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## SPECIAL FEATURE: OVERDOSE

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### Drug Overdose: New Insights, Innovative Surveillance, and Promising Interventions

Sandro Galea and Phillip O. Coffin

In New York City, where we work, fatalities due to drug abuse, primarily overdose deaths, in 2000 accounted for 924 deaths.<sup>1</sup> This was an increase from a low of 729 deaths in 1999, which followed a steady decline from 1,082 deaths in 1996. Of 638,484 drug-related emergency department visits reported in the United States in 2001, more than 5% took place in New York City, twice as many as would be expected on a population basis.<sup>2</sup> City emergency department admissions for heroin, the drug most frequently responsible for overdose fatalities, peaked at 136 per 100,000 in 1996 and then again at 128 and 127 per 100,000 in 2000 and 2001, respectively.<sup>2</sup> Unlike other localities, cocaine accounts for a substantial portion of overdose mortality in New York City.<sup>3</sup> Cocaine admissions in the city declined steadily, from 264 per 100,000 in 1996 to 166 per 100,000 in 2000 and 2001. Thus, while estimates of overdose prevalence evidence waxing and waning over the past decade, drug overdose persists as a significant cause of morbidity and mortality in our city and in many others worldwide.

This issue of the *Journal* brings together 11 original research articles that focus attention on the persistent problem of drug overdose. These articles summarize the burden of overdose that persists worldwide, as well as promising research and interventions that may contribute to a reduction in both the incidence of overdose and its consequences.

In a review, Darke and Hall, who have made seminal contributions to overdose research, summarize the known determinants of heroin overdose and suggest principal areas for urgent research—the role of polydrug use in overdose, demographics and circumstances of overdose, and interventions that can affect the incidence and outcome of overdose. Additions to this list by other contributors include the introduction of innovative surveillance and monitoring methods and the role of mental health conditions in the etiology of overdose. The articles that follow elaborate on these points, suggest answers, and raise more questions.

Two articles in this issue highlight areas in the study of overdose demographics and their correlates that have thus far received inadequate attention. Galea et al. discuss the racial/ethnic disparities in overdose mortality in New York City during the past decade. The authors show that, although rates of overdose death were consistently higher among blacks and Latinos compared to whites throughout the

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Correspondence: Sandro Galea, MD, MPH, Center for Urban Epidemiologic Studies, Room 556, New York Academy of Medicine, 1216 Fifth Avenue, New York, NY 10029-5283. (E-mail: sgalea@nyam.org)

1990s, these differences cannot be readily ascribed to drug use patterns, suggesting that situational factors may in part explain the observed differences. An article by Sergeev et al. provides some of the first evidence about the rising prevalence of opiate overdose among injection drug users in the Russian Federation. These two articles, taken in combination, suggest that although the basic demographics of overdose victims are well known, the fundamental determinants of overdose morbidity and mortality and the emergence of overdose in new locations may lie beyond individual drug users and may warrant creative structural thinking to bring about long-term solutions.

Two articles in this issue suggest that mental health may play an important role in shaping the risk of drug overdose. Tobin and Latkin show that active opiate and cocaine users who reported depressive symptoms were three times more likely to report having overdosed within the previous 12 months. An article by Heale et al. shows that while the majority of overdoses are unintentional, almost one in five of heroin overdose survivors interviewed said that they had, at some point, had an “intentional” overdose. Although, as the authors rightly point out, suicidal thought and behavior are complex and both studies are limited by cross-sectional designs and potential selective recall biases, the suggested association between mental health and risk of overdose deserves further attention. Meanwhile, it would seem prudent for health providers addressing overdose prevention to pay particular attention to persons with a history of mental health problems, particularly depression.

Studies by Clark and Bates and by Dietze et al. show how ambulance call systems can provide valuable population-based data to describe the incidence and correlates of overdose episodes. These studies, from different regions of Australia, highlight the role that ambulance-based surveillance can play in monitoring overdose and targeting overdose prevention interventions. We hope that the work published here may encourage collaboration among different branches of the medical/public health systems in the rest of the world to develop viable ambulance-based monitoring similar to that which has been demonstrably successful in Australia.

Two articles in this issue introduce spatial analytic methods as useful tools in overdose intervention efforts. Dietze et al. used their ambulance surveillance data to examine small-area variation in nonfatal heroin overdose. Their article is a particularly useful illustration of how small-area analysis can guide public health resource allocation in a timely fashion. A complementary contribution by Davidson et al. used medical examiner data to show that, in San Francisco, California, over one third of fatal overdoses over a 3-year period occurred in a small, delineated section of the city. These analyses both suggest that application of innovative surveillance methods (using disparate data sources such as medical examiner and ambulance call data) can lead to more efficient use of resources that can, it is hoped, translate into more efficacious overdose intervention. Hickman et al. report on an ambitious pilot cohort study of heroin users, linking data from specialist drug treatment sites in London, England. Overcoming formidable logistical and confidentiality obstacles, the authors illustrate a creative use of existing data to monitor overdose morbidity and mortality.

The addition of naloxone (Narcan) to the public health armamentarium is a critical step forward in the battle to reduce drug overdose mortality. Two articles in this issue suggest that naloxone, thus far introduced widely in only a few locations worldwide, will likely be well received by health care practitioners and clients alike. An article by Coffin et al. shows that, even in the absence of structured education about naloxone, more than a third of New York City clinicians in one survey would

consider prescribing naloxone to patients at risk of an opiate overdose. Perhaps more important, close to 90% of injection drug users surveyed by Seale et al. favored participating in an overdose management and naloxone training program. This article also raises some of the key issues about widespread naloxone use, including concerns that recipients might be even less likely to activate emergency medical services, or that they might use more or stronger drugs in light of the security conferred by naloxone. These issues are important and need to be explored and understood as naloxone is released into more widespread use. Naloxone is emerging as probably the most promising intervention to minimize overdose mortality. Work to address lingering concerns, together with research that prospectively evaluates the effect of naloxone introduction in different settings, will open a new phase in the history of drug overdose prevention and management.

The articles brought together in this issue of the *Journal* summarize the state of science in overdose research, monitoring, and intervention. In spite of growing sophistication in detecting and understanding drug overdose, it persists as a substantial cause of morbidity and mortality, particularly among habitual drug users. Some broad questions remain, such as the means through which polydrug use and cocaine use contribute to overdose and the contribution of structural factors (and policies) to overdose fatality.

Nonetheless, drug overdose is a preventable medical condition. Application of better monitoring and targeted interventions should reduce the incidence of overdose. Widespread introduction of naloxone should bring reductions in overdose mortality. Innovative structural interventions (e.g., the recent introduction of buprenorphine as a treatment for opiate addiction; policies to minimize fear of reprisal by police for alerting emergency medical services when witnessing or experiencing an overdose) may substantially reduce the incidence of overdose and its consequences.

Unfortunately, as the persistent prevalence of overdose in Western countries (particularly in minority racial/ethnic groups) and the emerging prevalence of overdose in eastern Europe suggest, our practical application of this knowledge falls short. We hope that the work featured here stimulates further research and evidence-based interventions that bring us closer to the goal of preventing drug overdose and eliminating attendant mortality.

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