may also take over-the-counter (OTC) acetaminophen in addition to the prescribed combination narcotic without realizing how much acetaminophen they're consuming or the risks associated with acetaminophen consumption. Many OTC combination products, such as cold preparations, also contain acetaminophen. Early signs of liver damage can resemble flu or cold symptoms, and a patient may continue to take a combination OTC cold product in an effort to treat those symptoms.

Why is the FDA restricting acetaminophen only in prescription products? The answer lies partly in the numbers. Narcotic preparations that contain acetaminophen account for more yearly doses of acetaminophen than single-ingredient OTC products of acetaminophen or OTC combination products containing acetaminophen. Since 1997 hydrocodone with acetaminophen has been the most frequently dispensed prescription, according to the FDA (go to <http://1.usa.gov/GzcSf> for more).

The rest of the answer is more complicated. For most of the population, acetaminophen is safe to use at recommended dosages. However, in cases of accidental overdosage, the result can be deadly. The FDA has been concerned about liver toxicity from acetaminophen use for more than a decade. The FDA's Nonprescription Drugs Advisory Committee has offered recommendations on this matter since 2002. The most recent action taken as a result of those recommendations was in 2009, when the FDA forced manufacturers of OTC products containing acetaminophen to change the products' labels. These changes included highlighting on the packaging in bold type that the product contains acetaminophen, highlighting the maximum safe daily dosage, emphasizing that liver damage (as well as kidney damage) is a risk from excessive dosing, placing the warning that consuming three or more alcoholic drinks per day increases the risk of liver damage, incorporating information related to alcohol use into the warning on liver failure instead of in a separate section (where it was previously), and adding a warning to avoid concomitant use of other acetaminophen-containing products or use of the product in the presence of current liver disease (without physician oversight). The FDA also launched a public education campaign in 2004 to help consumers learn how to use acetaminophen more safely. The FDA is still evaluating whether additional changes need to be made to increase the safe use of OTC acetaminophen.

What nurses can do. Nurses play an important role in reducing the risk of liver damage and acute liver failure caused by acetaminophen. RNs and NPs should be aware of the cumulative 24-hour dosage of acetaminophen their patients are receiving, whether they're taking acetaminophen alone to treat mild pain or fever or are taking a combination of narcotics and acetaminophen.

Patients' home use of OTC products containing acetaminophen should be assessed carefully. They should be monitored for signs of liver toxicity when receiving products with acetaminophen, and their liver enzymes should be assessed for elevations. If patients are receiving more than 4 g of acetaminophen in 24 hours or if they exhibit any signs or symptoms of liver toxicity, nurses should discuss reducing the dosage with the prescriber, or, if they're the prescriber, reduce the dosage immediately. All nurses should educate patients on the safe use of acetaminophen-containing products and the risks of overdosage. They should also emphasize that acetaminophen is in many combination OTC cold medications and that consumption of three or more alcoholic drinks per day greatly increases the risk of liver toxicity.