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Methamphetamine: Here we go again?

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ABSTRACT

Following more than two decades of generally increasing trends in the use and abuse of methamphetamine in certain parts of the country, prevalence indicators for the drug began to decrease in the mid-2000's—but was this decrease signaling the end of the "meth problem"? This paper has compiled historical and recent data from supply and demand indicators to provide a broader context within which to consider the changes in trends over the past half decade. Data suggest supply-side accommodation to changes in precursor chemical restrictions, with prevalence indicators beginning to attenuate in the mid-2000's and then increasing again by 2009–2010. Results support the need for continuing attention to control and interdiction efforts appropriate to the changing supply context and to continuing prevention efforts and increased number of treatment programs.

1. Introduction

The history of the methamphetamine epidemic in the U.S. has been marked by the interaction of supply and demand. Supply means not only the quantity of the drug available and seized, but also purity, price, formulation of the drug, and responses by criminal justice agencies. Demand is characterized by the initiation and continued use of the drug as shown in changes in incidence and prevalence in surveys and in adverse events as indicated by data such as emergency room and drug treatment program admissions. The cyclical nature of the increases and decreases in use after earlier methamphetamine precursor bans has been documented in studies by Cunningham & Liu, 2003, 2005; Cunningham, Liu and Callaghan (2009), Cunningham, Liu, and Muramoto (2008), Cunningham, Bojorquez, Campollo, Liu, and Maxwell (2010). Decreases in use are often accompanied by a lessening of public policy attention to prevention, treatment, and interdiction needs. Yet, as discussed by Cunningham et al., during the past few decades, decreases in methamphetamine trends have been short-lived and followed by subsequent increases. In this paper, we seek to document the emerging effects of the latest precursor bans on methamphetamine supply and demand and consider future changes in the use of this drug.

2. Material and methods

To help understand the changes and risk factors identified with methamphetamine, the most current data from surveys, emergency room and treatment admissions, arrestee drug testing, manufacturing processes, price and purity, and toxicological analyses of seized forensic items were retrieved from agency publications and national online sources. These data sources are described briefly along with their results. Data are displayed descriptively.

3. Results

3.1. Trends in indicators of methamphetamine supply

3.1.1. Production/distribution

Amphetamine tablets were available in the U.S. without a prescription until 1951. At that time, the illicit amphetamine market consisted of diverted pharmaceutical amphetamine (Anglin, Burke, Perrochet, Stamper, & Dawud-Noursi, 2000). In 1970, amphetamine was rescheduled, which lessened its availability for diversion and by 2010, amphetamine was only 5% of all the stimulants identified by federal, state, and local forensic laboratories, while methamphetamine comprised 95% of the two stimulants tested (Drug Enforcement Administration, Office of Diversion Control, 2011a).

After amphetamine was rescheduled in 1970, illicit manufacturers began making methamphetamine using phenyl-2-propanone ("P2P") and methylamine. Motorcycle gangs and small-scale local producers dominated the manufacturing and distribution process (Finckenauer, Fuentes, & Ward, 2001), but after phenylacetone became Schedule II in the U.S. in 1980, operators of clandestine laboratories shifted to using ephedrine and pseudoephedrine. Large quantities of ephedrine and pseudoephedrine were smuggled from Mexico for use in "super labs" in the southern California desert. At the same time, quantities of a smokable and highly pure form of d-methamphetamine hydrochloride, known as "ice," "crystal," or "tina," were imported from Far Eastern sources into Hawaii (Joe-Laidler & Morgan, 1997) and then

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into the West Coast of the U.S. with a gradual movement eastward towards the end of the 1990's (Ling, Rawson, & Shoptaw, 2006).

As methamphetamine use and abuse grew, there was an increase in small-time local producers in the U.S. who used over-the-counter cold medications and readily available chemicals to produce d-methamphetamine. The Birch reduction technique ("Nazi" method) used ephedrine or pseudoephedrine, lithium, and anhydrous ammonia, and the "cold" method used ephedrine or pseudoephedrine, red phosphorus, and iodine crystals (Bianchi, Shah, Rogers, & Mrazik, 2005).

Federal regulations targeting ephedrine and pseudoephedrine in forms used by large-scale producers in the U.S. were implemented in 1989, 1995, and 1997 and regulations of forms used by small-scale producers (e.g., over-the-counter medications) were implemented in 1996 and 2001. During 2004, in response to the proliferation of local laboratories, various states began to limit access to over-the-counter pseudoephedrine products and in March, 2006, U.S. federal legislation (P. L. 109–177) imposing limits became effective nationwide, with a resulting decline in methamphetamine items seized and examined in forensic laboratories reporting to DEA's National Forensic Laboratory Information System (NFLIS) and in the number of methamphetamine clandestine laboratories reported in DEA's National Clandestine Laboratory Database (DEA, 2011b; Maxwell & Rutkowski, 2008) (Fig. 1). However, in 2008, the number of laboratory incidents began to increase, an indication that methamphetamine "cooks" had found ways to circumvent the legislation and obtain pseudoephedrine tablets and other ingredients used to produce the drug. In addition, Mexican producers shifted to other precursors to produce methamphetamine. These increases are also seen in the proportion of methamphetamine items examined by toxicology laboratories (DEA, 2011b)) (Fig. 1).

Canada, which had been a main supplier of pseudoephedrine to Mexico, enacted legislation in January 2005 to control its distribution (Government of Canada, 2005). Mexico began to limit imports of pseudoephedrine to manufacturers in 2006 and further restrictions were placed on the sale of over-the-counter cold medications in 2007 (Randewich, 2007). The seizure of a "rogue" commercial chemical company in Mexico that had illegally imported more than 60 tons of pseudoephedrine and the 2008 ban on all pseudoephedrine and ephedrine products in Mexico resulted in significant decreases in methamphetamine purity and treatment admissions in Texas and Mexico (Cunningham et al., 2010).

As the precursor bans in Mexico and the U.S. became effective, the purity dropped but later rose (DEA, 2010a) as the producers shifted to the P2P process, which uses chemicals other than pseudoephedrine (Logan, 2002). By the first quarter of 2011, 77% of the domestic and Mexican samples examined by the DEA Special Testing and Research Laboratory were produced using the P2P method, while the phosphorus-iodine method was identified by DEA in only 9% of the samples. The other 22% were mixed combinations or unknown precursors (DEA, 2011c).

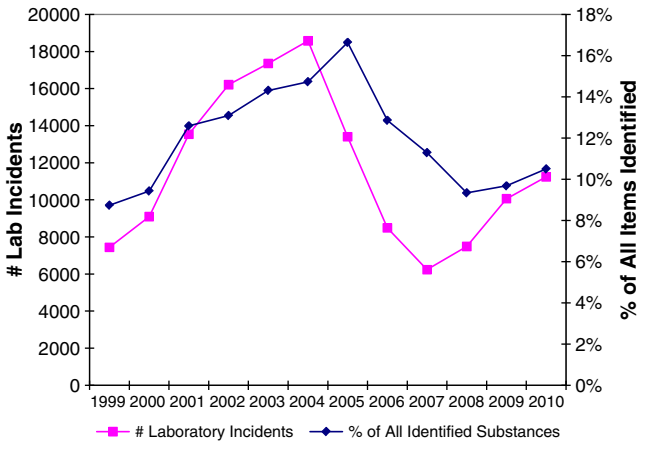

Fig. 1. Number of methamphetamine clandestine laboratory incidents and percentage of all substances identified that were methamphetamine in the U.S.: National Clandestine Laboratory Database and National Forensic Laboratory Information System 1999–2009.

The methamphetamine molecule exists as two enantiomers: that processed with ephedrine or pseudoephedrine yields *d*- methamphetamine while the P2P recipe produces combinations of *d*- and *l*-methamphetamine, which in an equal mixture of *d*- and *l*- is a racemic mixture. Using isomer purification techniques, the proportion of *d*-methamphetamine made with the P2P process is increasing. In the first quarter of 2010, 50% of the samples were *d*- isomer only and 35% were *d*- with *l*- isomers. In the fourth quarter of 2010, 62% were *d*-isomer only and 25% were *d*- with *l*- isomers (DEA, 2010b).

The *d*- methamphetamine form is associated with more potent physiologic and behavioral effects and higher abuse liability (Mendelson et al., 2006), as well as being a more potent dopamine releaser (Kuczenski, Segal, Cho, & Melega, 1995). Users injected with *d*-, *dl*-, or *l*-methamphetamine gave *l*- methamphetamine significantly lower ratings for its ability to produce "intoxication" and "drug liking." *D*-methamphetamine produced more intense stimulant effects and higher abuse liability than *l*- methamphetamine (Fowler et al., 2007). At high doses, *l*- methamphetamine intoxication was similar to that of *d*-methamphetamine, but the psychodynamic effects were shorter-lived and less desired by users, whereas the racemic mixture had similar effects to d-methamphetamine (Mendelson et al., 2006).

In addition to the shift to the P2P process, DEA reported that Mexican producers were increasingly turning to Central and South America and South Africa as sources of precursors. An additional concern is the finding that the samples entering the U.S. from the Far East in 2010 were approaching 96% purity (DEA, 2010b).

3.1.2. Price and purity

The **System to Retrieve Information on Drug Evidence (STRIDE)** is a database of drug exhibits sent to DEA laboratories from law enforcement agencies. It is not a representative sample of drugs available in the U.S., but reflects evidence submitted to DEA laboratories for analysis. Fig. 2 shows that from July 2007 through September 2010, the price per pure gram of methamphetamine decreased 61%, from $270.10 to $105.49, while the purity increased 114%, from 39% to 83% (DEA, 2010c).

3.2. Trends in indicators of methamphetamine demand

Similar to the trends seen in supply reduction, the demand for methamphetamine decreased after the precursor chemical bans. However, the demand for the drug has been characterized over time by geographic variations, as well as by different types of the drug, different routes of administration, and different types of users.

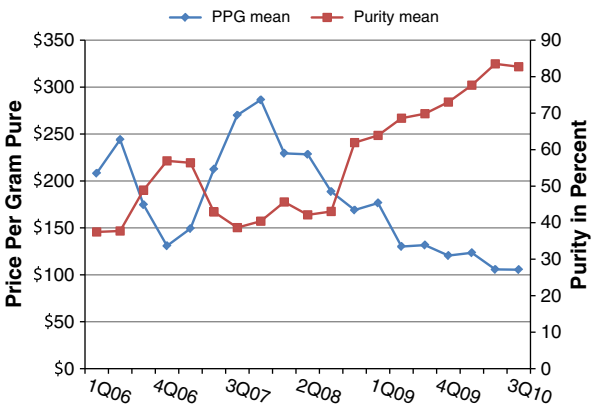

Fig. 2. All domestic methamphetamine purchases: STRIDE data 2006–2010.