

Drug Prices and Emergency Department Mentions for Cocaine and Heroin

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Most US drug control spending seeks to restrain supply,¹ which—unless it makes drugs physically scarce—affects use primarily through prices.² Hence, a key question concerns the extent to which drug prices affect use, particularly heavy or problematic use.³ If use is not related to price, this focus on supply factors, and much of the literature on controlling drug markets, may be misguided.⁴

Economists take it as an article of faith that use responds to price changes; they even have a term for quantifying the concept. The *price elasticity of demand* is the percentage change in consumption associated with a 1% increase in price. Other economists are more skeptical, believing that there may be an elasticity of demand for conventional goods, and perhaps even marijuana, but not for cocaine and heroin.

I am not an economist, but I have some sympathy for economists' view in this case. The purpose of this report is to show some figures that might help a noneconomist understand intuitively that price variations may be related to drug use and associated health consequences, at least at the aggregate level.

For cocaine and heroin, the figures presented here correlate retail prices, numbers of emergency department (ED) mentions, and numbers of mentions one might expect if prices were the only thing that affected ED mentions. Such correlations are not a significant contribution to the economics literature. Besides offering the usual admonition that “correlation does not imply causality,” an econometrician would note that prices and measures related to consumption are simultaneously determined, so price is an endogenous variable. To quantify the effect of price on consumption, one must “identify” the system with some “instrumental variable.” This is routine work for econometricians, and a growing literature empirically estimates elasticities of demand for addictive substances.⁵ This literature generally finds that consumption of drugs such as cigarettes, alco-

Objectives. In this report, the author illustrates the historic relation between retail drug prices and emergency department mentions for cocaine and heroin.

Methods. Price series based on the Drug Enforcement Administration's System to Retrieve Information From Drug Evidence database were correlated with data on emergency department mentions from the Drug Abuse Warning Network for cocaine (1978–1996) and heroin (1981–1996).

Results. A simple model in which emergency department mentions are driven by only prices explains more than 95% of the variation in emergency department mentions.

Conclusions. Fluctuations in prices are an important determinant of adverse health outcomes associated with drugs. (*Am J Public Health.* 2001;91:1446-1448)

hol, marijuana, and cocaine is surprisingly responsive to price changes.

Econometric studies can, however, be bewildering to the uninitiated. In my experience, citing these studies to an audience skeptical that prices influence drug use is of little value. Nevertheless, simple descriptive plots, even if they offer no quantitative estimate of the elasticity of demand, can persuade skeptics of the basic point that price matters.

METHODS

The unit of observation was annual data for the United States. Price data were derived from undercover purchases recorded by the Drug Enforcement Administration's System to Retrieve Information From Drug Evidence (STRIDE) database.⁶ Data for 1981 through 1996 were obtained from the Office of National Drug Control Policy.^{7,8} I extended the cocaine series back to 1978 with data from prior work.⁹ Prices were converted to constant dollars with the consumer price index.

Counts of ED mentions were taken from Drug Abuse Warning Network data.^{10,11} The Drug Abuse Warning Network monitors drug-related ED episodes by retrospectively examining ED records in a sample of nonfederal, general care, short-stay hospitals that operate a 24-hour ED. Its data have been criticized,^{12–15} but they remain the standard source of information on drug-related morbidity.

The third pair of data series was the number of mentions one would expect if ED mentions were determined only by prices through a constant price elasticity. By definition, a constant elasticity relation is log linear. Choosing the scaling constant and exponent to minimize the sum of the squared difference between the actual and the expected number of mentions yields the following relations:

$$(1) \quad \text{cocaine ED mentions} \\ = 5.85 \times 10^7 \times P^{-1.30}$$

$$(2) \quad \text{heroin or morphine ED mentions} \\ = 2.73 \times 10^7 \times P^{-0.84},$$

where P = price.

The apparently strong relation between use and price suggested by the exponents is consistent with cocaine elasticity estimates derived from youth surveys,¹⁶ cocaine and heroin estimates based on arrestee urinalysis results,¹⁷ and the observation that heroin prices are inversely related to the size of the methadone dose needed to stabilize persons addicted to heroin.¹⁸

RESULTS

Figure 1 plots retail price and the annual number of ED mentions for cocaine and heroin (1981–1996). A clear negative correlation is seen between prices and ED mentions, but it is difficult to judge its strength because it is an inverse log-linear

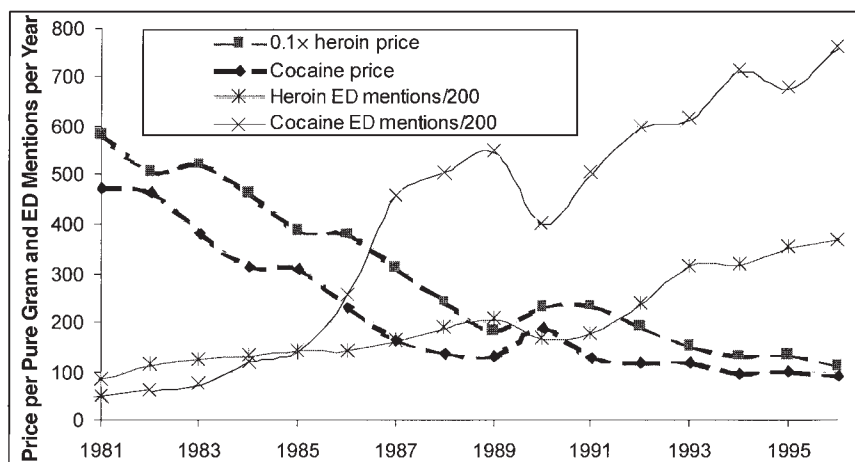


FIGURE 1—Trends in prices and emergency department (ED) mentions for cocaine and heroin: 1981-1996.

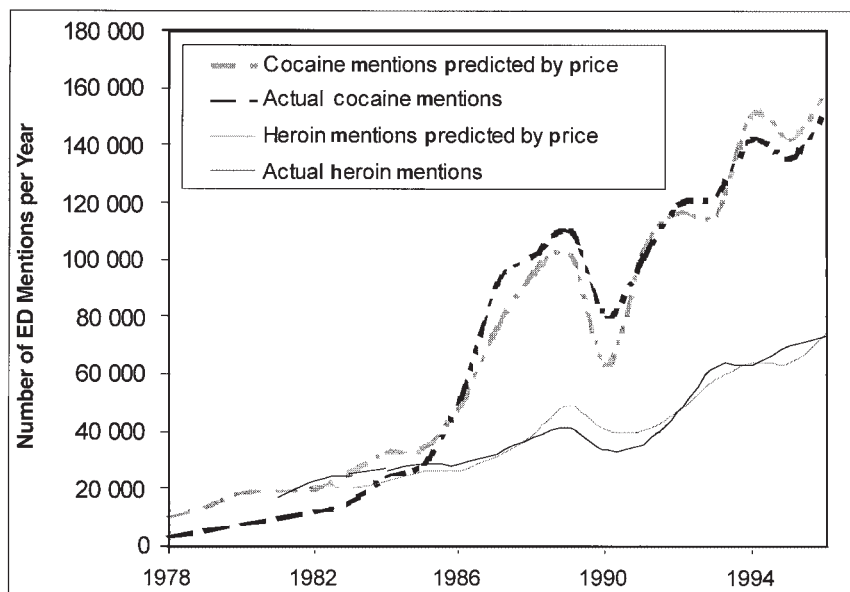


FIGURE 2—Actual emergency department (ED) mentions for cocaine (1978-1996) and heroin (1981-1996) compared with numbers predicted by prices.

correlation. To present the correlation visually, Figure 2 plots the actual and expected number of ED mentions. If price were all that determined the number of ED mentions (and did so through a constant elasticity), the 2 pairs of lines would coincide, which they nearly do. The correlation between actual and expected mentions is

0.987 for cocaine and 0.975 for heroin. Thus, price changes can explain 97.5% of the variation in ED mentions for cocaine and 95% of the variation for heroin. This is striking, considering the imperfections in price and ED data and the fact that the model omits factors such as changes in the number and age of users, the availability of

health insurance, the purity and availability of the drugs, and enforcement risks for users. Furthermore, the biggest discrepancies have a ready explanation. When prices spike, the actual number of ED mentions responds less than would be predicted by the constant elasticity relation. That makes sense if, as one would expect, ED mentions are less responsive to short-term price spikes than to longer-term price trends.

DISCUSSION

The preceding analysis shows that drug prices can explain a large proportion of the variation in national time series for the number of ED mentions for cocaine and heroin. The purpose in showing this is not to argue that other factors are unimportant or to quantify precisely the strength of the relation, but rather to give a visual, intuitive basis for understanding more obscure analyses of the relation between prices and drug use. Inasmuch as one believes that prices affect drug use and drug-related morbidity, it makes sense for policymakers to track price trends, to use price as a performance measure, and to think explicitly about how valuable it is to keep prices high and how best that can be accomplished.¹⁹ ■

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