

# Chronic Addiction to Dextromethorphan Cough Syrup: A Case Report

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**Background:** Serious drug abuse and addiction related to dextromethorphan-containing cough preparations has been a problem in the United States since the 1950s, but few physicians are aware of it. Physicians must be alert to the type of substances and quantities used and misused by patients in obtaining a thorough routine history of over-the-counter medication use.

**Methods:** We describe the case of a 66-year-old clerical worker who ingested 4 to 16 oz of dextromethorphan on a regular basis over an 8-year period. We consulted with our local Poison Control Center and undertook a literature search to research previous reports of similar cases to identify the features that would aid physicians in recognition and management of this problem.

**Results and Conclusion:** Despite the availability of a substantial number of case reports in specialty journals, there are almost no reports in the primary care literature of chronic dextromethorphan addiction. Our case highlights the difficulties in making an appropriate diagnosis and in obtaining effective help for the patient. (J Am Board Fam Med 2006;19:320–3.)

Dextromethorphan is readily available to the general public in the form of over-the-counter (OTC) cough and cold preparations. It is also a narcotic agent that carries the potential for abuse, which has been previously described in the literature. Our case report suggests that chronic abuse of dextromethorphan may be a more common form of substance abuse in primary care than is currently recognized.

## Case Reports

Mrs. BB is a 66-year-old female with a medical history of asthma, pulmonary embolism, upper gastrointestinal bleeding, alcohol abuse, and depression who presented to a university hospital emergency department with a complaint of “trembling” that she attributed to her chronic, excessive use of dextromethorphan-containing cough syrups; she stated that she believed she was going through an acute withdrawal reaction. She described herself as “a recovering alcoholic.” She gave a 30-year history of heavy alcohol abuse that began in her teens. She

had gone through alcohol detoxification programs on several occasions at multiple centers and finally became abstinent in 1984, at the age of 46, after a prolonged detoxification admission.

She remained free of addiction until she started experiencing marital difficulties several years later. She found that dextromethorphan-containing cough syrup gave her euphoria similar to that of alcohol and distracted her from her personal problems. She started to consume up to 4 oz of a dextromethorphan-containing cough syrup on an occasional basis; this produced a “high” and at times made her lethargic. She usually went to a CVS drugstore and bought their brand containing 10 mg of dextromethorphan hydrobromide and 100 mg of guaifenesin per 5 mL along with glycerin, fructose corn syrup, and propylene glycol. Gradually, she required more of the drug to achieve the same effect and increased her consumption to 8 oz/day, eventually achieving a maximum consumption of 16 oz/day at the time of admission, which amounts to approximately 960 mg of dextromethorphan. The patient stated that she intentionally avoided products listed as containing alcohol.

In the clinic setting, she had mentioned this problem to her physician, who suggested that she call a drug rehabilitation facility, but she did not follow through. She had been hospitalized for asthma on two prior occasions within the current year; she stated that her physicians failed to ad-

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dress her concerns about her excessive dextromethorphan use even after she volunteered this information.

On presentation to the emergency department, she reported that her last dose of dextromethorphan was 3 days before. She complained of abdominal pain, nausea, and one episode of vomiting on the previous day. She described the abdominal pain as sharp and epigastric in location. She also complained of tremors in both hands, but denied any other neurological symptoms. She admitted to feeling depressed, dysphoric, and having trouble sleeping. Her current medications included 81 mg/day aspirin, albuterol inhalers (2 puffs qid prn), fluticasone/salmeterol inhaled powder (250/50 bid), montelukast (10 mg qd), pantoprazole (40 mg qd), and supplemental calcium and vitamin D.

On physical examination, she was alert, cooperative, and in no acute distress. Her vital signs were 183/91 mm Hg, pulse 96 bpm, temperature 99°F, and respirations 16. The only findings noted on examination were a mild coarse tremor of her outstretched hands and mild rhonchi throughout both lung fields.

At admission, she was put on a clinical institute withdrawal assessment (CIWA) protocol to observe for signs of active withdrawal. She was given low-dose oral chlordiazepoxide to relieve symptoms of “trembliness.” Her urine toxicology screen came back positive for phencyclidine (PCP), but this proved to be a false positive due to dextromethorphan. Discharged 2 days later with a treatment center referral, she was admitted to a detoxification program. The treatment program consisted of a 5-day hospitalization, during which she was treated with chlordiazepoxide and counseling sessions, and 2 days of subsequent outpatient follow-up. She has been in recovery without relapse for the last 5 months.

## Discussion

Unfamiliar with this pattern of use, we contacted our Poison Control Center for a report on known toxicities and adverse effects of misuse. A review of the information they provided us, as well as published literature, revealed the following.

Dextromethorphan, the dextro isomer of the codeine analog of levorphanol, is a cough suppressant ingredient first marketed as a prescription antitussive in the early 1950s; it became an over-

the-counter drug in 1956. The maximum recommended daily dosage is approximately 120 mg/day. There have been anecdotal reports of cough syrup abuse since this time. It is now included in more than 75 nonprescription preparations and is available in concentrations of 5 to 15 mg/5 mL in various sizes. The “extra strength” cough syrups, which contain up to 3 mg dextromethorphan per mL, appear to present a special hazard.

Dextromethorphan is a *N*-methyl-D-aspartate (NMDA) receptor antagonist, which is actively being studied for use in treating neuropathic pain. Like PCP and ketamine, however, it can produce dissociative effects in higher doses (>240 mg).<sup>1</sup> Users describe a set of distinct dose-dependent “plateaus” ranging from a mild stimulant effect with distorted visual perceptions at low doses (around 120 mg) to a sense of complete dissociation from one’s body at doses of 10 oz or more. The effects typically last for 6 hours. Recent literature suggests that heavy dextromethorphan use may produce phencyclidine (PCP)-like effects from the metabolic conversion of dextromethorphan to its immediate metabolite, dextrorphan, which acts like an NMDA receptor antagonist. These include bizarre and hyperactive behavior, nystagmus, ataxia, hallucinations, CNS depression, and a false-positive urine test for PCP.<sup>2</sup> Dosages of 4 to 20 oz daily are required to produce the desired state of inebriation.

Problems with dextromethorphan had led to restrictions on the sale of a pure tablet form of the drug (*Romilar*) in 1960. In 1990, the Utah State Board of Pharmacy started requiring that *Robitussin DM* be moved behind the counter, resulting in a lower number of abuse cases reported. One survey conducted in the Utah Poison Control Center in 1999,<sup>3</sup> however, identified a sharp rise in intentional dextromethorphan abuse, particularly among adolescents. A 1993 report reviewed prior reports of chronic dextromethorphan abuse; the authors added 2 adolescent cases of their own.<sup>4</sup> Two fatal cases were reported from Sweden, leading its government to restrict dextromethorphan’s availability to prescription only.<sup>5</sup>

Descriptions of acute adverse clinical effects from this chronic high dosage is afforded by at least 16 English-language case reports, which focus mainly on acute psychotic reactions.<sup>6</sup> Chronic effects include recurrent mania from use of 100 to 400 mL daily of dextromethorphan for up to 8

years,<sup>7</sup> intermittent euphoria,<sup>8</sup> and severe cognitive deterioration.<sup>9</sup> Often, distinctions between acute and chronic overdose cannot be readily made, as in the case of a 23-year old gentleman who presented to an emergency department with acute intoxication on top of chronic addiction.<sup>10</sup> This subject holds the record for the highest daily dextromethorphan consumption, for the longest time, yet reported (36–48 oz of *Robitussin DM*/day, or 2160–2880 mg of dextromethorphan hydrobromide for up to 5 years).

Certain subsets of the general population appear at higher risk, including teenagers, alcoholics, and narcotic abusers. Street names for dextromethorphan include: “Candy,” “C-C-C,” “Dex,” “DM,” “Drex,” “Red Devils,” “Robo,” “Rojo,” “Skittles,” “Tussin,” “Velvet,” and “Vitamin D”; slang terms for chronic abuse include: “Dexing,” “Robotripping,” and “Robodosing.” Some experimental findings suggest that dextromethorphan can produce ethanol-like subjective effects in both alcoholics and controls and induce a mild form of craving in alcoholics only.<sup>11</sup> This would appear to be relevant to our case. The FDA has expressed its concern about potential abuse of dextromethorphan in a 2005 “Talk Paper” after the recent deaths of 5 teenagers, who apparently used pure dextromethorphan powder in capsule form.<sup>12</sup>

Dextromethorphan in these products is usually provided in the form of the hydrobromide salt. When large quantities are ingested, this raises the possibility of suffering clinical symptoms of cognitive impairment related to “bromidism.” We do not believe that this was relevant to our case as we were able to find only a single, very old (1978) case report in the literature limited to the elderly population.<sup>13</sup>

Case reports illustrate an additional dilemma in treating this addiction—the difficulties that many patients experience in getting health professionals to respond appropriately. In the case of the Army private mentioned in the 1993 report above, the patient had reported multiple attempts at seeking help from professionals (eg, a clergyman, a youth director, and a psychologist), but did not feel he was taken seriously. Having told his pharmacist about the problem, he allegedly received this response: “It is impossible to get high on *Robitussin*.”<sup>8</sup> In our case, multiple physicians failed to make any response to the admission of a problem during 2 hospitalizations.

From a primary care standpoint, chronic addiction to/abuse of non-prescription substances is difficult to diagnose and easily missed. The most practical recommendation would be to complete a thorough history of all non-prescription therapies used for each patient. Many physicians are unaware of their stimulating, euphoric, and metabolic effects, as well as the abuse potential of these common substances, which are readily available in large quantities and inexpensively both at the local drugstore and over the Internet. Chronic dextromethorphan abuse is difficult to treat because it falls outside of the physician’s usual treatment paradigm. If a physician just casually refers the patient to a treatment center, referral may fail either because the patient fails to follow through or because the treating facility does not regard dextromethorphan abuse as a high treatment priority.

Our recommendations for other physicians who may encounter similar problems in their practice are:

1. Take a complete nonprescription medication history for all patients.
2. When a patient appears to be using large quantities of any particular medication, check with your local Poison Control Center to get full reports of all related toxicities and effects of misuse.
3. Do not minimize the patient’s admission of misuse of the substance. Respond with empathy and concern and an explicit acknowledgment of the problem’s seriousness.
4. Make appropriate referrals to detoxification centers, but don’t stop there. Certain centers or personnel may minimize the potential seriousness of this addiction, compared with what they normally treat. It is probably appropriate for you, after a patient initiates a call, to speak directly with personnel at the treatment center, both to confirm the seriousness of the misuse and addiction and to insure that appropriate treatment is provided. As illustrated by our case, a short inpatient stay of 5 to 7 days with outpatient follow-up appears to be adequate treatment.
5. Continue to follow-up with and support the patient in abstinence after discharge from the detoxification program.

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