

Does precursor regulation make a difference?

Cunningham & Liu (2003) find that three different methamphetamine precursor regulations—imposed in 1989, 1995 and 1997—each led to sharp reductions in methamphetamine-related hospital admissions in three western US states; the failure of a fourth one comes as little surprise since it was not well targeted. This analysis is welcome both for its nature (enforcement programs are infrequently evaluated quantitatively) and findings (enforcement has a mixed track record in such evaluations). However, this interesting study raises two important questions that merit further exploration: (1) how can this time series analysis on one indicator be reconciled with other events and indicators?; and (2) how large were the benefits of these interventions relative to their costs (assessed in comparable units)?

As a prelude, let us first ask why precursor regulations should affect hospital admissions. Precursor control is a supply-side intervention that should drive up prices. As it becomes more difficult to find precursors, production costs rise until suppliers develop new sources (perhaps in other countries) or new technologies. Higher prices should lead to fewer persons using and/or lower quantities consumed per user.

Cunningham & Liu (2003) analyse hospital admissions only and make no broader statement as to whether the regulations affected methamphetamine use. However, it is implicit that reductions in prevalence or total consumption are the source of the decline in admissions, since there is nothing about the regulations that would have reduced the harmfulness of each dose of methamphetamine—the other potential source of a decline in hospital admissions. Hence, one would expect to see comparable evidence in other, drug-use-related indicators

EVIDENCE FROM OTHER INDICATORS

Examining other indicators (prices, treatment admissions, prevalence among arrestees, survey results and emergency department mentions) gives at best ambiguous support for Cunningham & Liu's findings. Methamphetamine prices have been in long-term decline, with brief interruptions [Office of National Drug Control Policy (ONDCP) 2001]. In 1989, there was a 9 month (three

quarter) increase in price from \$219 to \$250 per pure gram; this is roughly consistent with Cunningham & Liu's findings. However, there was no increase in 1995, and a only one quarter increase of barely 10% (in a noisy series) in the last quarter of 1997.

Data from the US Arrestee Drug Abuse Monitoring (ADAM) system provide mixed support for the Cunningham & Liu findings. Since 1990, ADAM has collected urinalysis data quarterly on about 250 arrestees in approximately 35 counties (National Institute of Justice, *Arrestee Drug Abuse Monitoring*, published annually). Consistent with hospital admissions data, the jurisdictions with the highest rates of methamphetamine use throughout the 1990s have been in the west of the USA. Following the August 1995 regulation, there was a substantial downturn in the five cities with the highest positive rates for methamphetamine (Los Angeles, Phoenix, Portland, San Diego and San Jose). For example, among male arrestees in San Diego the percentage testing positive fell from 41% in 1994 to 36% in 1995 and then to 29% in 1996. However, the pattern following the October 1997 regulation does not provide support: in only one of the cities (San Diego) was there a decline.

Using data from the 1999–2001 National Household Survey on Drug Abuse, the Office of Applied Studies produced an estimate of the annual incidence of methamphetamine use from 1965 to 2000 [Substance Abuse and Mental Health Services Administration (SAMHSA) 2002; Table H.49]. The statistical properties of this series are unexplored, but it shows no downturn following the regulations.

Treatment admissions is an ambiguous measure. In theory, admissions might rise because scarcity drives users to seek treatment or fall as use declines. In practice, studies have found evidence that sudden interruptions in the supply of cocaine and heroin have led to admission declines (Hyatt & Rhodes 1995). Yet treatment admissions in which methamphetamine is the principal drug of abuse rose substantially from 1992 to 2000 (from 14 000 to 66 000); there was a decline in 1996 (from 48 000 to 41 000), but no decline in 1998.

Another indicator is emergency department (ED) and medical examiner (ME) mentions recorded by the Drug Abuse Warning Network (DAWN). Annual methamphet-

Table 1 Evidence from other indicators provides mixed support.

	1989 event	1995 event	1997 event
Hospital-related measures			
Cunningham & Liu's findings for three states	-35% ^a	-48% to -71%	-38% to -61%
Annual national methamphetamine ED mentions	-40%	-31%	-33%
Annual national ED mentions for other drugs ^b	-25%	+6%	+4%
Annual methamphetamine ME data for six cities	+9%	-4%	-23%
Annual cocaine + heroin ME data for six cities	-26%	0%	-3%
Concordance of other indicators			
Methamphetamine retail prices	Strongly +	-	Weakly +
Urinalysis of arrestees (ADAM)	NA	+	-
NHSDA-based annual methamphetamine incidence	-	-	-
Annual methamphetamine treatment admissions	NA	+	-

^aCalifornia only; ^bsum of cocaine, heroin, marijuana, LSD and PCP.

amine ED counts for the USA as a whole fell by 30–40% in the year after each of the three interventions. However, interpretation of the 1989 decline is complicated by the near-simultaneous occurrence of events that affected illicit drug markets generally. In August 1989, the leading candidate for the Colombian presidency was assassinated by the Medellin trafficking syndicate. In response, the Colombian and US Governments aggressively attacked cocaine production and shipping. The next month, President Bush gave his famous speech renewing the American drug war, and domestic drug arrests and seizures rose to unprecedented levels.

These actions created a sharp spike in cocaine prices and a decline in cocaine consumption (ONDCP 2000). Not surprisingly, cocaine-related DAWN ED mentions fell sharply from 29 939 in the third quarter of 1989 to 22 646 in the fourth quarter of 1989 and eventually to 19 381 in the fourth quarter of 1990 (Kopstein 1992). Surprisingly, the decline was not confined to cocaine. Mentions of heroin and marijuana also fell by about one third during that period. No one has fully explained why ED mentions for other drugs should have fallen. Various conjectures can be advanced, the details of which matter less here than the possibility that some or even most of the 35% decline in California methamphetamine ED mentions that Cunningham & Liu document may have stemmed not solely from methamphetamine precursor regulation but rather from whatever was driving down ED mentions of cocaine, heroin and marijuana by about the same amount.

Medical examiner data are more variable. However, for the six cities with the most data (Dallas, Los Angeles, Philadelphia, Phoenix, San Diego and San Francisco), methamphetamine ME mentions rose by 230% from 1988 to 2000, including a 9% increase between 1989 and 1990—a period during which cocaine and heroin ME mentions in those cities fell by 30% and 22%, respec-

tively. The opposite pattern held between 1997 and 1998, with a 23% decline for methamphetamine and 1% and 5% declines for cocaine and heroin, respectively. There were only modest changes for all three substances between 1995 and 1996.

The concordance of these observations with Cunningham & Liu's findings is summarized in Table 1. They by no means negate Cunningham & Liu's conclusion that some precursor regulations can impact the methamphetamine market, but they raise the possibility that the 1997 regulation's effect may have been modest and the apparent effect in 1989 may have been partly to do with other factors. A careful follow-up study considering the interrelationships among a broader set of indicators would be instructive.

INTERPRETATION

Granting that precursor control can affect the market, the key question becomes whether the benefits of those effects are large or small relative to the costs of producing them. This vital question remains unanswered and warrants follow-on study. At first glance, one might think it would be trivial given Cunningham & Liu's analysis, but some reflection points to important challenges.

Firstly, it is difficult to determine the relationship between hospital admissions and the prevalence of methamphetamine use or the quantity consumed. Admissions might primarily reflect the flow of new users (inexpert in judging quantities and more susceptible to problems for any given use level) or the consumption intensity of frequent users (who account for most episodes), each of which is associated with a different set of social costs. The response of these two groups to supply restrictions could be different. New users might be more affected by any tightening of availability because they have fewer sources

of supply and are more price-sensitive; that generates reduced incidence. Heavy users may adjust by reducing the quantity consumed per week. Either might lead to reductions in hospital admissions that are disproportionate to other measures of methamphetamine use. Analysis of DAWN data, which include a 'reason for emergency department visit', may provide insight into this issue.

Secondly, markets adapt to disruptions, so a key question is not only how large initial effects are but also how durable they are. Cunningham & Liu note the effects were transitory: within 6–24 months, the effects had almost disappeared. Yet, if one thinks of effects as having an initial spike followed by some decay, Cunningham & Liu's analysis and estimation focuses on the height of the spike not the cumulative area under its curve, and a quantification of the benefits of precursor regulation depends more on the latter.

Likewise, quantification of the costs of these interventions is needed, including both regulatory burdens and limitations on the range of products available for legitimate therapeutic use. Again, initial and long-run steady state matter. If regulatory costs ebb little over time, while drug sellers can adapt to precursor controls relatively easily, then in the long run the supply control benefits may not be worth the costs, even if the ratio is initially favorable. Cost–benefit calculations, even if crude, are a critical supplement to the kind of analysis that Cunningham & Liu offer.

PETER REUTER

*School of Public Affairs and Department of Criminology
University of Maryland
College Park, MD
USA*

and

*Drug Policy Research Center
RAND*

Santa Monica, CA

USA

E-mail: preuter@umd.edu

JONATHAN P. CAULKINS

*H. John Heinz III School of Public Policy and Management
Carnegie Mellon University
Pittsburgh, PA
USA*

and

*Drug Policy Research Center
RAND*

Santa Monica, CA

USA

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