Expanding Access to Naloxone: Reducing Fatal Overdose, Saving Lives

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A serious but largely overlooked crisis has taken root in the United States. This epidemic continues virtually unchecked despite the existence of practical, low-cost interventions.

More than 100 people die every day in the United States from a drug overdose.[1] Overdose rates have tripled since 1990[2] and increased more than 140 percent between 2000 and 2008.[3] More than twice as many people die every year from an accidental drug overdose than from firearms.[4] In December, the Centers for Disease Control and Prevention (CDC) announced that poisoning surpassed auto collisions in 2008 as the leading cause of accidental death in the United States. Drug overdoses account for 9 out of 10 poisoning deaths, and more than 75 percent of drug overdoses are accidental.[5]

A national response is urgently needed and long overdue. Elected leaders, public officials and medical professionals can no longer delay the implementation of effective overdose reduction measures in every state and community. Failure to do so has already resulted in thousands of needless deaths every year.

Today's overdose crisis touches the lives of every type of family and individual, regardless of age, class, ethnicity or gender. Contrary to popular belief, it's not teenagers who die from drug overdose in the greatest numbers, but their parents – people in their 40s and 50s are more likely to die from an accidental drug overdose than adolescents. Furthermore, it's not illicit opiates like heroin that are primarily responsible for this growing crisis – more people die from prescription opioid overdoses than from all illicit drugs combined. (Opioids are a synthetic form of opiate – such as oxycodone or hydrocodone – that are available by prescription only, typically only for moderate-to-severe pain.)

By expanding the availability of proven, effective overdose interventions and improving education and outreach for people at risk of accidental overdose, policymakers can help to prevent the tragic and unnecessary loss of life.

Naloxone Saves Lives

Chief among today's highly effective available practices to halt and reverse the growing toll of accidental overdose fatalities is naloxone hydrochloride (also known as Narcan™), a low-cost medicine available generically that was first approved by the FDA in 1971. Naloxone is an opioid antagonist that blocks the brain cell receptors activated by prescription opioids such as oxycodone, as well as by illicit opiates such as heroin. It temporarily restores normal breathing within two to three minutes of administration.

Naloxone is the first line of treatment for emergency room physicians and paramedics upon encountering a patient experiencing an overdose. Ideally, emergency medical responders are summoned as soon as an overdose is detected. A dose of naloxone is then administered and rescue breathing is initiated if necessary. If the victim has not been revived after two minutes, another dose of naloxone is administered and so on until the naloxone has the desired effect. Naloxone's effects last for 30 to 75 minutes, allowing time for the arrival of emergency medical assistance.[6] Though the research is contradictory, some studies suggest that once the naloxone effect wears off, opioids in the circulatory system may become toxic again and without medical attention victims can subsequently cease breathing again.[7] However, naloxone can be administered repeatedly without harm.

Naloxone is most commonly administered via intramuscular injection, but it can also be administered intranasally using an atomizer device that delivers a mist to the nasal mucus membrane. The device used for this latter form of administration is not yet FDA approved, but it is in use by overdose prevention programs in Massachusetts, New Mexico and elsewhere.[8]

Naloxone's only effects are to reverse respiratory failure resulting from an opiate overdose and to cause uncomfortable withdrawal symptoms in the dependent user.[9] It has no pharmacological effect if administered to a person who has not taken opiates[10] and has no potential for abuse.[11] It is impossible to overdose on naloxone.

Expanding the Availability of Naloxone

One key barrier to broader naloxone access in the U.S. is its status as a prescription drug. Depending on state law, prescriptions for naloxone must either be written to individuals who have requested to carry the drug or may be made by programs operating under standing orders from a physician.

Advocates in some states are examining an alternative approach to increasing access to naloxone – changing the drug's FDA status from "prescription only" to "over the counter" (OTC). Given that it has little to no potential for misuse, naloxone could meet OTC standards, making this option worthy of further consideration.

Providing take-home naloxone to prescription opioid patients and their care providers is a simple step to help reduce accidental deaths. In a study researching naloxone distributed for later administration in case of overdose to people who inject heroin, it was determined to be a "simple, inexpensive measure that has the potential to significantly reduce mortality caused by heroin overdose."[12]

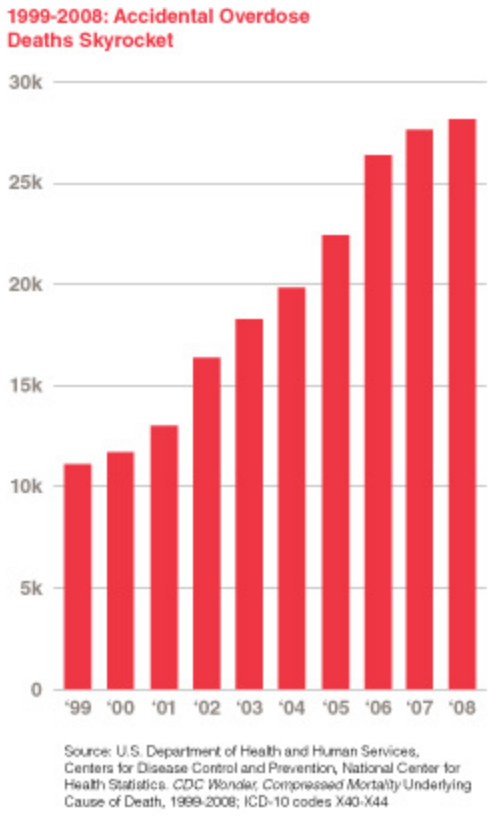
Another major barrier to expanding access to naloxone has been its status as a generic medication that is generally only used by emergency medical professionals. Because naloxone has limited use and is a generic medication, producing it does not yield substantial profits. Many pharmaceutical companies are unwilling to manufacture it, which has resulted in a scarcity of the medicine as demand increases for it. The scarcity of naloxone has increased its purchase price, which is another barrier to encouraging its distribution by service providers and other stakeholders with limited funding.[13]

Improving Naloxone Awareness Among Professionals

Although naloxone is the standard treatment for reversing respiratory failure due to opiate overdose and is widely used by EMS and other medical personnel,[14] lack of awareness about public need and physician bias against drug users are ongoing obstacles to wider naloxone distribution. In a 2006 survey of 571 physicians, just 23 percent were aware of the practice of prescribing naloxone to prevent heroin overdose, and 54 percent said they would not "consider prescribing naloxone and explaining its use to a patient (who uses injection drugs) because of their own negative views of injection drug users."[15]

Support is growing among some physicians and otherhealth professionals for regularly pairing naloxone with all opioid prescriptions.[16] Under this scenario, physicians would routinely write a prescription for naloxone to accompany every prescription for opioid medications. Such a convention would have the dual benefits of safeguarding the life of the patient and normalizing naloxone by educating the greater public about its function and proper use.

It is particularly important to make naloxone available in methadone clinics, addiction treatment programs, syringe exchange programs and emergency rooms. Law enforcement professionals and prison personnel should also be trained on how to respond to opiate overdose, including rescue breathing and administration of naloxone. Individuals who are released from incarceration are at elevated risk of an overdose and should be provided naloxone prior to release into the community.[17]



Naloxone Training for the Public

Overdose prevention programs provide a variety of vital services. In states like California, New Mexico, New York and Massachusetts, these programs provide target populations with naloxone and train them in rescue breathing and the importance of dialing 911 before naloxone administration. Overdose prevention programs also provide drug treatment program referrals, and connections to healthcare, social services and a variety of other programs.

Naloxone distribution programs train potential overdose witnesses to correctly administer the drug to a peer in need, greatly reducing the risk of accidental death. Most programs typically teach all aspects of overdose prevention, recognition and response, including teaching life-saving skills such as rescue breathing ('mouth-to-mouth'). Unfortunately, the number of these life-saving programs remains much too small when compared to the scope of the national accidental overdose crisis, but their results are highly encouraging. A recent CDC report credits naloxone distribution programs with saving more than 10,000 lives since the first program opened fifteen years ago.[18]

Overall, participation in naloxone distribution programs has been found to improve participants' recognition of and response to overdose. A 2008 study, conducted by Yale University researchers, found that people who use drugs can learn to identify and respond to opioid overdoses just as effectively as medical professionals. The study, funded by the National Institute of Mental Health, found that people who use heroin who receive training can recognize an overdose and determine whether and when naloxone should be administered.[19]

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Furthermore, research suggests that people who use drugs are enthusiastic and increasingly knowledgable about naloxone-availability programs.[20] A survey of people who inject drugs in San Francisco revealed that 87 percent would actively participate in an overdose prevention program that included take-home naloxone and overdose response training.[21]

Syringe Exchange Programs Demonstrate Public Interest in Naloxone

Community programs in a growing number of metropolitan areas are making important strides in increasing public access to naloxone. As of 2010, there were more than 180 naloxone distribution programs operating in fifteen states and the District of Columbia.[22] A number of syringe exchange programs make naloxone available to people who inject illicit drugs, which creates important linkages between services that can help prevent both accidental overdose and the spread of HIV/AIDS, hepatitis and other infectious diseases among people who use injection drugs.

Public health authorities are also implementing overdose prevention programs that are tailored to unique populations. People who do not inject drugs but are at risk of an opioid overdose from prescription pain medications are being trained and provided with naloxone in a growing number of locations including North Carolina, Pennsylvania and Massachusetts. Individuals living with HIV are at heightened risk of a fatal overdose and would benefit from overdose prevention programs tailored to their needs.[23] Naloxone distribution programs are being implemented and integrated into diverse community settings such as social service organizations, addiction treatment programs, parent support groups, and physicians' offices in order to meet the needs of unique populations and adjust to the rapid increase in opiate overdose from both prescription and illegal drugs.[24]

Naloxone-availability efforts have been undertaken in cities and states around the country with considerable success:

- A 2011 evaluation of a program in Pittsburgh found that 89 individuals reported administering naloxone in response to an overdose in a total of 249 separate overdose episodes. Of these 249 overdose episodes in which naloxone was administered, participants reported that 96 percent resulted in overdose reversal.[25]

- An evaluation of a program in New York City found that, of 122 participants trained and provided with naloxone, 71 (nearly 60 percent) reported using naloxone in response to an overdose, and 83 percent of those individuals who received care from program participants were successfully

revived by the naloxone. [26]

- An evaluation of the Chicago Recovery Alliance program – launched in 1998 and expanded in 2000 – in which physicians prescribe naloxone through mobile vans,[27] found that an estimated 10,211 people had engaged in the program and that 1,011 overdoses were reversed through naloxone administration as of December 2007.[28] Chicago, which had experienced a 135 percent increase in heroin overdose deaths between 1996 and 2000, saw a 30 percent decline in opioid overdose deaths, from 466 in 2000 to 324 in 2003.[29]

- In 2011, U.S. Army medical personnel at the Fort Bragg Military Installation in North Carolina implemented Operation Opioid SAFE. The program provides overdose prevention training and naloxone to active duty soldiers who are returning to the United States from overseas assignments and are at higher risk of opioid overdose.[30]

- The Baltimore City Department of Health announced in 2004 that at least 52 overdoses had been reversed through its naloxone overdose prevention program.[31] Reduction of overdose deaths in Baltimore to a 10-year low in 2005 was partly attributed to naloxone distribution.[32]

- San Francisco reported 148 heroin overdose reversals over three years (2004-06) as a direct result of its naloxone availability efforts.[33] Overdose deaths in the city declined in 2004, while overdoses in the rest of California increased by 42 percent.

- Reported overdose deaths in New Mexico, which has had a chronically high drug-related death rate, have dropped by 20 percent since the state's Department of Health began a naloxone-distribution program in 2001.[34]

- Following the introduction in 2006 of a naloxone-access program, Boston recorded 60 peer overdose reversals using naloxone in just over a year.[35]

- A December 2004 study of the Overdose Prevention and Reversal Program at the Lower East Side Harm Reduction Center in New York City revealed that naloxone is "undeniably advantageous for individuals to effectively revive an overdosing friend or family member, instead of resorting to potentially harmful and less effective methods of resuscitation."[36]

- New York State passed legislation in 2005 establishing that physicians may lawfully prescribe naloxone explicitly for potential future opiate overdose.[37]

- In 2007 in North Carolina, recognizing the rising rate of overdose among pain patients, the state medical board approved Project Lazarus in Wilkes County. The program asks providers prescribing opioid pain medications to also prescribe naloxone to a broad range of patients who may be at high risk of overdose. It also dispenses naloxone nasal sprays to other high-risk populations leaving hospital emergency rooms, detox centers and jails.[38]

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Some European countries are promoting increasingly unrestricted naloxone access for more effective overdose prevention:

- In June 2005, the United Kingdom added naloxone to the list of medicines (such as emergency adrenaline, glucagons and snake antivenom) that may be given by injection "by anyone for the purpose of saving life in an emergency" without specific medical instruction.[39]

- The drug has also been available over the counter without problems for many years in Italy.[40]

Managing Unintended Consequences

Some physicians and policymakers have expressed concerns that expanding access to naloxone could promote unintended consequences. The fear is that naloxone availability will encourage additional risky behavior on the part of overdose victims, including failing to seek medical attention, using larger dosages and/or injecting or ingesting additional opioids after naloxone administration to counter the unpleasant effects of naloxone-induced withdrawal.

Ongoing research does not support such claims. Two European studies found no serious adverse effects and observed no increase in risky behavior associated with naloxone availability.[41] One survey of people who inject heroin found that few would use more heroin following administration of naloxone.[42] In another, participants in naloxone programs reported no interest in increasing dosage or injecting more frequently as a result of naloxone availability.[43]

Some encouraging data are also emerging regarding the provision of care. A 2005 study of San Francisco's pilot naloxone access program found that, of 20 overdoses witnessed by drug users trained in overdose response, 19 victims received CPR or naloxone from the trainee and all 20 survived.[44] Expansion of naloxone availability and carefully monitored analyses of its impact would provide important evidence on its potential and on whether concerns about unintended effects are justified.

Recommendations

The following public policy recommendations, if implemented, would significantly reduce the incidence of accidental fatal overdose, especially those involving opioids, in the United States.

1) Enhance overdose prevention education.
2) Improve monitoring, research, outreach and coordination to build awareness of the overdose crisis, its ramifications, and public health approaches to reducing it.[45]
3) Remove barriers to naloxone access.
4) Promote 911 Good Samaritan immunity law reform.

Congress should:

- make ongoing NIDA grants to existing research projects for determining: the circumstances and risk factors of overdose deaths due to contaminants; the efficiency of current naloxone protocols; what overdose and drug abuse prevention messages work best; and who is overdosing, what they're overdosing on, why they're overdosing and how it can be prevented.

- fund clinical trials necessary to assess the feasibility of nationwide over-the-counter access to naloxone and direct the FDA to fast track research and decision making. Federally funded research and design around an FDA-approved intranasal delivery device (similar to an asthma inhaler or nasal decongestant spray) would help enable over-the-counter naloxone.

- act to improve overdose data collection and collaboration between relevant federal and state agencies.

- develop a national annual report on nonfatal and fatal overdoses that includes trends in polydrug use in victims, full toxicology and victim profiles. Ideally, such a report would document which drugs were in the bloodstreams of overdose victims; underlying drugs resulting in overdose deaths; age, sex and race of victims; and location of death, i.e. home, hospital or street.

- quickly disseminate SAMHSA information on model overdose prevention programs and fund training and technical assistance to implement them.

- develop a national alert system for handling regional overdose-related emergencies and widely share DEA information on drug contaminants or other factors affecting the potency and purity of street drugs.

- direct the U.S. Department of Health and Human Services to work with the above-mentioned agencies and the FDA to describe the overdose crisis for Congress, with a state-by-state review that includes overdose patterns, prevention methods, data collection recommendations and programs to improve emergency responses.

- establish trial research programs that examine the efficacy of supervised injection facilities and gather more data.

Congress and states should:

- expand funding for overdose prevention programs to include naloxone distribution and training.

- pass legislation to shield medical professionals, law enforcement and laypeople from civil or criminal liability for participating in naloxone programs or for emergency administration of naloxone.

- support uniform training of first responders, emergency medical technicians and law enforcement personnel on overdose prevention and management and on the proper use of naloxone.

States and cities should:

- provide education in prevention and overdose reversal to people residing in homeless shelters and to individuals prior to their release from jails, prisons, residential treatment and detoxification programs.

- provide overdose education at methadone clinics and all syringe exchange programs.

- support public education initiatives to foster and improve cooperation with ambulance and police services.

- train drug users in CPR and rescue breathing and address treatment and relapse concerns.

- encourage doctors to prescribe naloxone to opioid pain patients and better educate their patients about the risks inherent to opioid analgesics.

- devise overdose trainings and education campaigns targeted at general- and family-practice physicians, registered nurses, pharmacists and other medical personnel.

- enact 911 Good Samaritan immunity laws at all jurisdictional levels to protect overdose witnesses from criminal prosecution.

- shield first responders from liability should the use of naloxone prove ineffective.

- consider the benefits of medically supervised injection facilities as a method of reducing drug-related harm to individuals, reducing crime and improving public safety and quality of life.

Doctors should:

- provide patients using prescription methadone or other opioids for pain management with overdose prevention instruction that covers diversion to “non-medical” use.

- be encouraged to prescribe naloxone to opioid pain patients and better educate their patients about the risks inherent to opioid analgesics.

Conclusion

Rising incidences of injury and death related to accidental drug overdoses remain a hidden crisis in the United States. The first step in combating this crisis must be the promotion of informed public discussion and debate about the problem, which claims tens of thousands of lives each year.

The public health crisis of accidental fatal drug overdoses can be substantially addressed. Proven strategies exist to reduce the incidence of overdose and to dramatically lower the chance of fatality when an overdose does occur.

By employing the appropriate public health approaches, federal, state and local authorities can effectively reduce overdose risk and fatality rates. Together, improved gathering and dissemination of critical drug-related information, expansion of access to naloxone, and provision of basic legal protections for good Samaritans and medical personnel, as well as genuine exploration of more cutting-edge strategies, can prevent overdoses and save thousands of lives.

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Addiction

RESEARCH REPORT

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Randomized controlled trial comparing the effectiveness and safety of intranasal and intramuscular naloxone for the treatment of suspected heroin overdose

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ABSTRACT

Aims Traditionally, the opiate antagonist naloxone has been administered parenterally; however, intranasal (i.n.) administration has the potential to reduce the risk of needlestick injury. This is important when working with populations known to have a high prevalence of blood-borne viruses. Preliminary research suggests that i.n. administration might be effective, but suboptimal naloxone solutions were used. This study compared the effectiveness of concentrated (2 mg/ml) i.n. naloxone to intramuscular (i.m.) naloxone for suspected opiate overdose. **Methods** This randomized controlled trial included patients treated for suspected opiate overdose in the pre-hospital setting. Patients received 2 mg of either i.n. or i.m. naloxone. The primary outcome was the proportion of patients who responded within 10 minutes of naloxone treatment. Secondary outcomes included time to adequate response and requirement for supplementary naloxone. Data were analysed using multivariate statistical techniques. **Results** A total of 172 patients were enrolled into the study. Median age was 29 years and 74% were male. Rates of response within 10 minutes were similar: i.n. naloxone (60/83, 72.3%) compared with i.m. naloxone (69/89, 77.5%) [difference: −5.2%, 95% confidence interval (CI) −18.2 to 7.7]. No difference was observed in mean response time (i.n.: 8.0, i.m.: 7.9 minutes; difference 0.1, 95% CI −1.3 to 1.5). Supplementary naloxone was administered to fewer patients who received i.m. naloxone (i.n.: 18.1%; i.m.: 4.5%) (difference: 13.6%, 95% CI 4.2–22.9). **Conclusions** Concentrated intranasal naloxone reversed heroin overdose successfully in 82% of patients. Time to adequate response was the same for both routes, suggesting that the i.n. route of administration is of similar effectiveness to the i.m. route as a first-line treatment for heroin overdose.

Keywords Heroin, intranasal, naloxone, opioid, overdose, resuscitation.

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INTRODUCTION

Heroin overdose is a major cause of death in some countries [1–4]. In most instances, timely treatment with naloxone, an opiate antagonist, reverses opioid toxicity. In the community setting, paramedics administer naloxone routinely for suspected opioid overdose via the intramuscular (i.m.) and/or intravenous (i.v.) routes [5–7]. Administration of the drug by these routes to populations such as injecting drug users carries some risk. Injecting drug users are often infected with blood-borne viruses such as human immunodeficiency virus (HIV), hepatitis B (HBV) and hepatitis C (HCV) [8–10], and in spite of best practice guidelines designed to minimize needlestick injury among health workers, needlestick injuries occur, allowing for the possibility of blood-borne virus transmission. Among health care workers, 4% of HIV infections and 40% of HBV and HCV infections occur after occupational exposure [11].

There is growing interest in intranasal (i.n.) administration of naloxone [12–17]. The benefits of i.n. administration include ease of access, greatly reduced

needlestick injury risk and the potential for peer and non-health professional administration. Its use in acute overdose is supported by a number of small cohort studies [18–22]. To date, there has only been one randomized trial comparing i.n. and i.m. administration [22]. It found i.m. administration resulted in shorter response time than i.n. administration (mean 6 minutes versus 8 minutes), but the i.n. route was successful for 74% of patients. The preparation used for i.n. administration in that study (2 mg in 5 ml) far exceeded recommendations for i.n. use of drugs that specify volumes of less than 1 ml per nostril [12]. It was, however, the only preparation available at the time of that study. That raised the question of whether concentrated, small-volume dosing would improve the effectiveness of i.n. naloxone.

The aim of this study was to determine the effectiveness and safety of concentrated (2 mg/ml) i.n. naloxone compared to i.m. naloxone for treatment of suspected opiate overdose in the pre-hospital setting. Specifically, the study sought to compare the two preparations in terms of response times, side effects, need for a second dose of naloxone and final outcomes.

METHODS

Participants

This was a prospective, randomized, unblinded trial conducted in Melbourne, Victoria, Australia. Patients requiring treatment by six designated branches of Metropolitan Ambulance Service (MAS, Victoria) for suspected opiate overdose during the period from 1 August 2006 to 31 January 2008 were considered for enrolment. We chose these branches as they were located in areas with higher incidence of heroin overdose, known historically to capture more than half of the heroin overdoses in the metropolitan region [23].

Patients were eligible for enrolment if they suffered a suspected opiate overdose [altered conscious state, pinpoint pupils, respiratory depression (respirations < 10)], were unrousable as defined by Glasgow Coma Score (GCS) $\leq$12 and had no major facial trauma, blocked nasal passages or epistaxis. The GCS score was chosen as the measure of sedation because it is the parameter used operationally in the ambulance service within which our study was conducted [24].

We were aiming for a consecutive sample. However, paramedic staff turnover meant that not all eligible patients were enrolled during the study period. Paramedics required training in the study protocol and use of the atomization device before enrolling participants. This meant that potential participants, who were treated by paramedics who had not been trained, could not be enrolled into the study. During the study period there were approximately 1300 heroin overdose attendances, defined as a patient with a positive response to the administration of naloxone by paramedics, in metropolitan Melbourne [25].

Melbourne Health Human Research Ethics Committee (HREC) approved the study. Requirement for individual patient consent was waived. Subjects were informed of their participation by way of an information letter after regaining consciousness which allowed them to withdraw themselves from the study or seek further information.

Procedure

Allocation of mode of administration (i.n. or i.m.) was achieved by block randomization using an online computer program to achieve a random sequence of allocations. Block randomization was performed to achieve equal distribution of allocations (i.n. or i.m.) to each study site. The nature of pre-hospital emergency care and the urgency of treatment for this condition prohibits more sophisticated double-treatment randomization techniques.

Randomization envelopes, present in each ambulance, were designed by the study investigators to conceal the randomization group. The allocation notice was positioned between the study information sheet and the envelope was made of thicker, non-transparent paper. This was designed to prevent paramedics choosing the randomization arm selectively for potential subjects. All envelopes were identical from the outside. All envelopes were numbered sequentially according to the block randomization procedure, and all envelopes were accounted for at monthly intervals and at the end of the study.

After determining eligibility, a randomization envelope was opened at the scene, allocating patients to receive either i.n. naloxone 2 mg or i.m. naloxone 2 mg. Supportive care (primarily breathing support) was administered simultaneously, in accordance with ambulance clinical practice guidelines for this condition.

Administration by i.m. injection was by standard MAS practice using a pre-packaged 'min-i-jet'™ preparation containing naloxone solution (2 mg/5 ml). Naloxone for i.n. administration was constituted in a tamper-evident vial as a preparation of 2 mg in 1 ml, manufactured specifically for the study and complying with national medication quality and safety standards. At the scene, contents of the vial were withdrawn into a luer-lock syringe, and the syringe was then attached to a mucosal atomization device (MAD®). Paramedics were instructed to depress the syringe rapidly during i.n. administration to achieve adequate atomisation. Study participants received 1 mg (0.5 ml) in each nostril.

Standard supportive care, including airway and breathing support as needed, continued throughout the

data collection period until either recovery or transport to hospital. All patients who failed to respond to either form of naloxone treatment after 10 minutes were eligible for a 'rescue' dose of 0.8 mg i.m. naloxone. The 10-minute recommendation was chosen for consistency with treatment recommendations already laid down in the relevant ambulance service protocols [26].

Measurements

Paramedics entered study information into an electronic patient case record (e-PCR), as per the Victorian Ambulance Clinical Information System (VACIS). The e-PCR is the tool used by paramedics to document emergency care administered for all cases. The data for this study were extracted by explicit review of these files. Information collected included demographic data [age, gender, vital signs (including respiratory rate, pulse, GCS)], suspicion of other drugs/alcohol taken, specific location, other people present, resuscitative measures (basic life support, airway management), naloxone administration (dose, route, time of administration, difficulty during administration, requirement for secondary naloxone), response times, side effects and final outcome (self-care, hospitalization, death). Data were entered directly into a Microsoft Access database developed specifically for this study. All data entries were checked for accuracy by an independent blinded research assistant. A third researcher arbitrated discrepant data extraction (three cases only).

The primary outcome of interest was the proportion of patients with an adequate response within 10 minutes of naloxone administration. Response was defined as effective and spontaneous respirations at a rate ≥ 10 per minute and/or GCS ≥ 13. Patients who received a supplementary dose were classified automatically as not achieving an adequate response within 10 minutes. This end-point was chosen to be consistent with current ambulance practice guidelines, where secondary naloxone is recommended for inadequate response after a 10-minute period [25]. While, for many clinicians, reversal of respiratory depression is the key outcome, improvement in level of consciousness, indicating the reversal of over-sedation responsible for respiratory depression, has been used by previous studies in this field [18,19] as an indicator of successful treatment.

Secondary outcomes included time to adequate response, hospitalization, adverse event rate and requirement for 'rescue' naloxone due to inadequate primary response as judged by the treating paramedics.

Adverse events were grouped into three categories including drug-related (vomiting, nausea, seizure, sweating, tremor, acute pulmonary oedema, increased blood pressure, tremulousness, seizures, ventricular tachycardia and fibrillation, cardiac arrest, agitation and paraesthesia), administration-related (nasal obstruction, nasal deformity) and study-related (epistaxis, ruptured septum, spitting, coughing, leakage of solution from nasal passages).

Data analyses

Descriptive analyses [proportion, mean, median, effect size difference with 95% confidence interval (CI)] were conducted using Intercooled Stata version 8.2 [27] to describe the demographic data and compare groups (i.n. and i.m.) for observed differences (drug use, alcohol use). Primary outcomes were compared by univariate analysis including observed difference and odds ratio (OR) with 95% CI, hazard ratio (HR) and χ^2 analysis. Correlates included in the multivariate models (logistic regression, Cox regression) were age, gender and concomitant alcohol and/or drug use.

Response time was compared using Kaplan–Meier survival analysis. A clinically significant difference in response time was defined as 1 minute. This end-point was based on the likelihood of oxygen de-saturation after 1 minute as a result of respiratory depression. For all patients, entry time was defined as 1 minute after administration by either route; exit time was the earliest of (i) adequate response; or (ii) rescue naloxone; or (iii) last recorded observation. Only the first of these exit times was regarded as an event, and the latter two were considered as censored observations.

Based on previous studies [18,19,22], we needed to recruit at least 84 patients per group to detect a difference in proportions for successful response to naloxone treatment of 11% (100% versus 89%) with power 80% (Intercooled Stata version 10.0) [28]. With this sample, and assuming similar results of around 95% success for both groups, the width of the 95% CI for difference in risk will be $\pm$ 6.4%.

RESULTS

Two hundred and sixty-six patients were treated for suspected heroin overdose at the enrolment sites during the study period; 13 patients were not considered for study enrolment. A further 75 patients were not eligible, as shown in the participant flow diagram (Fig. 1), including 20 patients who could not be included because paramedics at the site had not been trained in the study protocol. Of the remaining 178 patients, six patients were excluded from participation for the following reasons: equipment for intranasal administration was missing for three patients and three patients became alert prior to naloxone administration (two in the i.n. group and one in the i.m. group). These six patients were excluded from

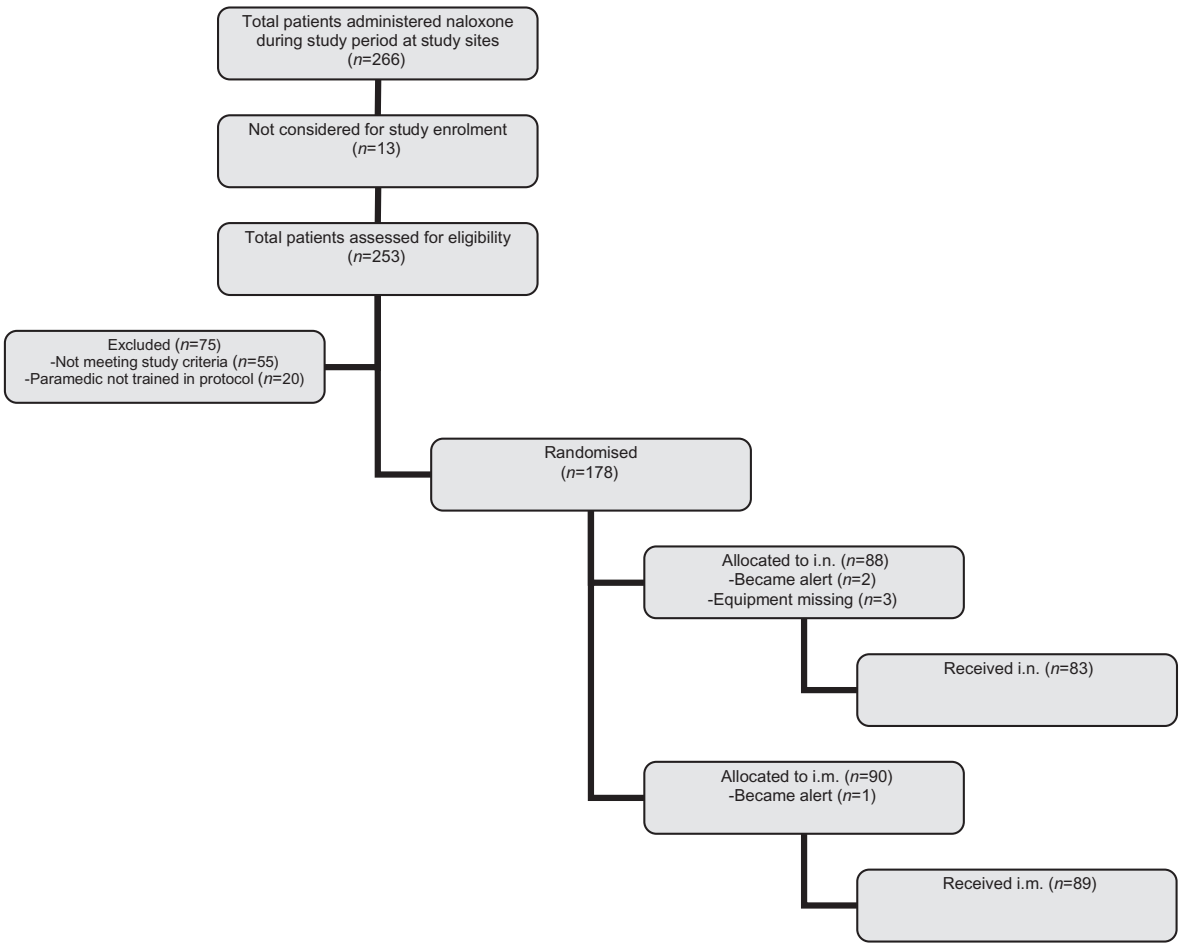

Figure 1 Participant flow diagram. i.m.: intramuscular; i.n.: intranasal

final data analysis. Hence, data were not analysed on an 'intention-to-treat' basis but, rather, analysed by the treatment they received.

The final sample consisted of 172 patients who received i.n. (83 patients) or i.m. (89 patients) naloxone.

The characteristics of the patients are shown in Table 1 according to their allocated treatment. Patients were broadly similar for age, gender and treatment time. The median age was 29 years, and 74% were male. An important difference in baseline characteristics was observed, with more patients in the i.n. group suspected of concomitant drug use compared to the i.m. group [i.n.: 21.7%, i.m.: 9.0%, difference 12.7% (95% CI 2.0, 23.4)].

Study outcomes are shown in Table 2. One hundred and twenty-nine patients (75%) achieved an adequate response within 10 minutes from initial naloxone treatment, 60 (72.3%) in the i.n. group and 69 (77.5%) in the i.m. group [difference −5.2% (95% CI −18.2, 7.7%)]. Mean response time (minutes) was similar between the two groups [i.n.: 8.0, i.m.: 7.9, HR 0.8 (95% CI 0.6, 1.2)], as shown in Fig. 2. The absence of significant difference was supported by multivariate analysis for adequate response within 10 minutes [OR 0.7 (95% CI 0.3, 1.5)] and actual response time [HR 0.84 (95% CI 0.6, 1.2)].

Table 1 Comparison of characteristics for patients treated for heroin overdose with intranasal or intramuscular naloxone.

Variable	*Intranasal (%) n = 83*	*Intramuscular (%) n = 89*
Age (mean years)	30.6	31.8
Treatment time[a] (mean minutes)	13.1	13.4
Male	64 (77.1)	63 (70.8)
Concomitant alcohol	25 (30.1)	31 (34.8)
Concomitant drugs	18 (21.7)	8 (9.0)[b]
Concomitant alcohol ± drugs	39 (47.0)	33 (37.1)
Public use	42 (50.6)	47 (52.8)

[a]Time from ambulance call to administration of naloxone treatment.
[b]Observed difference 12.7% (95% confidence interval 2.0, 23.4).

Rescue naloxone was administered more often to patients in the i.n. group (18.1%) compared with those

Table 2 Comparison of outcomes for patients treated by intranasal (i.n.) or intramuscular (i.m.) naloxone.

Outcome	*i.n. (83)* *n (%)*	*i.m. (89)* *n (%)*	*Difference (95% CI)*	*Univariate analysis* *OR (95% CI)*	*Multivariate analysis* *OR (95% CI)*
Adequate response ≤ 10 minutes	60 (72.3)	69 (77.5)	−5.2%, (−18.2, 7.7)	0.8, (0.4, 1.5)	0.7, (0.3, 1.5)
Rescue naloxone for inadequate response	15 (18.1)	4 (4.5)	13.6%, (4.2, 22.9)	4.7, (1.6, 14.1)	4.8, (1.4, 16.3)*
Hospitalization	24 (28.9)	23 (25.8)	3.1%, (−10.3, 16.4)	1.2, (0.6, 2.3)	1.3, (0.6, 2.7)
Minor adverse event	16 (19.3)	17 (19.1)	0.2%, (−11.6, 11.9)	1.0, (0.5, 2.2)	1.1, (0.5, 2.5)
				HR (95% CI)	HR (95% CI)
Mean response time (minutes)	8.0	7.9	0.1 (−1.3, 1.5)	0.8, (0.6, 1.2)**	0.84, (0.6, 1.2)***

*$P = 0.01$; **$P = 0.29$; ***$P = 0.29$. HR: hazard ratio in i.n. group, relative to i.m. group; OR: odds ratio for each outcome in i.n. group, relative to i.m. group; CI: confidence interval.

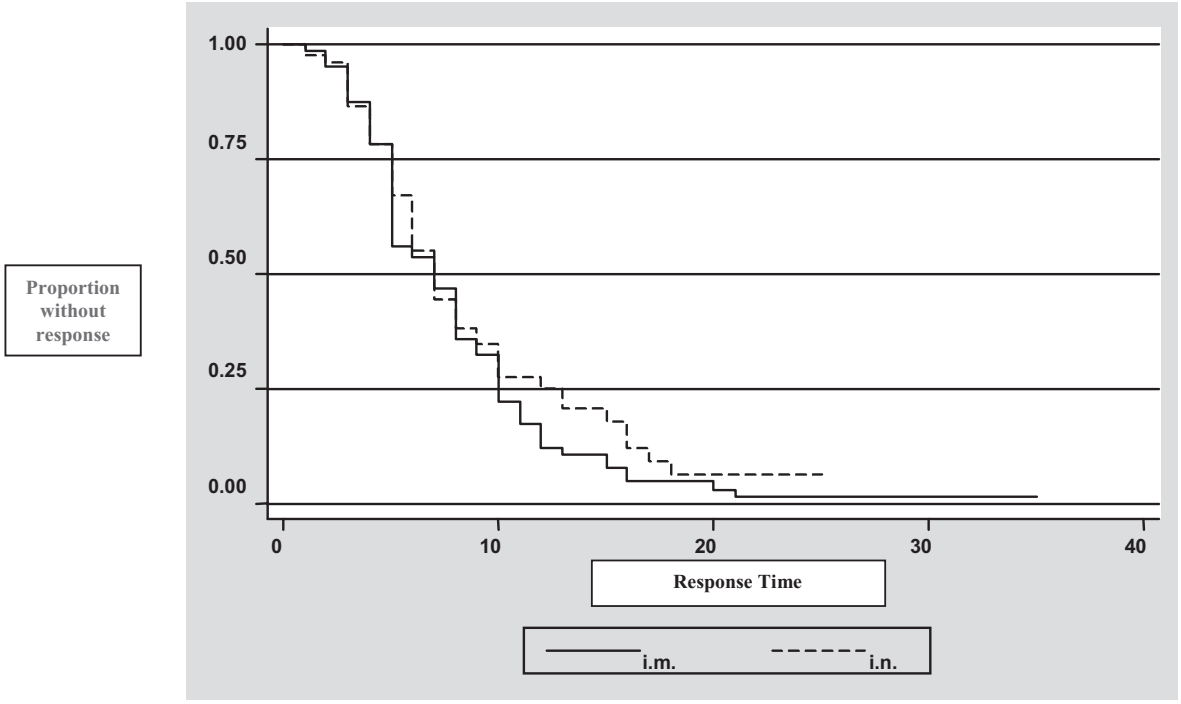

Figure 2 Kaplan–Meier survival curve comparing response times for patients who receive intranasal (i.n.) or intramuscular (i.m.) naloxone

in the i.m. group (4.5%) [difference 13.6% (95% CI 4.2, 22.9%)]. After controlling for age, gender and suspected concomitant alcohol and/or drugs, this difference remained statistically significant [OR 4.8 (95% CI 1.4, 16.3)]. Twenty-four patients did not achieve an adequate response at 10 minutes and were not administered secondary naloxone (i.n.: 8/23, i.m.: 16/20). Average response from initial naloxone treatment was 16 minutes for these cases. It is our assumption that paramedics chose to wait for a response after the 10-minute cut-off, and patients responded without secondary naloxone administration. However, we did not collect information regarding reasons for not administering naloxone for these cases.

There was one major adverse event. A patient who received i.m. naloxone had a *grand mal* epileptic seizure, was given i.v. diazepam, and was transferred subsequently to hospital for further management. Minor adverse events were similar between the two groups (i.n.: 19.3%, i.m.: 19.1%; difference 0.2% 95% CI −11.6, 11.9), as were hospitalization rates (i.n.: 28.9%, i.m.: 25.8%; difference 3.1% 95% CI −10.3, 16.4). No difference was observed in agitation and/or violence (i.n.: 6.0%, i.m.: 7.9%), nausea and/or vomiting (i.n.: 8.4%, i.m.: 7.9%) and headache (i.n.: 4.8%, i.m.: 3.3%) after naloxone treatment. To our knowledge there were no needlestick injuries during i.m. administration of naloxone during the study period.

DISCUSSION

Emergency medical service (EMS) personnel are at an increased risk of blood-borne virus exposure when providing treatment to injecting drug users, a population with an increased prevalence of HIV, and HBV and HBC [29–31]. Administration of medication via non-parenteral routes is one means of reducing needlestick injury risk. This study has shown that administration of naloxone via the i.n. route, using a concentrated solution, to patients with suspected heroin overdose in the pre-hospital setting is a safe and effective treatment option, with similar response rates, response times and side-effect profile to i.m. administration.

Previous studies have reported success rates for i.n. naloxone between 74 and 91% [18,19,22]. In these studies, successful treatment was defined as an adequate response to i.n. naloxone without the requirement to administer secondary naloxone treatment. Taken together with this study, they provide strong evidence that i.n. naloxone is effective for initial treatment of heroin overdose in the community.

Current ambulance protocols for naloxone in most jurisdictions recommend i.m. administration [26,32]. The protocol for the ambulance service involved in this study involves naloxone administration using a pre-packaged syringe and needle (min-i-jet™), which means that needlestick injury protection is reliant upon paramedics adhering to good practice around the management of needles; i.n. administration of naloxone offers clear advantages here in terms of a reduction in needlestick injury risk. Given our findings, it would appear that i.n. naloxone is a viable therapy that reduces the possibility of needlestick injury among paramedics when compared to parenteral alternatives.

While the finding that approximately a quarter of patients in each group did not respond to naloxone is important, it should be noted that there was no statistically significant difference between the groups with regard to the proportion of non-responders. Lack of response to naloxone therapy after ambulance response has been reported (20–63%) [18,19,22]. Non-response may reflect simple misclassification (heroin overdose is notoriously difficult to define) [33], but may reflect other causes such as the possibility that the delay between overdose and the attendance of the ambulance reduces adequate response, with greater delays possibly being associated with more advanced respiratory depression. Polydrug use and other physical comorbidity may also be relevant [34]. Irrespectively, the non-response we observed highlights the importance of pre-hospital supportive care (by bystanders followed initially by EMS personnel) that remains an essential component in preventing deaths.

Response to i.m. naloxone treatment was slower in this study (8 minutes) in comparison to previous research (6 minutes) [22]. It is unclear why this is so, as the naloxone preparation and protocol for i.m. administration were identical in both studies, but there may have been differences between studies regarding the type and quantity of drugs used by participants prior to overdose. Response to i.n. administration was the same as reported previously [22], despite the change in concentration.

A concentrated preparation of naloxone has not been investigated previously. For optimal absorption and effectiveness, it is advised that medication for i.n. administration be prepared in volumes of less than 1 ml per nostril [12]. A suitable preparation for nasal administration (<1 ml per nostril) of a dose equivalent to that used in this study is not currently available in Australia or overseas. Naloxone for i.n. administration was manufactured specifically for this study under the legislative authority as a registered clinical trial. Previous studies using dilute preparations have reported success rates between 74 and 91% [18,19,22]. The success rate in this study is not significantly better than these, so it cannot be concluded that the concentrated solution is more effective. That said, smaller volumes are easier to administer and lend themselves more effectively to pre-packaged devices. In addition, there were no reports of excess fluid expulsion from the nose or coughing by study subjects in this current study, as was observed in previous research [22].

Although patients who received i.n. naloxone were 4.8 times (95% CI 1.4, 16.3) more likely to receive rescue naloxone, this finding needs to be considered from a clinical perspective. Administration of rescue naloxone to patients included in our study was a subjective decision made by paramedics at the scene, and was very dependent upon the individual paramedic and their comfort waiting for an adequate response, the patient's respiratory and conscious state and patient request for further naloxone. Paramedics were encouraged to administer secondary naloxone if an inadequate response was observed after 10 minutes. It is possible that a response might have been observed for some patients if a longer observation period had occurred. Also, randomization was not blinded. A double-blind study design would have eliminated this limitation. Paramedics might have administered secondary naloxone to patients who received the i.n. allocation due to apprehension about the effectiveness of the i.n. treatment option. However, the possibility that patients who receive i.n. naloxone may require rescue naloxone more often cannot be ruled out by our study.

The fact that 72% of the i.n. group responded within 10 minutes highlights the potential of i.n. naloxone to be used for peer administration. Naloxone distribution

programmes using parenteral naloxone have been instituted in some places [32,35], and favourable reports of lives saved have been reported [35]. The preferred route for peer naloxone administration is an important issue, and has been reported in a separate study [36]. Nasal administration for peer naloxone distribution was preferred (74%) by current heroin users ($n = 99$) in a study performed in Melbourne (Australia) during 2007 [36]. Administration via the i.n. route may be a simpler option for those without professional health care training and largely eliminates infection risk. An opioid overdose prevention programme in Boston (USA) distributes an intranasal naloxone spray to potential bystanders [37]. They report that after 15 months from programme commencement there have been 74 successful overdose reversals, and few problems with the i.n. spray.

Our study responds to the need for well-designed randomized clinical trials in the drug and emergency medicine research fields. It does, however, have some limitations that should be considered when interpreting the results. The study may have been strengthened by a double-blinded study design; however, the pre-hospital setting for research poses challenges that require flexibility and simplicity in study design [38]. Not all patients were enrolled into the study, although we encouraged paramedics to consider all patients treated for heroin overdose for recruitment. Our study did not include all ambulance sites in metropolitan Melbourne, hence only 266 were considered for recruitment. This might have resulted in a systematic bias in enrolment. We were also unable to measure for opioid, polydrug or alcohol load. Hence, heroin overdose was not confirmed. Tolerance to heroin has been shown to be influenced greatly by alcohol and polydrug use [39–41]. Paramedics document routinely evidence of polydrug and/or alcohol consumption prior to the event, but there may have been some unidentified cases. Our sample size calculations were made on data that was available at the time of study design. This over-estimated significantly the success rates of both routes of administration and posed a potential threat to the study's power. This is countered by the almost identical response times, so a clinically significant difference in effectiveness is unlikely.

In conclusion, we have shown that naloxone administered via the i.n. route is an effective and safe intervention for the initial management of heroin overdose. However, the concentrated preparation we used was not more effective than the less concentrated version used in a previous study. The i.n. option offers rescuers a needleless option as first-line treatment and opens opportunities for wider distribution of naloxone for peer and non-health care administration. A low adverse event rate was found for both (i.n. and i.m.) routes.

Declarations of interest

None.

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Community-Based Opioid Overdose Prevention Programs Providing Naloxone — United States, 2010

Drug overdose death rates have increased steadily in the United States since 1979. In 2008, a total of 36,450 drug overdose deaths (i.e., unintentional, intentional [suicide or homicide], or undetermined intent) were reported, with prescription opioid analgesics (e.g., oxycodone, hydrocodone, and methadone), cocaine, and heroin the drugs most commonly involved (*1*). Since the mid-1990s, community-based programs have offered opioid overdose prevention services to persons who use drugs, their families and friends, and service providers. Since 1996, an increasing number of these programs have provided the opioid antagonist naloxone hydrochloride, the treatment of choice to reverse the potentially fatal respiratory depression caused by overdose of heroin and other opioids (*2*). Naloxone has no effect on non-opioid overdoses (e.g., cocaine, benzodiazepines, or alcohol) (*3*). In October 2010, the Harm Reduction Coalition, a national advocacy and capacity-building organization, surveyed 50 programs known to distribute naloxone in the United States, to collect data on local program locations, naloxone distribution, and overdose reversals. This report summarizes the findings for the 48 programs that completed the survey and the 188 local programs represented by the responses. Since the first opioid overdose prevention program began distributing naloxone in 1996, the respondent programs reported training and distributing naloxone to 53,032 persons and receiving reports of 10,171 overdose reversals. Providing opioid overdose education and naloxone to persons who use drugs and to persons who might be present at an opioid overdose can help reduce opioid overdose mortality, a rapidly growing public health concern.

Overdose is common among persons who use opioids, including heroin users. In a 2002–2004 study of 329 drug users, 82% said they had used heroin, 64.6% had witnessed a drug overdose, and 34.6% had experienced an unintentional drug overdose (*4*). In 1996, community-based programs began offering naloxone and other opioid overdose prevention services to persons who use drugs, their families and friends, and service providers (e.g., health-care providers, homeless shelters, and substance abuse treatment programs). These services include education regarding overdose risk factors, recognition of signs of opioid overdose, appropriate responses to an overdose, and administration of naloxone.

To identify local program locations and assess the extent of naloxone distribution, in October 2010 the Harm Reduction Coalition e-mailed an online survey to staff members at the 50 programs then known to distribute naloxone. Follow-up e-mails and telephone calls were used to encourage participation, clarify responses, and obtain information on local, community-based programs. The survey included questions about the year the program began distributing naloxone, the number of persons trained in overdose prevention and naloxone administration, the number of overdose reversals reported, and whether the totals were estimates or based on program data. The survey also asked questions regarding the naloxone formulations currently distributed, any recent difficulties in obtaining naloxone, and the program's experience with naloxone distribution.

Staff members at 48 (96%) of the 50 programs completed the online survey. Since the first program began distributing naloxone in 1996, through June 2010, the 48 responding programs reported providing training and distributing naloxone to an estimated 53,032 persons (program range: zero to 16,220; median: 102.5; mean: 1,104.8).* From the first naloxone distribution in 1996 through June 2010, the programs

* The number of participants to whom naloxone was distributed was estimated by 29 responding programs (26.5% of total) and based on program data for 19 respondents (73.5%).

INSIDE

106 Ectopic Pregnancy Mortality — Florida, 2009–2010
110 Notes from the Field: Norovirus Infections Associated with Frozen Raw Oysters — Washington, 2011
111 QuickStats

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

received reports of 10,171 overdose reversals using naloxone (range: zero to 2,385; median: 32; mean: 211.9).† During a recent 12-month period, respondents distributed an estimated 38,860 naloxone vials (Table).§ Using data from the survey, the number of programs beginning naloxone distribution each year during 1996–2010 was compared with the annual crude rates of unintentional drug overdose deaths per 100,000 population from 1979 to 2008 (Figure 1) (*1*).

The 48 responding programs were located in 15 states and the District of Columbia. Four responding programs provided consolidated data for multiple local, community-based programs. Three state health departments, in New York, New Mexico, and Massachusetts, provided data for 129 local programs (65, 56, and eight, respectively); a nongovernmental organization in Wisconsin provided data on a statewide operation with 16 local programs. In all, the 48 responding programs provided data for 188 local opioid overdose prevention programs that distributed naloxone (Figure 2). Nineteen (76.0%) of the 25 states with 2008 drug overdose death rates higher than the median and nine (69.2%) of the 13 states in the highest quartile (*1*) did not have a community-based opioid overdose prevention program that distributed naloxone (Figure 2).

For a recent 12-month period, the 48 responding programs reported distributing 38,860 naloxone vials, including refills (range: zero to 12,070; median: 97; mean: 809.6).¶ Overdose prevention programs were characterized as small, medium, large, or very large, based on the number of naloxone vials distributed during that period. The six responding programs in the large and very large categories distributed 32,812 (84.4%) of the naloxone vials (Table).

Twenty-one (43.7%) responding programs reported problems obtaining naloxone in the "past few months" before the survey. The most frequently reported reasons for difficulties obtaining naloxone were the cost of naloxone relative to available funding and the inability of suppliers to fill orders.**

† The number of opioid overdose reversals was estimated by 26 responding programs (25.4% of total) and based on program data for 22 respondents (74.6%).

§ The number of vials distributed to participants during 2009 or July 2009–June 2010 was estimated by 21 program respondents (6.5% of total) and based on program data for 27 respondents (93.5%).

¶ Responding programs provide naloxone for injection in multidose (10 mL) and single-dose (1 mL) vials with concentrations of 0.4 mg/mL. Vials that are adapted for intranasal use (using a mucosal atomization device) are single-dose 2 mL vials with concentration of 1 mg/mL. Typically, respondents provide 1 multidose or 2 single-dose vials in an overdose rescue kit. Forty-two (87.5%) of 48 reported providing only injectable naloxone (63.0% of total vials), four (8.3%) provided only intranasal naloxone (33.1%), and four (8.3%) provided both injectable and intranasal naloxone (3.9%).

** The two most commonly reported reasons for difficulties obtaining naloxone were the cost of naloxone relative to available funding (seven responding programs) and inability of suppliers to fill orders (13 respondents). Four respondents reported interruptions because they did not have a qualified medical provider to either order naloxone from suppliers or prescribe naloxone to users. Five reported two of the three reasons for interruptions.

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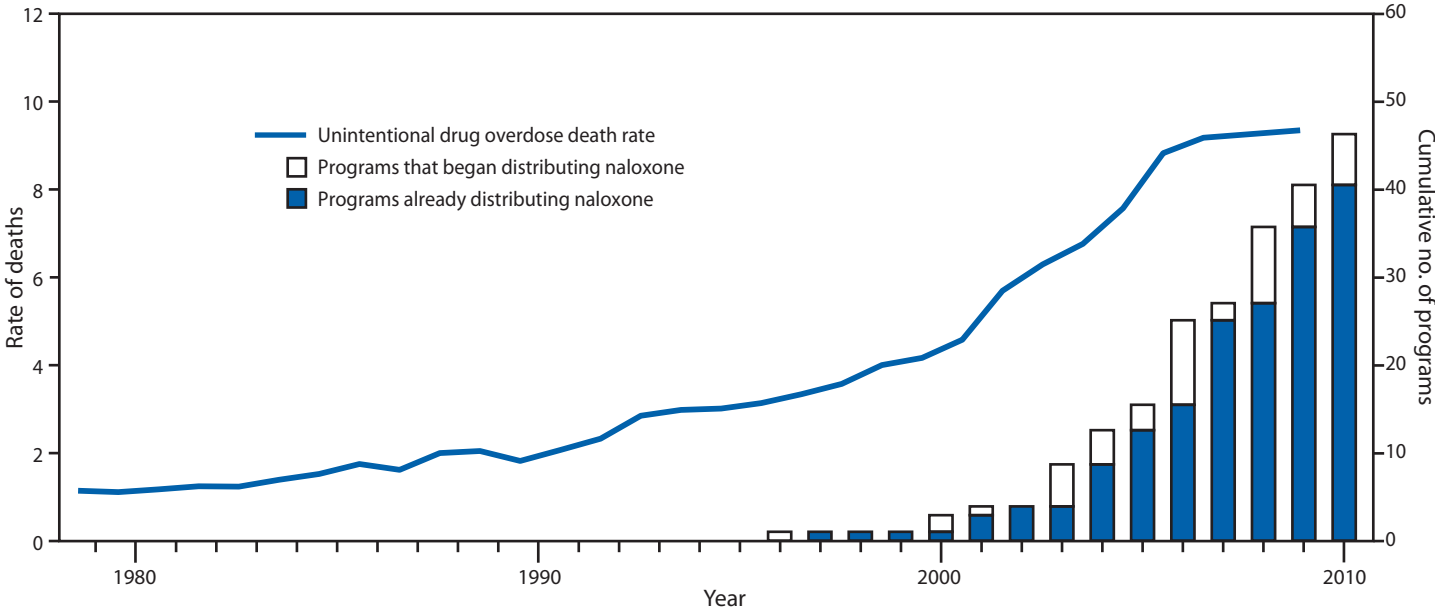
TABLE. Number of opioid overdose programs/local programs, naloxone vials provided in a recent 12-month period, program participants overall, and overdose reversals, by program size — United States, 1996–2010

Program size (by no. of vials of naloxone provided during a recent 12-month period)	No. of program respondents	No. of local programs	No. of naloxone vials provided to participants during a recent 12-month period*		No. of program participants from beginning of program through June 2010†		Reported opioid overdose reversals from beginning of program through June 2010§	
			No.	(%)	No.	(%)	No.	(%)
Small <100	24	24	754	(1.9)	1,646	(3.1)	371	(3.6)
Medium 101–1,000	18	18	5,294	(13.6)	13,214	(24.9)	3,241	(31.9)
Large 1,001–10,000	4	74	9,792	(25.3)	26,213	(49.4)	5,648	(55.5)
Very large >10,000	2	72	23,020	(59.2)	11,959	(22.6)	1,091	(10.7)
Total	**48**	**188**	**38,860**	**(100.0)**	**53,032**	**(100.0)**	**10,171**	**(100.0)**

* Units of naloxone (including number of vials or intranasal doses and refills) distributed to participants during 2009 or July 2009–June 2010. Estimated by 21 program respondents (2,524 units, 6.5% of total) and based on program data for 27 respondents (36,336 units, 93.5%).
† Number of participants to whom naloxone was distributed from the start of program through June 2010. Estimated by 29 respondents (14,066 participants, 26.5% of total) and based on program data for 19 respondents (38,966 participants, 73.5%).
§ Number of opioid overdose reversals reported using the naloxone provided by the program from the start of the program through June 2010. Estimated by 26 respondents (2,582 reversals, 25.4% of total) and based on program data for 22 respondents (7,589 reversals, 74.6%).

FIGURE 1. Annual crude rates* of unintentional drug overdose deaths and number of overdose prevention programs distributing naloxone — United States, 1979–2010



* Per 100,000 population.

Reported by

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Editorial Note

The findings in this report suggest that distribution of naloxone and training in its administration might have prevented numerous deaths from opioid overdoses. Syringe exchange and harm reduction programs for injection-drug users were early adopters of opioid overdose prevention interventions, including providing naloxone (*5,6*). More noninjection opioid users might be reached by opioid overdose prevention training and (where feasible) provision of naloxone in jails and prisons, substance abuse treatment programs, parent support groups,

and physician offices (Maya Doe-Simkins, MPH, Boston Medical Center, personal communication, 2011). Reaching users of prescription opioid analgesics is important because a large proportion of drug overdose deaths have been associated with these drugs (*1,7*).

Widespread concern about the substantial increases in opioid drug overdose deaths has prompted adoption of various other prevention measures, including 1) education of patients, clinicians, pharmacists, and emergency department staff members; 2) issuing opioid prescribing guidelines; 3) prescription drug monitoring programs; 4) legal and administrative efforts to reduce illegal prescribing; 5) prescription drug take-back programs; and 6) improved access to substance abuse treatment (*8,9*). Programs such as Project Lazarus and Operation OpioidSAFE in North Carolina include clinicians prescribing naloxone to patients receiving opioid analgesic prescriptions who meet criteria for higher overdose risk (*8*) (Anthony Dragovich, MD, Womack Army Medical Center, Fort Bragg, North Carolina, personal communication, 2011).

In the United States, naloxone is provided to participants in different ways, including through onsite medical professionals and the use of standing orders. Recognizing the potential value of providing naloxone to laypersons, some states (e.g., California, Illinois, New Mexico, New York, and Washington) have passed laws and changed regulations to provide limited liability for prescribers who work with programs providing naloxone to laypersons. In addition, Washington, Connecticut, New Mexico, and New York have enacted Good Samaritan laws providing protection from arrest in an effort to encourage bystanders at a drug overdose to call 911 and use naloxone when available (*9*). Because of high overdose mortality among persons who use drugs, the Global Fund to Fight AIDS, Tuberculosis, and Malaria recommends naloxone distribution as a component of comprehensive services for drug users (*10*).

In this analysis, the majority (76.0%) of the 25 states with 2008 age-adjusted drug overdose death rates higher than the median did not have a community-based opioid overdose prevention program that distributed naloxone. High death rates provide one measure of the extent of drug overdoses; however, the number of deaths also should be considered. For example, in 2008, West Virginia had the highest drug overdose death rate (25.8) in the United States, and Texas (8.6) had one of the lowest. However, the West Virginia rate was based on 459 deaths, whereas the Texas rate was based on 2,053 deaths. States might consider both death rates and number of deaths in their intervention planning.

The findings in this report are subject to at least three limitations. First, other naloxone distribution programs might exist that were unknown to the Harm Reduction Coalition. Second, all data are based on unconfirmed self-reports from the 48 responding programs. Finally, the numbers of persons trained in naloxone administration and the number of overdose reversals involving naloxone likely were underreported because of incomplete data collection and unreported overdose reversals. However, because not all untreated opioid overdoses are fatal, some of the persons with reported overdose reversals likely would have survived without naloxone administration (*2*).

In this report, nearly half (43.7%) of the responding opioid overdose programs reported problems obtaining naloxone related to cost and the supply chain. Price increases of some formulations of naloxone appear to restrict current program activities and the possibility of new programs. Economic pressures on state and local budgets could decrease funding of opioid overdose prevention activities (Daniel Bigg, Chicago Recovery Alliance, personal communication, 2011). To address the substantial increases in opioid-related drug overdose deaths, public health agencies could consider comprehensive measures that include teaching laypersons how to respond to overdoses and administer naloxone to those in need.

What is already known on this topic?

From 1990 to 2008, drug overdose death rates increased threefold in the United States, and the number of annual deaths increased to 36,450. Opioids (including prescription opioid medications and heroin) are major causes of drug overdose deaths. Naloxone is the standard of care for treatment of potentially fatal respiratory depression caused by opioid overdose.

What is added by this report?

In October 2010, at least 188 local opioid overdose prevention programs that distributed naloxone existed. During 1996–2010, these programs in 15 states and the District of Columbia reported training and providing naloxone to 53,032 persons, resulting in 10,171 drug overdose reversals using naloxone. However, many states with high drug overdose death rates have no opioid overdose prevention programs that distribute naloxone.

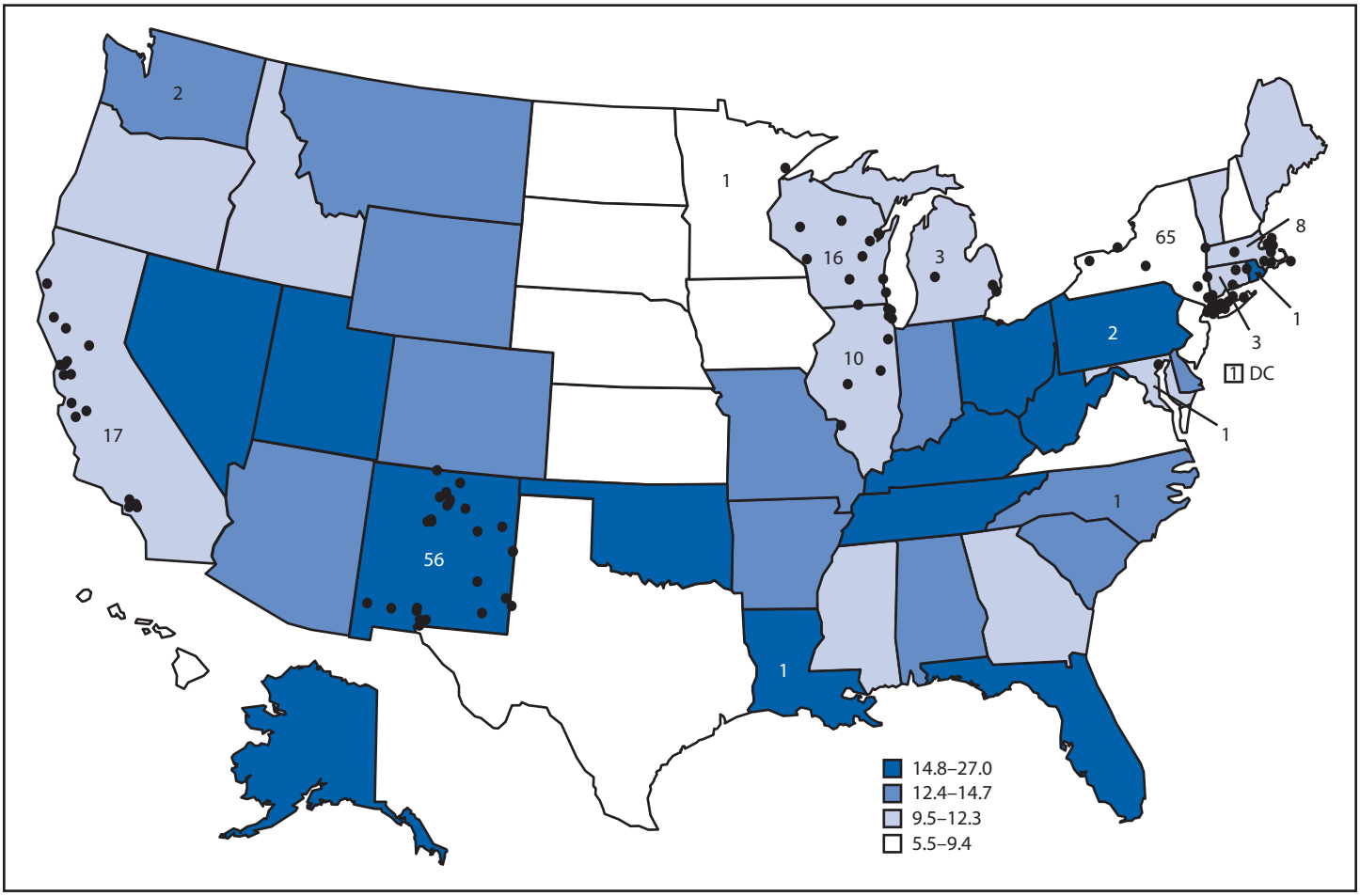
What are the implications for public health practice?

To address the high rates of opioid drug overdose deaths, public health agencies could, as part of a comprehensive prevention program, implement community-based opioid drug overdose prevention programs, including training and providing naloxone to potential overdose witnesses, and systematically assess the impact of these programs.

Acknowledgments

Participating opioid overdose programs. Naloxone Overdose Prevention Education Working Group.

FIGURE 2. Number (N = 188) and location* of local drug overdose prevention programs providing naloxone in 2010 and age-adjusted rates† of drug overdose deaths§ in 2008 — United States



* Not shown in states with fewer than three local programs.
† Per 100,000 population.
§ **Source:** National Vital Statistics System. Available at http://www.cdc.gov/nchs/nvss.htm. Includes intentional, unintentional, and undetermined.

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Ectopic Pregnancy Mortality — Florida, 2009–2010

Ectopic pregnancy occurs when a fertilized ovum implants on any tissue other than the endometrial lining of the uterus. Approximately 1%–2% of pregnancies in the United States are ectopic (*1*,*2*); however, these pregnancies account for 3%–4% of pregnancy-related deaths (*3*). The ectopic pregnancy mortality ratio in the United States decreased from 1.15 deaths per 100,000 live births in 1980–1984 to 0.50 in 2003–2007 (*4*). During 1999–2008, the ectopic pregnancy mortality ratio in Florida was similar to the national rate, 0.6 deaths per 100,000 live births, but increased abruptly to 2.5 during 2009–2010. Florida's Pregnancy-Associated Mortality Review (PAMR) identified ectopic pregnancy deaths during 1999–2010 through its routine process of identifying all pregnancy-related deaths. A multidisciplinary investigation committee reviewed the ectopic pregnancy deaths for cause of death, risk factors, and prevention opportunities. This report summarizes the investigation results, which identified 11 ectopic pregnancy deaths from 2009–2010 and 13 deaths from the 10-year period 1999–2008. The increase in ectopic mortality appears to be associated with illicit drug use and delays in seeking health care. The findings underscore the importance of ongoing, state-based identification and review of pregnancy-related deaths. Such reviews have the potential to identify emerging causes of deaths and associated risk factors, such as ectopic pregnancy deaths among women who use illicit drugs. Efforts to prevent ectopic pregnancy deaths need to ensure early access to care, promote awareness about early pregnancy testing and ectopic pregnancy risk, and raise public awareness about substance abuse health risks, especially during pregnancy.

In 1996, the Florida Department of Health initiated PAMR to improve surveillance of pregnancy-related deaths in Florida. PAMR was formed to highlight gaps in health care, identify systematic service delivery problems, and make recommendations to facilitate improvements in the overall systems of care. The PAMR process begins by identifying pregnancy-associated deaths. A pregnancy-associated death is defined as occurring during or within 1 year after the end of pregnancy; the association is purely temporal. Pregnancy-associated deaths occurring within the previous year are identified through a quarterly review, using a computer algorithm examining linked data files from 1) death certificates of females aged 8–61 years, 2) statewide prenatal risk screenings for high-risk pregnancies, 3) certificates of live birth, and 4) fetal death certificates. The pregnancy-associated death certificates identified through this computer algorithm are reviewed by a PAMR subcommittee to determine if the death is pregnancy-related and to assign an underlying cause of death. A pregnancy-related death is defined as a pregnancy-associated death resulting from 1) complications of the pregnancy itself, 2) a chain of events initiated by the pregnancy that led to the death, or 3) aggravation of an unrelated condition by the physiologic or pharmacologic effects of the pregnancy that resulted in death. The PAMR subcommittee identified 470 pregnancy-related deaths that occurred during 1999–2010.

In late 2010, the PAMR subcommittee identified a potential increase in ectopic pregnancy deaths in 2009. A retrospective review of the identified pregnancy-related deaths from 1999–2009 confirmed this increase. Ectopic pregnancy deaths in 2010 were identified by a prospective review of the pregnancy-associated deaths for 2010. The PAMR subcommittee found that 24 ectopic pregnancy-related deaths had occurred during 1999–2010.

PAMR staff members abstracted physician, hospital, medical examiner, health department, prenatal screening, and other records of all ectopic pregnancy deaths in Florida. Characteristics of the ectopic pregnancy deaths (e.g., sociodemographics, health history, and events surrounding death) were identified from available data sources. A multidisciplinary investigation committee systematically reviewed the de-identified abstracted records for causes of death, risk factors, and prevention opportunities. For deaths that occurred during 2009–2010, copies of original health records were obtained to ensure completeness. Statewide hospital discharge, ambulatory care, outpatient surgery, and emergency department databases also were searched to find evidence of other health-care encounters. Ectopic pregnancy mortality ratios were calculated as numbers of deaths per 100,000 live births using natality files for the denominator. Poisson distribution was used to calculate 95% confidence intervals. Significance was assessed using the mid-p exact test ($p<0.05$).

The PAMR subcommittee identified 368 pregnancy-related deaths from 1999–2008 and 102 pregnancy-related deaths from 2009–2010. For the period 1999–2008, 13 ectopic pregnancy-related deaths were identified in Florida, comprising 3.5% of all pregnancy-related deaths. For the period 2009–2010, 11 ectopic pregnancy-related deaths were identified, comprising 10.8% of all pregnancy-related deaths. All 24 deaths were confirmed ectopic pregnancy diagnoses and were related to pregnancy in an oviduct. In comparison with the earlier period, the ectopic pregnancy mortality ratios for 2009–2010 were significantly higher among women who were non-Hispanic white (2.0 versus 0.3 deaths per 100,000

live births in 1999–2008), Hispanic (3.3 versus 0.0), unmarried (4.8 versus 0.7), without insurance or a health plan (17.6 versus 1.8), and had less than a high school education (6.4 versus 0.8) (Table).

During 2009–2010, the women who died were more likely to have collapsed, presumably from hemorrhage associated with acute tubal rupture, before seeking health care, compared with women who died during 1999–2008 (1.8 versus 0.3 deaths per 100,000 live births during 1999–2008). Of the eight women who collapsed during 2009–2010, six tested positive at autopsy for illicit drug use; exposure for one death was unknown. Four women tested positive for cocaine. No comparison could be made between the frequencies of illicit drug use among women who died from ectopic pregnancy during 1999–2008 and 2009–2010 because testing for illicit drug use was performed substantially less often in the earlier period. During 2009–2010, among the three women who sought care before collapse, two experienced a delay in medical diagnosis. Five of six women experienced similar delays in medical diagnosis during 1999–2008.

What is already known on this topic?

Only 1%–2% of pregnancies in the United States are ectopic, yet these pregnancies account for 3%–4% of pregnancy-related deaths. The ectopic pregnancy mortality ratio in the United States decreased from 1.15 deaths per 100,000 live births during 1980–1984 to 0.50 during 2003–2007.

What is added by this report?

Florida's ectopic pregnancy mortality ratio abruptly increased from 0.6 deaths per 100,000 live births during 1999–2008 to 2.5 during 2009–2010. The increase in ectopic mortality appears to be associated with illicit drug use and delays in seeking health care.

What are the implications for public health practice?

State-based pregnancy-related mortality surveillance is needed to guide public health actions to prevent future deaths. Efforts to prevent ectopic pregnancy deaths need to ensure early access to care, promote awareness about early pregnancy testing and ectopic pregnancy risk, and raise public attention about substance abuse health risks, especially during pregnancy.

TABLE. Ectopic pregnancy mortality incidence and ratios, by selected characteristics — Florida, 1999–2008 and 2009–2010

	Deaths: 1999–2008				Deaths: 2009–2010			
Characteristic	**No.**	**(%)**	**Mortality ratio***	**(95% CI†)**	**No.**	**(%)**	**Mortality ratio***	**(95% CI†)**
Total§	**13**	**(100.0)**	**0.6**	**(0.32–1.03)**	**11**	**(100.0)**	**2.5**	**(1.25–4.47)**
Age group (yrs)								
20–24§	2	(15.4)	0.4	(0.05–1.44)	4	(36.4)	3.7	(1.01–9.47)
25–29	3	(23.1)	0.5	(0.10–1.46)	3	(27.3)	2.5	(0.52–7.31)
30–34	4	(30.8)	0.8	(0.22–2.05)	0	(0)	0.0	
35–39¶	2	(15.4)	0.8	(0.10–2.89)	4	(36.4)	7.8	(2.13–19.97)
≥40	2	(15.4)	3.4	(0.41–12.28)	0	—	0.0	
Race/Ethnicity								
White, non-Hispanic¶	3	(23.1)	0.3	(0.06–0.88)	4	(36.4)	2.0	(0.54–5.12)
Black, non-Hispanic	8	(61.5)	1.7	(0.73–3.35)	3	(27.3)	3.1	(0.64–9.06)
Hispanic§	0	—	0.0		4	(36.4)	3.3	(0.90–8.45)
Other	2	(15.4)	2.3	(0.28–8.31)	0	—	0.0	
Education								
Less than high school diploma¶	3	(23.1)	0.8	(0.16–2.34)	5	(45.5)	6.4	(2.08–14.94)
High school graduate	7	(53.9)	1.1	(0.44–2.27)	3	(27.3)	2.2	(0.45–6.43)
Some college	1	(7.7)	0.3	(0.01–1.67)	2	(18.2)	1.7	(0.21–6.14)
College graduate	2	(15.4)	0.8	(0.10–2.89)	1	(9.1)	1.0	(0.03–5.57)
Marital status								
Married	7	(53.8)	0.5	(0.20–1.03)	1	(9.1)	0.4	(0.01–2.23)
Not married§	6	(46.2)	0.7	(0.26–1.52)	10	(90.9)	4.8	(2.30–8.83)
Health plan**								
Insurance	3	(33.3)	0.6	(0.12–1.75)	0	—	0.0	
Medicaid	2	(22.2)	0.4	(0.05–1.44)	1	(9.1)	0.5	(0.01–2.79)
No insurance or plan§	2	(22.2)	1.8	(0.22–6.50)	7	(63.6)	17.6	(7.08–36.26)
Prison	0	—			1	(9.1)		
Unknown	2	(22.2)	22.9	(2.77–82.72)	2	(18.2)	96.0	(11.63–346.78)
Physical collapse								
Yes§	7	(53.8)	0.3	(0.12–0.62)	8	(72.7)	1.8	(0.78–3.55)
No	6	(46.2)	0.3	(0.11–0.65)	3	(27.3)	0.7	(0.14–2.05)

* Deaths per100,000 live births.
† Confidence interval; calculated using the Poisson distribution.
§ P-value <0.01 calculated by mid-p exact test.
¶ P-value <0.05 calculated by mid-p exact test.
** Mortality ratio calculated using deaths and births from March 2004 through December 2008.

Reported by

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Editorial Note

Ectopic pregnancy mortality rates in the United States steadily declined during the late 20th century, through 2007 (*4*). The decline in these deaths has been attributed to improvements in the sensitivity, accuracy, and use of pregnancy testing, ultrasound for diagnosis, and improvements in therapeutic modalities, including laparoscopic surgery and medical management of ectopic pregnancy. This success relies heavily on access to early care so that women who have signs and symptoms of ectopic pregnancy can be identified, diagnosed, and treated. The contribution of any change in the incidence of ectopic pregnancy to the decline in mortality is unknown. Obtaining a reliable incidence rate for ectopic pregnancy in the United States is difficult. The latest estimate of 19.7 ectopic pregnancies per 1,000 pregnancies in the United States for 1990–1992 was reported using inpatient National Hospital Discharge Survey and outpatient National Hospital Ambulatory Medical Care Survey data (*5*). However, hospital discharge data are no longer considered an accurate surveillance data source for all ectopic pregnancies because more of these pregnancies are managed on an outpatient basis and with nonsurgical interventions. Other surveillance approaches suggest that the frequency of ectopic pregnancy in the United States has not changed substantially in the United States since the early 1990s (*6,7*).

The 11 ectopic pregnancy deaths in Florida during 2009–2010 contrast with a total of 14 deaths in the entire United States attributable to ectopic pregnancy identified in national vital statistics for 2007, the most recent year for which national data are available (*8*). Compared with the earlier period, this series of ectopic pregnancy deaths in Florida during 2009–2010 is associated with a higher proportion of women who collapsed, which is generally associated with acute tubal rupture and hemorrhage. Based on limited evidence from household and family members and from electronic hospital, outpatient surgery, and emergency department records, these women had not received any health care before collapse. These findings suggest that delays in obtaining care contributed to the deaths of these women. More often, these women were from disadvantaged groups of women who might have experienced difficulties accessing health care, such as women not covered by insurance or a health plan. The high prevalence of illicit drug users among deaths in Florida during 2009–2010 might have been associated with delays in seeking care, receiving care, or both; this presents a challenge for prevention. The lack of drug testing in the earlier period limits the ability to ascertain whether the recent increase was predominantly related to illicit drug use.

This is the first report of an abrupt increase in ectopic pregnancy deaths identified in the United States in recent times. Pregnancy-related mortality surveillance systems previously have identified various clusters, including a cluster of maternal deaths associated with barbiturate anesthetics in New York City (*9*) and excessive maternal mortality among members of a religious group in Indiana (*10*).

The findings in this report are subject to at least four limitations. First, the total number of ectopic pregnancy deaths in Florida was small. Second, complete medical histories were not obtainable for every woman who died, limiting available information on risk factors and services. Third, rates of ectopic pregnancy deaths could not be calculated based on ectopic pregnancies because an accurate system for surveillance for cases of ectopic pregnancy at the population level is not available. Finally, women who nearly died from ectopic pregnancy were not studied.

This report reinforces the need for pregnancy-related mortality surveillance and its potential for guiding public health actions to prevent future deaths. Based on the findings from its review, Florida's PAMR team recommended promoting awareness among women and health-care providers, especially emergency-care providers, about ensuring early access to care and the importance of early suspicion and testing for pregnancy. The high prevalence of illicit drug use among the women who died highlights the need to raise public awareness about health risks associated with drug exposure during pregnancy.

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Notes from the Field

Norovirus Infections Associated with Frozen Raw Oysters — Washington, 2011

On October 19, 2011, Public Health – Seattle & King County was contacted regarding a woman who had experienced acute gastroenteritis after dining at a local restaurant with friends. Staff members interviewed the diners and confirmed that three of the seven in the party had consumed a raw oyster dish. Within 18–36 hours after consumption, the three had onsets of aches, nausea, and nonbloody diarrhea lasting 24–48 hours. One ill diner also reported vomiting. The four diners who had not eaten the raw oysters did not become ill.

An inspection of a walk-in freezer at the restaurant revealed eight 3-pound bags of frozen raw oysters, which the restaurant indicated had been an ingredient of the dish consumed by the ill diners. The oysters had been imported from South Korea by company A and shipped to a local vendor, which sold them to the restaurant. All eight bags were sent to the Food and Drug Administration's Gulf Coast Seafood Laboratory for norovirus testing and characterization by real-time reverse transcription–polymerase chain reaction (rRT-PCR).

A stool specimen from one of two ill diners collected 17 days after symptom onset tested positive for norovirus; sequence analysis identified GI.1 and GII.17 strains. Sequence analysis of the oysters identified a GII.3 strain. Because oysters can harbor multiple norovirus strains that are unequally amplified by rRT-PCR, discordance between stool specimens and food samples in shellfish-associated norovirus outbreaks is common and does not rule out an association. On November 4, 2011, company A recalled its frozen raw oysters.*

*Additional information available at http://www.fda.gov/food/foodsafety/corenetwork/ucm279170.htm.

The frozen oysters implicated in this outbreak were distributed internationally and had a 2-year shelf-life. Contamination of similar products has been implicated previously in international norovirus transmissions (*1*). Such contamination has potential for exposing persons widely dispersed in space and time, making cases difficult to identify or link through traditional complaint-based surveillance. To facilitate investigation of foodborne norovirus outbreaks, CDC recently implemented CaliciNet, the national electronic norovirus outbreak surveillance network (*2*). During suspected norovirus outbreaks, CDC recommends collection of stool specimens to confirm the diagnosis, characterize norovirus strains, and upload sequence results into CaliciNet. Additionally, all suspected and confirmed norovirus outbreaks should be reported to CDC by state and local health departments through the National Outbreak Reporting System (*3*).

Reported by

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Errata

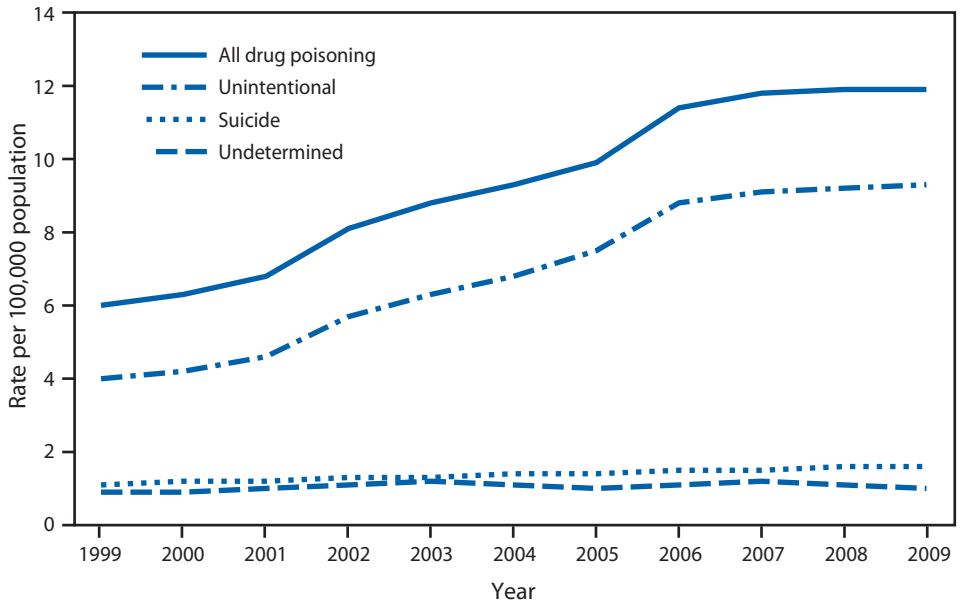
Vol. 61, No. 4

In the report, "Progress in Global Measles Control, 2000–2010," errors occurred. On page 74, in Table 1, the heading over the second column of data under both 2000 and 2010 should read, "**No. of member states in region reporting measles surveillance data**." On page 76, in Table 2, in the row India*, in the seventh column, the "Yes" should be deleted.

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Drug Poisoning Death Rates,* by Intent — United States, 1999–2009



* Age-adjusted to the 2000 U.S. standard population. Drug poisoning deaths were defined as those having *International Classification of Diseases, 10th Revision* codes X40–X44 (unintentional), X60–X64 (suicide), X85 (homicide), or Y10–Y14 (undetermined intent). Age-adjusted drug poisoning rates for homicides, legal interventions, and operations of war are <0.1 per 100,000 population each year and are not shown.

During 1999–2009, the age-adjusted drug poisoning death rate nearly doubled, from 6.1 per 100,000 population in 1999 to 12.0 in 2009. The age-adjusted unintentional drug poisoning death rate more than doubled during that period, from 4.0 per 100,000 population in 1999 to 9.3 in 2009. Drug poisoning suicide rates also increased, from 1.1 per 100,000 population in 1999 to 1.6 in 2009. Rates of drug poisoning deaths from undetermined intent remained stable, with a rate of 0.9 per 100,000 population in 1999 and 1.0 in 2009.

Sources: National Vital Statistics System mortality data (1999–2009). Available at http://www.cdc.gov/nchs/deaths.htm.

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Notifiable Diseases and Mortality Tables

TABLE I. Provisional cases of infrequently reported notifiable diseases (<1,000 cases reported during the preceding year) — United States, week ending February 11, 2012 (6th week)*

Disease	Current week	Cum 2012	5-year weekly average†	Total cases reported for previous years					States reporting cases during current week (No.)
				2011	2010	2009	2008	2007	
Anthrax	—	—	—	1	—	1	—	1	
Arboviral diseases§,¶:									
California serogroup virus disease	—	—	0	131	75	55	62	55	
Eastern equine encephalitis virus disease	—	—	—	4	10	4	4	4	
Powassan virus disease	—	—	—	16	8	6	2	7	
St. Louis encephalitis virus disease	—	—	—	5	10	12	13	9	
Western equine encephalitis virus disease	—	—	—	—	—	—	—	—	
Babesiosis	1	8	—	639	NN	NN	NN	NN	NY (1)
Botulism, total	2	7	2	123	112	118	145	144	
foodborne	—	—	0	11	7	10	17	32	
infant	2	6	1	80	80	83	109	85	PA (1), OH (1)
other (wound and unspecified)	—	1	0	32	25	25	19	27	
Brucellosis	3	6	1	80	115	115	80	131	MD (1), FL (2)
Chancroid	—	1	1	27	24	28	25	23	
Cholera	—	—	0	31	13	10	5	7	
Cyclosporiasis§	—	4	2	145	179	141	139	93	
Diphtheria	—	—	—	—	—	—	—	—	
Haemophilus influenzae,** invasive disease (age <5 yrs):									
serotype b	—	2	1	9	23	35	30	22	
nonserotype b	—	12	5	115	200	236	244	199	
unknown serotype	2	23	4	249	223	178	163	180	NY (1), OH (1)
Hansen disease§	1	5	2	57	98	103	80	101	MS (1)
Hantavirus pulmonary syndrome§	—	—	0	20	20	20	18	32	
Hemolytic uremic syndrome, postdiarrheal§	—	2	2	211	266	242	330	292	
Influenza-associated pediatric mortality§,††	1	3	4	118	61	358	90	77	NV (1)
Listeriosis	2	34	9	803	821	851	759	808	NE (1), NV (1)
Measles§§	—	12	1	216	63	71	140	43	
Meningococcal disease, invasive¶¶:									
A, C, Y, and W-135	—	10	7	195	280	301	330	325	
serogroup B	1	3	4	118	135	174	188	167	OK (1)
other serogroup	—	1	1	17	12	23	38	35	
unknown serogroup	8	44	12	381	406	482	616	550	MA (1), OH (1), FL (3), ID (1), NV (1), OR (1)
Novel influenza A virus infections***	—	—	0	8	4	43,774	2	4	
Plague	—	—	—	2	2	8	3	7	
Poliomyelitis, paralytic	—	—	—	—	—	1	—	—	
Polio virus Infection, nonparalytic§	—	—	—	—	—	—	—	—	
Psittacosis§	—	—	0	2	4	9	8	12	
Q fever, total§	1	4	2	113	131	113	120	171	
acute	—	1	1	90	106	93	106	—	
chronic	1	3	0	23	25	20	14	—	MO (1)
Rabies, human	—	—	—	2	2	4	2	1	
Rubella†††	—	—	0	4	5	3	16	12	
Rubella, congenital syndrome	—	—	0	—	—	2	—	—	
SARS-CoV§	—	—	—	—	—	—	—	—	
Smallpox§	—	—	—	—	—	—	—	—	
Streptococcal toxic-shock syndrome§	—	9	3	126	142	161	157	132	
Syphilis, congenital (age <1 yr)§§§	—	3	9	274	377	423	431	430	
Tetanus	—	—	0	12	26	18	19	28	
Toxic-shock syndrome (staphylococcal)§	1	3	2	74	82	74	71	92	CA (1)
Trichinellosis	—	1	0	9	7	13	39	5	
Tularemia	—	—	0	138	124	93	123	137	
Typhoid fever	4	25	8	332	467	397	449	434	NY (3), CA (1)
Vancomycin-intermediate *Staphylococcus aureus*§	2	2	1	67	91	78	63	37	NY (1), FL (1)
Vancomycin-resistant *Staphylococcus aureus*§	—	—	—	—	2	1	—	2	
Vibriosis (noncholera *Vibrio* species infections)§	4	23	3	748	846	789	588	549	GA (1), FL (2), AL (1)
Viral hemorrhagic fever¶¶¶	—	—	—	—	1	NN	NN	NN	
Yellow fever	—	—	—	—	—	—	—	—	

See Table 1 footnotes on next page.

TABLE I. (*Continued*) Provisional cases of infrequently reported notifiable diseases (<1,000 cases reported during the preceding year) — United States, week ending February 11, 2012 (6th week)*

—: No reported cases. N: Not reportable. NN: Not Nationally Notifiable. Cum: Cumulative year-to-date counts.

* Case counts for reporting year 2011 and 2012 are provisional and subject to change. For further information on interpretation of these data, see http://www.cdc.gov/osels/ph_surveillance/nndss/phs/files/ProvisionalNationa%20NotifiableDiseasesSurveillanceData20100927.pdf.

† Calculated by summing the incidence counts for the current week, the 2 weeks preceding the current week, and the 2 weeks following the current week, for a total of 5 preceding years. Additional information is available at http://www.cdc.gov/osels/ph_surveillance/nndss/phs/files/5yearweeklyaverage.pdf.

§ Not reportable in all states. Data from states where the condition is not reportable are excluded from this table except starting in 2007 for the arboviral diseases, STD data, TB data, and influenza-associated pediatric mortality, and in 2003 for SARS-CoV. Reporting exceptions are available at http://www.cdc.gov/osels/ph_surveillance/nndss/phs/infdis.htm.

¶ Includes both neuroinvasive and nonneuroinvasive. Updated weekly from reports to the Division of Vector-Borne Infectious Diseases, National Center for Zoonotic, Vector-Borne, and Enteric Diseases (ArboNET Surveillance). Data for West Nile virus are available in Table II.

** Data for *H. influenzae* (all ages, all serotypes) are available in Table II.

†† Updated weekly from reports to the Influenza Division, National Center for Immunization and Respiratory Diseases. Since October 2, 2011, three influenza-associated pediatric deaths occurring during the 2011-12 influenza season have been reported.

§§ No measles cases were reported for the current week.

¶¶ Data for meningococcal disease (all serogroups) are available in Table II.

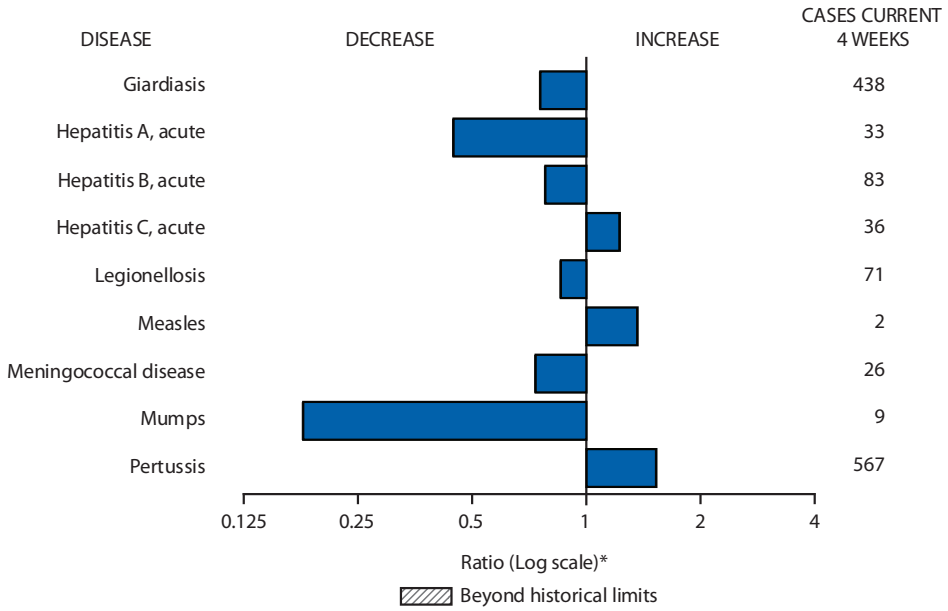
*** CDC discontinued reporting of individual confirmed and probable cases of 2009 pandemic influenza A (H1N1) virus infections on July 24, 2009. During 2009, four cases of human infection with novel influenza A viruses, different from the 2009 pandemic influenza A (H1N1) strain, were reported to CDC. The four cases of novel influenza A virus infection reported to CDC during 2010, and the eight cases reported during 2011, were identified as swine influenza A (H3N2) virus and are unrelated to the 2009 pandemic influenza A (H1N1) virus. Total case counts are provided by the Influenza Division, National Center for Immunization and Respiratory Diseases (NCIRD)..

††† No rubella cases were reported for the current week.

§§§ Updated weekly from reports to the Division of STD Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention.

¶¶¶ There were no cases of viral hemorrhagic fever reported during the current week. See Table II for dengue hemorrhagic fever.

FIGURE I. Selected notifiable disease reports, United States, comparison of provisional 4-week totals February 11, 2012, with historical data



* Ratio of current 4-week total to mean of 15 4-week totals (from previous, comparable, and subsequent 4-week periods for the past 5 years). The point where the hatched area begins is based on the mean and two standard deviations of these 4-week totals.

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TABLE II. Provisional cases of selected notifiable diseases, United States, weeks ending February 11, 2012, and February 12, 2011 (6th week)*

Reporting area	*Chlamydia trachomatis* infection					Coccidioidomycosis					Cryptosporidiosis				
	Current week	Previous 52 weeks		Cum 2012	Cum 2011	Current week	Previous 52 weeks		Cum 2012	Cum 2011	Current week	Previous 52 weeks		Cum 2012	Cum 2011
		Med	Max				Med	Max				Med	Max		
United States	11,081	26,829	30,720	102,555	152,529	70	400	586	1,402	2,658	43	132	398	441	538
New England	679	892	1,594	3,316	3,871	—	0	1	—	—	1	6	22	27	30
Connecticut	—	240	869	—	150	N	0	0	N	N	—	1	9	4	8
Maine	73	59	100	378	340	N	0	0	N	N	—	1	4	2	4
Massachusetts	452	433	860	2,104	2,381	N	0	0	N	N	1	3	8	15	15
New Hampshire	5	58	90	92	363	—	0	1	—	—	—	1	5	2	1
Rhode Island	99	80	187	648	503	—	0	0	—	—	—	0	1	—	—
Vermont	50	27	84	94	134	N	0	0	N	N	—	1	5	4	2
Mid. Atlantic	1,880	3,203	3,954	15,670	18,417	—	0	0	—	—	2	15	43	50	61
New Jersey	—	540	1,004	2,160	2,599	N	0	0	N	N	—	0	1	1	—
New York (Upstate)	746	715	1,758	3,404	3,351	N	0	0	N	N	1	4	16	14	9
New York City	273	1,046	1,315	3,985	6,607	N	0	0	N	N	—	1	6	9	7
Pennsylvania	861	1,030	1,602	6,121	5,860	N	0	0	N	N	1	9	27	26	45
E.N. Central	1,246	4,131	4,603	15,809	26,466	—	1	5	5	4	8	32	148	103	127
Illinois	36	1,157	1,396	2,850	7,073	N	0	0	N	N	1	3	26	3	13
Indiana	273	550	726	2,413	3,784	N	0	0	N	N	—	3	14	—	20
Michigan	520	922	1,229	4,573	6,486	—	0	3	2	1	—	6	14	17	30
Ohio	238	1,020	1,182	3,892	6,333	—	0	2	3	3	5	11	95	59	41
Wisconsin	179	464	548	2,081	2,790	N	0	0	N	N	2	8	65	24	23
W.N. Central	10	1,501	1,817	2,228	8,720	—	0	2	—	—	2	16	85	34	61
Iowa	1	212	431	1,261	1,290	N	0	0	N	N	—	6	19	12	19
Kansas	—	208	281	104	1,159	N	0	0	N	N	—	0	11	2	—
Minnesota	—	316	401	—	2,042	—	0	0	—	—	—	0	0	—	—
Missouri	—	533	759	—	2,839	—	0	0	—	—	—	5	61	10	18
Nebraska	—	127	215	546	682	—	0	2	—	—	1	2	12	3	18
North Dakota	—	46	76	5	261	N	0	0	N	N	—	0	12	—	—
South Dakota	9	62	89	312	447	N	0	0	N	N	1	2	13	7	6
S. Atlantic	3,554	5,448	7,444	25,900	31,207	—	0	2	—	—	12	22	59	99	118
Delaware	92	86	182	436	456	—	0	0	—	—	—	0	1	1	2
District of Columbia	92	111	219	725	635	—	0	0	—	—	—	0	1	—	1
Florida	1,038	1,501	1,684	8,073	8,816	N	0	0	N	N	7	8	17	41	45
Georgia	742	1,069	1,563	5,179	4,783	N	0	0	N	N	3	5	12	20	30
Maryland	134	481	790	1,101	2,276	—	0	2	—	—	2	1	7	16	6
North Carolina	722	1,000	1,688	5,587	4,932	N	0	0	N	N	—	0	44	—	9
South Carolina	—	528	1,539	—	3,887	N	0	0	N	N	—	2	6	10	16
Virginia	734	659	1,778	4,319	4,878	N	0	0	N	N	—	2	8	10	9
West Virginia	—	81	144	480	544	N	0	0	N	N	—	0	5	1	—
E.S. Central	1,241	1,883	2,804	7,281	10,558	—	0	0	—	—	2	8	25	28	15
Alabama	527	533	1,566	2,362	3,184	N	0	0	N	N	1	2	7	12	8
Kentucky	386	301	557	1,643	1,096	N	0	0	N	N	—	2	17	3	4
Mississippi	—	398	696	—	2,682	N	0	0	N	N	—	1	4	4	2
Tennessee	328	601	782	3,276	3,596	N	0	0	N	N	1	2	6	9	1
W.S. Central	324	3,346	4,313	10,749	19,324	—	0	1	—	—	7	8	44	34	20
Arkansas	—	309	511	—	2,089	N	0	0	N	N	—	0	2	1	—
Louisiana	270	364	1,071	1,566	2,284	—	0	1	—	—	2	1	9	8	3
Oklahoma	54	143	675	543	1,224	N	0	0	N	N	2	2	6	6	4
Texas	—	2,408	3,113	8,640	13,727	N	0	0	N	N	3	5	40	19	13
Mountain	898	1,740	2,409	8,041	10,234	58	306	458	1,232	2,031	3	10	29	28	64
Arizona	109	549	802	2,935	3,112	55	303	455	1,218	2,001	—	1	4	1	3
Colorado	440	415	847	2,096	2,479	N	0	0	N	N	—	2	11	2	18
Idaho	104	85	274	439	508	N	0	0	N	N	1	1	9	11	7
Montana	74	68	88	438	391	N	0	0	N	N	2	1	6	7	4
Nevada	45	203	380	233	1,344	3	2	5	10	12	—	0	2	2	1
New Mexico	125	218	483	1,082	1,378	—	1	4	—	11	—	2	9	4	19
Utah	1	133	190	710	781	—	0	4	2	5	—	1	5	—	6
Wyoming	—	32	67	108	241	—	0	2	2	2	—	0	3	1	6
Pacific	1,249	3,977	5,428	13,561	23,732	12	92	163	165	623	6	10	20	38	42
Alaska	40	109	157	601	767	N	0	0	N	N	—	0	3	—	—
California	805	2,988	4,499	9,915	18,069	12	92	163	165	623	4	6	16	33	18
Hawaii	—	114	142	—	663	N	0	0	N	N	—	0	1	2	—
Oregon	—	273	412	1,095	1,472	N	0	0	N	N	2	2	8	3	18
Washington	404	436	611	1,950	2,761	N	0	0	N	N	—	1	15	—	6
Territories															
American Samoa	—	0	0	—	—	N	0	0	N	N	N	0	0	N	N
C.N.M.I.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Guam	—	17	44	—	50	—	0	0	—	—	—	0	0	—	—
Puerto Rico	66	105	348	636	627	N	0	0	N	N	N	0	0	N	N
U.S. Virgin Islands	—	16	27	—	80	—	0	0	—	—	—	0	0	—	—

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TABLE II. (*Continued*) Provisional cases of selected notifiable diseases, United States, weeks ending February 11, 2012, and February 12, 2011 (6th week)*

Reporting area	Dengue Virus Infection									
	Dengue Fever†					Dengue Hemorrhagic Fever§				
	Current week	Previous 52 weeks		Cum 2012	Cum 2011	Current week	Previous 52 weeks		Cum 2012	Cum 2011
		Med	Max				Med	Max		
United States	—	3	16	—	28	—	0	1	—	—
New England	—	0	1	—	1	—	0	0	—	—
Connecticut	—	0	0	—	—	—	0	0	—	—
Maine	—	0	0	—	—	—	0	0	—	—
Massachusetts	—	0	0	—	—	—	0	0	—	—
New Hampshire	—	0	0	—	—	—	0	0	—	—
Rhode Island	—	0	0	—	—	—	0	0	—	—
Vermont	—	0	1	—	1	—	0	0	—	—
Mid. Atlantic	—	1	6	—	8	—	0	0	—	—
New Jersey	—	0	0	—	—	—	0	0	—	—
New York (Upstate)	—	0	2	—	—	—	0	0	—	—
New York City	—	0	4	—	4	—	0	0	—	—
Pennsylvania	—	0	2	—	4	—	0	0	—	—
E.N. Central	—	0	2	—	4	—	0	1	—	—
Illinois	—	0	1	—	—	—	0	1	—	—
Indiana	—	0	1	—	1	—	0	0	—	—
Michigan	—	0	1	—	1	—	0	0	—	—
Ohio	—	0	1	—	—	—	0	0	—	—
Wisconsin	—	0	1	—	2	—	0	0	—	—
W.N. Central	—	0	2	—	—	—	0	0	—	—
Iowa	—	0	1	—	—	—	0	0	—	—
Kansas	—	0	1	—	—	—	0	0	—	—
Minnesota	—	0	1	—	—	—	0	0	—	—
Missouri	—	0	0	—	—	—	0	0	—	—
Nebraska	—	0	0	—	—	—	0	0	—	—
North Dakota	—	0	1	—	—	—	0	0	—	—
South Dakota	—	0	0	—	—	—	0	0	—	—
S. Atlantic	—	1	8	—	8	—	0	1	—	—
Delaware	—	0	2	—	—	—	0	0	—	—
District of Columbia	—	0	0	—	—	—	0	0	—	—
Florida	—	1	7	—	5	—	0	0	—	—
Georgia	—	0	1	—	1	—	0	0	—	—
Maryland	—	0	2	—	—	—	0	0	—	—
North Carolina	—	0	1	—	1	—	0	0	—	—
South Carolina	—	0	1	—	—	—	0	0	—	—
Virginia	—	0	1	—	1	—	0	1	—	—
West Virginia	—	0	0	—	—	—	0	0	—	—
E.S. Central	—	0	3	—	—	—	0	0	—	—
Alabama	—	0	1	—	—	—	0	0	—	—
Kentucky	—	0	1	—	—	—	0	0	—	—
Mississippi	—	0	0	—	—	—	0	0	—	—
Tennessee	—	0	2	—	—	—	0	0	—	—
W.S. Central	—	0	2	—	—	—	0	0	—	—
Arkansas	—	0	0	—	—	—	0	0	—	—
Louisiana	—	0	1	—	—	—	0	0	—	—
Oklahoma	—	0	0	—	—	—	0	0	—	—
Texas	—	0	1	—	—	—	0	0	—	—
Mountain	—	0	1	—	2	—	0	0	—	—
Arizona	—	0	1	—	1	—	0	0	—	—
Colorado	—	0	0	—	—	—	0	0	—	—
Idaho	—	0	0	—	—	—	0	0	—	—
Montana	—	0	0	—	—	—	0	0	—	—
Nevada	—	0	1	—	—	—	0	0	—	—
New Mexico	—	0	1	—	1	—	0	0	—	—
Utah	—	0	1	—	—	—	0	0	—	—
Wyoming	—	0	0	—	—	—	0	0	—	—
Pacific	—	0	4	—	5	—	0	0	—	—
Alaska	—	0	0	—	—	—	0	0	—	—
California	—	0	2	—	3	—	0	0	—	—
Hawaii	—	0	4	—	—	—	0	0	—	—
Oregon	—	0	0	—	—	—	0	0	—	—
Washington	—	0	1	—	2	—	0	0	—	—
Territories										
American Samoa	—	0	0	—	—	—	0	0	—	—
C.N.M.I.	—	—	—	—	—	—	—	—	—	—
Guam	—	0	0	—	—	—	0	0	—	—
Puerto Rico	—	16	83	—	125	—	0	3	—	1
U.S. Virgin Islands	—	0	0	—	—	—	0	0	—	—

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† Dengue Fever includes cases that meet criteria for Dengue Fever with hemorrhage, other clinical and unknown case classifications.
§ DHF includes cases that meet criteria for dengue shock syndrome (DSS), a more severe form of DHF.

TABLE II. (*Continued*) Provisional cases of selected notifiable diseases, United States, weeks ending February 11, 2012, and February 12, 2011 (6th week)*

Reporting area	Ehrlichiosis/Anaplasmosis†														
	Ehrlichia chaffeensis					*Anaplasma phagocytophilum*					Undetermined				
	Current week	Previous 52 weeks		Cum 2012	Cum 2011	Current week	Previous 52 weeks		Cum 2012	Cum 2011	Current week	Previous 52 weeks		Cum 2012	Cum 2011
		Med	Max				Med	Max				Med	Max		
United States	1	9	90	8	9	2	16	57	9	11	—	2	8	2	2
New England	—	0	1	—	—	—	3	28	1	4	—	0	1	—	—
Connecticut	—	0	0	—	—	—	0	0	—	—	—	0	0	—	—
Maine	—	0	1	—	—	—	0	3	1	1	—	0	0	—	—
Massachusetts	—	0	0	—	—	—	1	18	—	—	—	0	0	—	—
New Hampshire	—	0	1	—	—	—	0	4	—	—	—	0	1	—	—
Rhode Island	—	0	1	—	—	—	0	15	—	3	—	0	1	—	—
Vermont	—	0	0	—	—	—	0	1	—	—	—	0	0	—	—
Mid. Atlantic	—	1	5	—	1	2	6	35	7	3	—	0	2	—	—
New Jersey	—	0	0	—	—	—	0	0	—	—	—	0	0	—	—
New York (Upstate)	—	0	4	—	—	2	3	35	5	2	—	0	2	—	—
New York City	—	0	2	—	1	—	1	5	2	1	—	0	0	—	—
Pennsylvania	—	0	0	—	—	—	0	1	—	—	—	0	0	—	—
E.N. Central	—	0	5	—	1	—	0	2	—	1	—	0	6	—	2
Illinois	—	0	4	—	—	—	0	2	—	—	—	0	1	—	1
Indiana	—	0	0	—	—	—	0	0	—	—	—	0	4	—	1
Michigan	—	0	2	—	—	—	0	0	—	—	—	0	2	—	—
Ohio	—	0	1	—	1	—	0	1	—	—	—	0	1	—	—
Wisconsin	—	0	0	—	—	—	0	1	—	1	—	0	1	—	—
W.N. Central	—	1	16	1	—	—	0	6	—	—	—	0	6	—	—
Iowa	N	0	0	N	N	N	0	0	N	N	N	0	0	N	N
Kansas	—	0	2	—	—	—	0	1	—	—	—	0	1	—	—
Minnesota	—	0	0	—	—	—	0	1	—	—	—	0	0	—	—
Missouri	—	1	16	1	—	—	0	5	—	—	—	0	6	—	—
Nebraska	—	0	1	—	—	—	0	1	—	—	—	0	1	—	—
North Dakota	N	0	0	N	N	N	0	0	N	N	N	0	0	N	N
South Dakota	—	0	1	—	—	—	0	1	—	—	—	0	0	—	—
S. Atlantic	1	3	33	7	7	—	1	8	1	2	—	0	2	2	—
Delaware	—	0	2	—	1	—	0	1	—	—	—	0	0	—	—
District of Columbia	N	0	0	N	N	N	0	0	N	N	N	0	0	N	N
Florida	—	0	3	—	1	—	0	3	—	—	—	0	0	—	—
Georgia	1	0	3	4	1	—	0	2	1	—	—	0	1	1	—
Maryland	—	0	3	—	2	—	0	2	—	—	—	0	1	1	—
North Carolina	—	0	17	1	2	—	0	6	—	2	—	0	0	—	—
South Carolina	—	0	1	—	—	—	0	0	—	—	—	0	1	—	—
Virginia	—	1	13	2	—	—	0	3	—	—	—	0	1	—	—
West Virginia	—	0	1	—	—	—	0	0	—	—	—	0	1	—	—
E.S. Central	—	1	8	—	—	—	0	2	—	1	—	0	3	—	—
Alabama	—	0	2	—	—	—	0	1	—	1	N	0	0	N	N
Kentucky	—	0	3	—	—	—	0	0	—	—	—	0	0	—	—
Mississippi	—	0	1	—	—	—	0	1	—	—	—	0	0	—	—
Tennessee	—	0	5	—	—	—	0	1	—	—	—	0	3	—	—
W.S. Central	—	0	30	—	—	—	0	3	—	—	—	0	0	—	—
Arkansas	—	0	13	—	—	—	0	3	—	—	—	0	0	—	—
Louisiana	—	0	0	—	—	—	0	0	—	—	—	0	0	—	—
Oklahoma	—	0	25	—	—	—	0	1	—	—	—	0	0	—	—
Texas	—	0	1	—	—	—	0	1	—	—	—	0	0	—	—
Mountain	—	0	0	—	—	—	0	0	—	—	—	0	1	—	—
Arizona	—	0	0	—	—	—	0	0	—	—	—	0	1	—	—
Colorado	N	0	0	N	N	N	0	0	N	N	N	0	0	N	N
Idaho	N	0	0	N	N	N	0	0	N	N	N	0	0	N	N
Montana	N	0	0	N	N	N	0	0	N	N	N	0	0	N	N
Nevada	N	0	0	N	N	N	0	0	N	N	N	0	0	N	N
New Mexico	N	0	0	N	N	N	0	0	N	N	N	0	0	N	N
Utah	—	0	0	—	—	—	0	0	—	—	—	0	1	—	—
Wyoming	—	0	0	—	—	—	0	0	—	—	—	0	0	—	—
Pacific	—	0	0	—	—	—	0	1	—	—	—	0	2	—	—
Alaska	N	0	0	N	N	N	0	0	N	N	N	0	0	N	N
California	—	0	0	—	—	—	0	0	—	—	—	0	2	—	—
Hawaii	N	0	0	N	N	N	0	0	N	N	N	0	0	N	N
Oregon	—	0	0	—	—	—	0	1	—	—	—	0	0	—	—
Washington	—	0	0	—	—	—	0	0	—	—	—	0	0	—	—
Territories															
American Samoa	N	0	0	N	N	N	0	0	N	N	N	0	0	N	N
C.N.M.I.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Guam	N	0	0	N	N	N	0	0	N	N	N	0	0	N	N
Puerto Rico	N	0	0	N	N	N	0	0	N	N	N	0	0	N	N
U.S. Virgin Islands	—	0	0	—	—	—	0	0	—	—	—	0	0	—	—

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† Cumulative total *E. ewingii* cases reported for year 2011 = 13, and 0 case reports for 2012.

TABLE II. (*Continued*) Provisional cases of selected notifiable diseases, United States, weeks ending February 11, 2012, and February 12, 2011 (6th week)*

Reporting area	Giardiasis					Gonorrhea					*Haemophilus influenzae*, invasive† All ages, all serotypes				
	Current week	Previous 52 weeks		Cum 2012	Cum 2011	Current week	Previous 52 weeks		Cum 2012	Cum 2011	Current week	Previous 52 weeks		Cum 2012	Cum 2011
		Med	Max				Med	Max				Med	Max		
United States	118	279	449	1,033	1,471	2,384	6,025	6,790	24,476	35,392	31	66	102	342	425
New England	3	27	64	75	135	77	108	178	357	480	1	4	9	29	27
Connecticut	—	4	10	7	26	—	44	101	—	181	—	1	4	7	7
Maine	1	3	10	8	9	7	5	18	47	15	1	0	2	3	5
Massachusetts	2	12	29	47	78	50	47	80	235	242	—	2	7	16	12
New Hampshire	—	2	8	6	7	6	2	7	11	9	—	0	2	2	1
Rhode Island	—	0	10	2	6	10	7	35	60	28	—	0	2	1	1
Vermont	—	3	19	5	9	4	0	6	4	5	—	0	2	—	1
Mid. Atlantic	24	54	90	182	282	393	744	916	3,824	4,203	6	15	28	87	80
New Jersey	—	0	0	—	—	—	150	232	602	724	—	1	6	1	15
New York (Upstate)	9	20	50	61	90	116	116	325	592	520	6	3	14	21	15
New York City	6	16	29	78	111	53	241	315	926	1,478	—	4	10	26	14
Pennsylvania	9	15	30	43	81	224	267	492	1,704	1,481	—	5	14	39	36
E.N. Central	18	47	84	157	264	304	1,063	1,275	4,190	7,078	3	11	22	38	78
Illinois	—	10	19	3	53	7	293	395	704	1,793	—	3	11	1	22
Indiana	1	6	13	8	35	49	132	170	594	1,015	—	2	6	2	10
Michigan	4	10	21	45	55	147	235	371	1,263	1,769	1	1	4	8	10
Ohio	13	15	30	74	75	65	314	403	1,154	1,991	2	4	7	23	24
Wisconsin	—	8	19	27	46	36	91	118	475	510	—	1	4	4	12
W.N. Central	4	18	50	92	113	1	313	382	428	1,710	1	2	9	10	10
Iowa	—	4	15	22	27	1	37	108	244	212	—	0	1	—	—
Kansas	1	2	9	9	14	—	42	65	31	220	—	0	2	2	—
Minnesota	—	0	0	—	—	—	44	61	—	243	—	0	0	—	—
Missouri	2	6	17	38	39	—	149	204	—	802	—	1	5	5	6
Nebraska	1	3	11	18	22	—	28	52	124	136	1	0	2	3	4
North Dakota	—	0	12	—	—	—	5	14	—	25	—	0	6	—	—
South Dakota	—	1	8	5	11	—	11	20	29	72	—	0	1	—	—
S. Atlantic	41	51	105	258	272	883	1,503	1,946	6,948	8,445	10	14	31	88	107
Delaware	—	0	3	1	2	18	15	35	97	111	—	0	2	—	—
District of Columbia	1	1	5	2	6	30	38	105	279	260	—	0	1	—	—
Florida	24	23	69	110	150	251	374	472	2,035	2,307	4	4	12	23	36
Georgia	5	11	51	87	45	216	322	456	1,532	1,507	2	2	6	17	24
Maryland	8	6	14	34	26	31	119	176	336	634	2	2	6	16	15
North Carolina	N	0	0	N	N	191	334	548	1,685	1,691	—	1	7	6	8
South Carolina	—	2	8	10	9	—	152	421	—	1,080	1	1	5	13	6
Virginia	3	5	12	14	34	146	122	353	925	742	—	2	8	7	18
West Virginia	—	0	8	—	—	—	14	29	59	113	1	0	5	6	—
E.S. Central	1	3	9	18	11	297	505	789	1,942	2,909	1	4	12	27	25
Alabama	1	3	9	18	11	148	167	408	673	993	—	1	3	5	8
Kentucky	N	0	0	N	N	91	77	151	422	285	1	1	4	6	6
Mississippi	N	0	0	N	N	—	102	196	—	755	—	0	3	5	2
Tennessee	N	0	0	N	N	58	149	222	847	876	—	2	8	11	9
W.S. Central	—	5	15	29	26	100	877	1,175	2,822	5,238	6	2	10	20	27
Arkansas	—	3	8	11	7	—	87	138	—	601	—	0	3	2	4
Louisiana	—	2	10	18	19	83	120	255	453	670	—	1	4	7	14
Oklahoma	—	0	0	—	—	17	33	196	136	421	6	1	9	11	9
Texas	N	0	0	N	N	—	589	832	2,233	3,546	—	0	1	—	—
Mountain	5	22	41	51	124	77	205	323	986	1,270	2	5	10	25	46
Arizona	1	2	6	8	13	34	87	136	556	434	—	1	6	7	20
Colorado	—	7	23	23	32	38	40	77	229	332	—	1	4	1	12
Idaho	1	3	9	6	18	—	3	15	3	14	1	0	2	2	2
Montana	1	2	5	3	2	3	1	4	9	13	—	0	1	2	1
Nevada	1	1	7	6	14	1	39	103	23	239	1	0	2	3	2
New Mexico	1	1	6	2	10	1	34	73	134	198	—	1	3	7	8
Utah	—	2	9	2	28	—	5	10	28	30	—	0	3	2	1
Wyoming	—	0	5	1	7	—	0	3	4	10	—	0	1	1	—
Pacific	22	47	163	171	244	252	631	758	2,979	4,059	1	4	9	18	25
Alaska	—	2	7	5	7	11	19	31	86	121	—	0	3	1	4
California	14	33	51	129	174	203	517	610	2,574	3,366	—	1	5	6	8
Hawaii	—	0	4	1	2	—	12	24	—	79	—	0	3	2	3
Oregon	2	6	20	21	47	—	26	60	76	156	1	1	6	9	10
Washington	6	6	132	15	14	38	50	79	243	337	—	0	1	—	—
Territories															
American Samoa	—	0	0	—	—	—	0	0	—	—	—	0	0	—	—
C.N.M.I.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Guam	—	0	0	—	—	—	0	5	—	1	—	0	0	—	—
Puerto Rico	—	0	4	—	7	—	6	14	19	36	—	0	0	—	—
U.S. Virgin Islands	—	0	0	—	—	—	2	10	—	17	—	0	0	—	—

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† Data for *H. influenzae* (age <5 yrs for serotype b, nonserotype b, and unknown serotype) are available in Table I.

TABLE II. (*Continued*) Provisional cases of selected notifiable diseases, United States, weeks ending February 11, 2012, and February 12, 2011 (6th week)*

Reporting area	Hepatitis (viral, acute), by type														
	A					B					C				
	Current week	Previous 52 weeks		Cum 2012	Cum 2011	Current week	Previous 52 weeks		Cum 2012	Cum 2011	Current week	Previous 52 weeks		Cum 2012	Cum 2011
		Med	Max				Med	Max				Med	Max		
United States	13	22	41	71	141	17	47	97	189	315	10	19	38	84	91
New England	—	1	5	2	11	—	1	8	—	15	—	1	5	2	8
Connecticut	—	0	3	2	5	—	0	4	—	1	—	0	4	2	7
Maine	—	0	2	—	—	—	0	2	—	1	—	0	3	—	—
Massachusetts	—	0	3	—	3	—	0	6	—	12	—	0	2	—	1
New Hampshire	—	0	0	—	—	—	0	1	—	1	N	0	0	N	N
Rhode Island	—	0	1	—	1	U	0	0	U	U	U	0	0	U	U
Vermont	—	0	2	—	2	—	0	0	—	—	—	0	1	—	—
Mid. Atlantic	3	3	7	12	20	1	5	8	12	28	3	2	5	11	6
New Jersey	—	0	0	—	—	—	0	1	2	—	—	0	1	1	—
New York (Upstate)	1	1	4	5	3	1	1	4	2	7	2	1	4	3	4
New York City	—	1	4	3	10	—	1	5	4	9	—	0	1	—	—
Pennsylvania	2	1	4	4	7	—	2	4	4	12	1	1	3	7	2
E.N. Central	1	3	7	7	29	4	6	37	24	63	—	2	8	8	22
Illinois	—	1	5	1	6	—	1	3	1	16	—	0	2	—	1
Indiana	—	0	1	—	4	—	1	4	3	8	—	0	5	2	14
Michigan	—	1	6	5	8	—	1	6	3	16	—	1	4	6	6
Ohio	1	0	2	1	9	4	1	30	17	20	—	0	1	—	—
Wisconsin	—	0	1	—	2	—	0	3	—	3	—	0	1	—	1
W.N. Central	1	1	7	5	6	—	2	9	6	15	—	0	4	1	—
Iowa	—	0	1	—	1	—	0	1	—	1	—	0	0	—	—
Kansas	—	0	1	—	—	—	0	2	—	3	—	0	1	1	—
Minnesota	—	0	7	—	—	—	0	7	—	—	—	0	2	—	—
Missouri	—	0	1	2	3	—	1	4	5	6	—	0	0	—	—
Nebraska	1	0	1	3	—	—	0	2	1	4	—	0	1	—	—
North Dakota	—	0	0	—	—	—	0	0	—	—	—	0	0	—	—
South Dakota	—	0	0	—	2	—	0	0	—	1	—	0	0	—	—
S. Atlantic	3	4	11	14	30	5	12	57	55	72	5	5	14	26	17
Delaware	1	0	1	1	1	—	0	2	2	—	U	0	0	U	U
District of Columbia	—	0	0	—	—	—	0	0	—	—	—	0	0	—	—
Florida	2	1	8	6	9	4	4	7	18	25	4	1	3	11	5
Georgia	—	1	5	1	8	—	2	7	7	18	—	1	3	1	4
Maryland	—	0	4	1	4	—	1	4	12	8	—	1	3	2	2
North Carolina	—	0	3	2	2	—	1	9	5	10	—	1	7	3	4
South Carolina	—	0	2	—	2	—	1	3	2	5	—	0	1	—	—
Virginia	—	0	3	2	4	1	1	4	9	6	1	0	3	2	2
West Virginia	—	0	2	1	—	—	0	43	—	—	—	0	7	7	—
E.S. Central	—	1	6	1	3	3	10	18	55	54	2	5	10	20	16
Alabama	—	0	2	—	—	—	2	6	9	7	—	0	3	2	—
Kentucky	—	0	2	—	2	2	3	10	22	21	1	2	8	10	9
Mississippi	—	0	1	—	1	—	1	4	2	3	U	0	0	U	U
Tennessee	—	0	5	1	—	1	4	8	22	23	1	1	5	8	7
W.S. Central	5	3	7	14	5	4	6	14	17	25	—	1	5	5	9
Arkansas	—	0	2	—	—	—	1	4	—	3	—	0	0	—	—
Louisiana	—	0	2	—	1	—	0	2	3	9	—	0	1	—	4
Oklahoma	—	0	2	—	—	—	1	9	2	3	—	1	4	—	3
Texas	5	3	7	14	4	4	3	11	12	10	—	0	3	5	2
Mountain	—	1	5	7	11	—	1	4	8	15	—	1	5	2	7
Arizona	—	0	2	2	4	—	0	3	1	2	U	0	0	U	U
Colorado	—	0	2	3	5	—	0	2	—	2	—	0	2	—	2
Idaho	—	0	1	1	—	—	0	1	—	2	—	0	2	—	3
Montana	—	0	1	—	1	—	0	0	—	—	—	0	2	—	—
Nevada	—	0	3	1	—	—	0	3	7	6	—	0	2	2	—
New Mexico	—	0	1	—	1	—	0	2	—	—	—	0	2	—	—
Utah	—	0	1	—	—	—	0	1	—	3	—	0	2	—	2
Wyoming	—	0	1	—	—	—	0	0	—	—	—	0	1	—	—
Pacific	—	3	11	9	26	—	3	8	12	28	—	2	10	9	6
Alaska	—	0	1	—	—	—	0	1	—	1	U	0	0	U	U
California	—	3	7	6	23	—	2	7	7	21	—	1	4	4	2
Hawaii	—	0	2	—	1	—	0	1	1	2	U	0	0	U	U
Oregon	—	0	2	1	1	—	0	4	3	4	—	0	2	3	3
Washington	—	0	4	2	1	—	0	3	1	—	—	0	8	2	1
Territories															
American Samoa	—	0	0	—	—	—	0	0	—	—	—	0	0	—	—
C.N.M.I.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Guam	—	0	5	—	1	—	2	8	—	7	—	0	3	—	3
Puerto Rico	—	0	1	—	—	—	0	2	—	—	N	0	0	N	N
U.S. Virgin Islands	—	0	0	—	—	—	0	0	—	—	—	0	0	—	—

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TABLE II. (*Continued*) Provisional cases of selected notifiable diseases, United States, weeks ending February 11, 2012, and February 12, 2011 (6th week)*

Reporting area	Legionellosis					Lyme disease					Malaria				
	Current week	Previous 52 weeks		Cum 2012	Cum 2011	Current week	Previous 52 weeks		Cum 2012	Cum 2011	Current week	Previous 52 weeks		Cum 2012	Cum 2011
		Med	Max				Med	Max				Med	Max		
United States	19	68	168	176	218	55	410	1,618	1,091	937	8	25	48	96	148
New England	1	4	40	7	20	—	81	504	64	300	—	1	7	6	11
Connecticut	—	1	11	2	3	—	36	234	3	125	—	0	2	—	1
Maine	—	0	3	—	—	—	13	67	23	20	—	0	2	—	—
Massachusetts	1	3	24	4	13	—	17	106	16	99	—	1	6	5	8
New Hampshire	—	0	3	—	1	—	10	90	6	43	—	0	1	—	—
Rhode Island	—	0	9	1	2	—	1	31	1	1	—	0	2	—	—
Vermont	—	0	2	—	1	—	6	70	15	12	—	0	1	1	2
Mid. Atlantic	5	15	77	37	51	41	200	765	851	375	—	6	13	13	39
New Jersey	—	0	0	—	—	—	2	144	511	1	—	0	0	—	—
New York (Upstate)	1	6	27	13	14	29	56	211	79	41	—	1	4	2	4
New York City	—	3	14	6	18	—	1	16	—	14	—	4	11	9	28
Pennsylvania	4	5	42	18	19	12	111	538	261	319	—	1	5	2	7
E.N. Central	2	13	51	35	36	—	23	284	12	83	2	3	10	7	16
Illinois	—	2	11	2	5	—	1	21	—	4	—	1	5	—	6
Indiana	1	2	8	7	6	—	1	12	—	—	—	0	2	1	1
Michigan	—	2	15	—	7	—	1	12	6	—	—	0	4	1	1
Ohio	1	7	34	26	18	—	1	6	5	3	2	0	4	4	7
Wisconsin	—	0	1	—	—	—	20	242	1	76	—	0	2	1	1
W.N. Central	—	1	8	4	4	1	1	16	3	2	1	1	5	6	2
Iowa	—	0	2	—	—	—	0	13	1	1	—	0	3	1	—
Kansas	—	0	2	—	—	—	0	2	—	—	1	0	2	2	—
Minnesota	—	0	0	—	—	—	0	0	—	—	—	0	0	—	—
Missouri	—	1	5	4	3	—	0	2	—	1	—	0	2	3	1
Nebraska	—	0	2	—	—	1	0	2	2	—	—	0	1	—	1
North Dakota	—	0	1	—	—	—	0	9	—	—	—	0	0	—	—
South Dakota	—	0	1	—	1	—	0	2	—	—	—	0	1	—	—
S. Atlantic	3	11	30	51	30	12	64	180	143	170	2	8	25	38	50
Delaware	—	0	4	3	—	3	13	48	34	52	1	0	3	1	—
District of Columbia	—	0	3	1	—	—	0	3	1	2	—	0	2	—	3
Florida	2	4	13	26	15	2	3	8	12	3	—	2	6	14	9
Georgia	—	1	4	4	3	—	0	5	5	1	1	1	6	5	10
Maryland	1	2	15	5	3	3	20	116	50	61	—	2	15	10	12
North Carolina	—	1	7	4	4	—	0	12	1	6	—	0	7	1	5
South Carolina	—	0	5	2	—	—	0	6	1	1	—	0	1	2	—
Virginia	—	1	7	6	5	4	16	75	33	41	—	1	8	5	11
West Virginia	—	0	5	—	—	—	0	13	6	3	—	0	1	—	—
E.S. Central	—	2	11	4	8	—	1	5	1	—	—	1	4	—	2
Alabama	—	0	2	1	1	—	0	2	—	—	—	0	3	—	1
Kentucky	—	1	4	—	3	—	0	1	1	—	—	0	2	—	—
Mississippi	—	0	3	—	1	—	0	1	—	—	—	0	1	—	—
Tennessee	—	1	8	3	3	—	0	4	—	—	—	0	3	—	1
W.S. Central	—	3	8	2	8	1	1	4	2	1	1	1	5	6	5
Arkansas	—	0	2	—	—	—	0	0	—	—	—	0	1	—	—
Louisiana	—	0	3	—	4	—	0	1	1	—	—	0	1	—	—
Oklahoma	—	0	3	—	1	—	0	0	—	—	1	0	3	4	1
Texas	—	2	7	2	3	1	1	4	1	1	—	0	5	2	4
Mountain	1	2	9	8	15	—	1	5	5	1	2	1	5	4	9
Arizona	—	1	4	3	4	—	0	4	1	—	—	0	4	—	3
Colorado	—	0	4	—	6	—	0	1	—	—	—	0	3	—	3
Idaho	—	0	1	1	1	—	0	2	2	—	—	0	1	—	—
Montana	—	0	1	—	—	—	0	3	—	—	—	0	1	—	—
Nevada	1	0	2	2	1	—	0	1	—	—	2	0	2	4	2
New Mexico	—	0	2	—	—	—	0	2	—	1	—	0	1	—	1
Utah	—	0	2	1	3	—	0	1	1	—	—	0	1	—	—
Wyoming	—	0	2	1	—	—	0	1	1	—	—	0	0	—	—
Pacific	7	6	17	28	46	—	2	8	10	5	—	3	11	16	14
Alaska	—	0	0	—	—	—	0	3	—	—	—	0	2	1	2
California	7	4	11	24	40	—	1	8	10	3	—	3	7	14	8
Hawaii	—	0	2	—	1	N	0	0	N	N	—	0	1	—	—
Oregon	—	0	3	4	1	—	0	2	—	2	—	0	4	1	3
Washington	—	0	13	—	4	—	0	5	—	—	—	0	2	—	1
Territories															
American Samoa	N	0	0	N	N	N	0	0	N	N	—	0	1	—	—
C.N.M.I.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Guam	—	0	0	—	—	—	0	0	—	—	—	0	0	—	—
Puerto Rico	—	0	0	—	—	N	0	0	N	N	—	0	0	—	—
U.S. Virgin Islands	—	0	0	—	—	—	0	0	—	—	—	0	0	—	—

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TABLE II. (*Continued*) Provisional cases of selected notifiable diseases, United States, weeks ending February 11, 2012, and February 12, 2011 (6th week)*

Reporting area	Meningococcal disease, invasive† All serogroups					Mumps					Pertussis				
	Current week	Previous 52 weeks		Cum 2012	Cum 2011	Current week	Previous 52 weeks		Cum 2012	Cum 2011	Current week	Previous 52 weeks		Cum 2012	Cum 2011
		Med	Max				Med	Max				Med	Max		
United States	9	12	26	58	105	2	7	19	18	42	147	308	760	1,562	2,132
New England	1	0	3	1	3	—	0	2	—	1	10	17	32	111	57
Connecticut	—	0	1	—	1	—	0	0	—	—	—	1	5	2	10
Maine	—	0	1	—	—	—	0	2	—	—	—	3	19	16	10
Massachusetts	1	0	2	1	2	—	0	1	—	1	1	4	10	24	23
New Hampshire	—	0	1	—	—	—	0	0	—	—	—	2	13	3	8
Rhode Island	—	0	1	—	—	—	0	2	—	—	—	0	8	12	6
Vermont	—	0	3	—	—	—	0	1	—	—	9	1	16	54	—
Mid. Atlantic	—	1	4	8	11	1	0	7	1	5	65	40	167	371	183
New Jersey	—	0	0	—	—	—	0	1	—	5	—	4	10	6	15
New York (Upstate)	—	0	4	1	1	—	0	3	—	—	46	13	135	207	53
New York City	—	0	2	3	6	—	0	6	—	—	—	4	42	29	—
Pennsylvania	—	0	2	4	4	1	0	1	1	—	19	13	30	129	115
E.N. Central	1	2	6	6	15	—	2	12	4	12	14	67	214	442	536
Illinois	—	0	3	—	4	—	1	10	—	4	—	21	122	98	102
Indiana	—	0	2	—	2	—	0	2	1	—	—	4	21	10	48
Michigan	—	0	1	—	3	—	0	2	2	2	3	10	38	49	136
Ohio	1	0	2	5	4	—	0	2	1	5	8	13	25	82	185
Wisconsin	—	0	2	1	2	—	0	1	—	1	3	13	64	203	65
W.N. Central	—	1	3	3	8	—	0	3	1	5	7	22	119	112	119
Iowa	—	0	1	—	1	—	0	2	—	—	—	4	9	16	35
Kansas	—	0	1	—	1	—	0	1	—	1	—	2	6	11	17
Minnesota	—	0	0	—	—	—	0	1	—	—	—	0	110	—	—
Missouri	—	0	2	3	3	—	0	2	1	3	5	8	33	80	47
Nebraska	—	0	2	—	3	—	0	1	—	1	2	1	5	3	15
North Dakota	—	0	1	—	—	—	0	3	—	—	—	0	10	—	3
South Dakota	—	0	1	—	—	—	0	0	—	—	—	0	7	2	2
S. Atlantic	3	2	8	9	13	—	1	4	4	1	19	26	51	138	233
Delaware	—	0	1	—	—	—	0	0	—	—	1	0	5	5	3
District of Columbia	—	0	1	—	—	—	0	1	—	—	—	0	2	1	1
Florida	3	1	5	7	4	—	0	2	2	—	13	6	17	52	34
Georgia	—	0	1	—	1	—	0	2	—	—	—	3	7	9	37
Maryland	—	0	2	2	1	—	0	1	1	—	3	2	10	20	20
North Carolina	—	0	3	—	3	—	0	2	—	—	—	3	10	5	59
South Carolina	—	0	1	—	2	—	0	1	—	—	—	2	9	6	26
Virginia	—	0	2	—	2	—	0	4	—	1	2	6	25	25	53
West Virginia	—	0	3	—	—	—	0	1	1	—	—	0	15	15	—
E.S. Central	—	0	3	—	6	—	0	1	—	2	1	9	17	54	78
Alabama	—	0	2	—	5	—	0	1	—	1	—	2	11	2	21
Kentucky	—	0	2	—	—	—	0	0	—	—	—	3	9	27	34
Mississippi	—	0	1	—	1	—	0	1	—	1	—	0	4	5	4
Tennessee	—	0	2	—	—	—	0	1	—	—	1	2	7	20	19
W.S. Central	1	1	5	2	9	—	1	13	2	11	8	19	97	47	73
Arkansas	—	0	2	—	2	—	0	2	—	—	—	1	5	1	7
Louisiana	—	0	2	1	3	—	0	0	—	—	—	0	3	2	7
Oklahoma	1	0	2	1	1	—	0	2	—	—	—	0	11	—	2
Texas	—	0	2	—	3	—	1	13	2	11	8	18	94	44	57
Mountain	2	1	4	5	6	—	0	2	2	1	4	39	82	169	301
Arizona	—	0	1	1	2	—	0	0	—	—	1	12	48	93	117
Colorado	—	0	1	—	1	—	0	1	1	—	—	7	25	28	69
Idaho	1	0	1	1	2	—	0	2	—	—	2	3	12	12	17
Montana	—	0	2	1	—	—	0	1	1	—	—	1	32	10	22
Nevada	1	0	1	1	—	—	0	0	—	—	1	0	5	10	7
New Mexico	—	0	1	1	—	—	0	1	—	1	—	4	24	11	11
Utah	—	0	2	—	1	—	0	0	—	—	—	6	15	2	56
Wyoming	—	0	0	—	—	—	0	1	—	—	—	0	3	3	2
Pacific	1	3	11	24	34	1	0	11	4	4	19	60	251	118	552
Alaska	—	0	1	—	1	—	0	1	—	—	1	0	3	10	12
California	—	2	7	16	26	—	0	11	3	—	—	35	78	19	490
Hawaii	—	0	1	—	1	—	0	1	—	1	—	1	9	9	6
Oregon	1	0	4	8	4	—	0	1	—	3	2	5	23	14	24
Washington	—	0	3	—	2	1	0	1	1	—	16	11	199	66	20
Territories															
American Samoa	—	0	0	—	—	—	0	0	—	—	—	0	0	—	—
C.N.M.I.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Guam	—	0	0	—	—	—	1	3	—	4	—	2	14	—	4
Puerto Rico	—	0	0	—	—	—	0	1	1	—	—	0	1	—	1
U.S. Virgin Islands	—	0	0	—	—	—	0	0	—	—	—	0	0	—	—

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† Data for meningococcal disease, invasive caused by serogroups A, C, Y, and W-135; serogroup B; other serogroup; and unknown serogroup are available in Table I.

TABLE II. (*Continued*) Provisional cases of selected notifiable diseases, United States, weeks ending February 11, 2012, and February 12, 2011 (6th week)*

Reporting area	Rabies, animal					Salmonellosis					Shiga toxin-producing *E. coli* (STEC)†				
	Current week	Previous 52 weeks		Cum 2012	Cum 2011	Current week	Previous 52 weeks		Cum 2012	Cum 2011	Current week	Previous 52 weeks		Cum 2012	Cum 2011
		Med	Max				Med	Max				Med	Max		
United States	36	60	104	164	304	230	870	1,859	2,163	2,824	15	84	206	196	229
New England	5	5	16	36	10	1	36	107	83	139	—	3	13	7	11
Connecticut	—	2	10	13	2	—	8	30	18	38	—	1	4	2	7
Maine	3	1	6	14	2	—	2	7	7	12	—	0	3	—	—
Massachusetts	—	0	0	—	—	1	19	44	46	68	—	1	9	5	2
New Hampshire	—	0	3	3	1	—	3	8	5	12	—	0	3	—	2
Rhode Island	2	0	6	4	—	—	1	62	—	4	—	0	2	—	—
Vermont	—	0	2	2	5	—	1	8	7	5	—	0	3	—	—
Mid. Atlantic	4	16	36	22	79	25	74	172	194	238	2	9	28	29	34
New Jersey	—	0	0	—	—	—	0	3	3	—	—	0	1	1	—
New York (Upstate)	4	7	20	22	27	16	25	67	55	51	1	3	13	6	10
New York City	—	0	3	—	1	3	19	42	63	77	—	2	6	7	6
Pennsylvania	—	8	21	—	51	6	31	113	73	110	1	3	16	15	18
E.N. Central	1	2	17	3	4	14	88	184	157	354	—	15	52	29	53
Illinois	—	0	6	—	3	—	27	80	26	122	—	4	14	5	9
Indiana	—	0	7	—	—	—	8	27	10	33	—	1	10	—	9
Michigan	1	1	6	2	1	3	14	42	41	61	—	3	19	19	13
Ohio	—	1	5	1	—	11	20	46	73	92	—	3	10	5	10
Wisconsin	N	0	0	N	N	—	12	46	7	46	—	3	21	—	12
W.N. Central	5	1	8	11	1	14	39	99	124	127	2	11	40	33	17
Iowa	—	0	0	—	—	—	8	19	16	33	—	2	15	5	4
Kansas	1	0	4	5	1	1	8	27	36	20	—	2	8	4	3
Minnesota	—	0	0	—	—	—	0	0	—	—	—	0	0	—	—
Missouri	—	0	4	2	—	9	15	42	53	53	1	5	32	16	5
Nebraska	—	0	3	—	—	4	4	13	13	12	1	1	8	5	5
North Dakota	4	0	3	4	—	—	0	15	—	—	—	0	4	—	—
South Dakota	—	0	0	—	—	—	3	10	6	9	—	1	4	3	—
S. Atlantic	12	17	48	37	190	76	276	739	840	840	5	12	25	45	43
Delaware	—	0	0	—	—	1	3	12	8	12	—	0	2	1	—
District of Columbia	—	0	0	—	—	—	1	6	—	5	1	0	1	1	1
Florida	11	0	2	13	120	47	107	203	378	324	3	3	9	23	6
Georgia	—	0	0	—	—	17	45	138	113	142	—	2	8	4	7
Maryland	—	6	13	17	18	4	19	46	71	68	1	1	4	2	8
North Carolina	—	0	0	—	—	—	32	251	127	126	—	2	11	4	13
South Carolina	N	0	0	N	N	1	26	71	70	78	—	0	4	2	—
Virginia	—	11	27	—	52	6	19	54	65	85	—	2	8	8	8
West Virginia	1	0	30	7	—	—	0	18	8	—	—	0	2	—	—
E.S. Central	—	3	11	7	11	16	64	190	182	220	—	4	18	13	13
Alabama	—	2	7	6	6	5	19	70	52	78	—	1	15	4	2
Kentucky	—	0	2	1	1	4	11	30	32	32	—	1	5	3	4
Mississippi	—	0	1	—	—	2	22	66	51	39	—	0	4	4	1
Tennessee	—	1	4	—	4	5	15	51	47	71	—	1	11	2	6
W.S. Central	8	1	21	36	—	18	132	250	163	251	2	10	49	13	15
Arkansas	—	0	10	1	—	—	13	52	28	36	—	1	6	3	1
Louisiana	—	0	0	—	—	1	14	44	48	52	—	0	1	—	—
Oklahoma	—	0	21	4	—	15	13	31	38	23	2	1	10	5	4
Texas	8	0	7	31	—	2	92	158	49	140	—	7	49	5	10
Mountain	1	1	4	11	—	8	45	93	121	240	—	11	27	15	25
Arizona	N	0	0	N	N	4	15	35	51	84	—	2	7	2	2
Colorado	—	0	0	—	—	—	9	23	18	50	—	3	9	2	12
Idaho	—	0	1	—	—	3	2	8	7	23	—	1	8	2	4
Montana	N	0	0	N	N	—	2	10	7	5	—	1	4	—	—
Nevada	—	0	2	—	—	1	3	7	8	19	—	1	7	1	1
New Mexico	1	0	4	11	—	—	5	22	13	33	—	1	3	3	3
Utah	—	0	2	—	—	—	6	15	15	23	—	1	7	2	3
Wyoming	—	0	0	—	—	—	1	9	2	3	—	0	7	3	—
Pacific	—	4	13	1	9	58	92	173	299	415	4	9	28	12	18
Alaska	—	0	2	1	4	—	1	6	7	8	—	0	1	—	—
California	—	3	12	—	3	36	72	141	235	310	—	4	14	3	13
Hawaii	—	0	0	—	—	—	7	14	10	40	—	0	2	—	—
Oregon	—	0	2	—	2	—	6	12	16	42	1	1	11	4	4
Washington	—	0	0	—	—	22	9	40	31	15	3	2	19	5	1
Territories															
American Samoa	N	0	0	N	N	—	0	0	—	—	—	0	0	—	—
C.N.M.I.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Guam	—	0	0	—	—	—	0	2	—	3	—	0	0	—	—
Puerto Rico	—	0	6	—	2	—	3	12	3	14	—	0	0	—	—
U.S. Virgin Islands	—	0	0	—	—	—	0	0	—	—	—	0	0	—	—

C.N.M.I.: Commonwealth of Northern Mariana Islands.
U: Unavailable. —: No reported cases. N: Not reportable. NN: Not Nationally Notifiable. Cum: Cumulative year-to-date counts. Med: Median. Max: Maximum.
* Case counts for reporting year 2011 and 2012 are provisional and subject to change. For further information on interpretation of these data, see http://www.cdc.gov/osels/ph_surveillance/nndss/phs/files/ProvisionalNationa%20NotifiableDiseasesSurveillanceData20100927.pdf. Data for TB are displayed in Table IV, which appears quarterly.
† Includes *E. coli* O157:H7; Shiga toxin-positive, serogroup non-O157; and Shiga toxin-positive, not serogrouped.

TABLE II. (*Continued*) Provisional cases of selected notifiable diseases, United States, weeks ending February 11, 2012, and February 12, 2011 (6th week)*

Reporting area	Shigellosis					Spotted Fever Rickettsiosis (including RMSF)†									
						Confirmed					Probable				
	Current week	Previous 52 weeks		Cum 2012	Cum 2011	Current week	Previous 52 weeks		Cum 2012	Cum 2011	Current week	Previous 52 weeks		Cum 2012	Cum 2011
		Med	Max				Med	Max				Med	Max		
United States	107	245	355	933	926	3	3	15	11	8	3	29	138	38	32
New England	1	4	21	10	22	—	0	1	—	—	—	0	1	—	—
Connecticut	—	1	4	2	4	—	0	0	—	—	—	0	0	—	—
Maine	—	0	8	—	1	—	0	0	—	—	—	0	1	—	—
Massachusetts	1	3	20	8	16	—	0	0	—	—	—	0	1	—	—
New Hampshire	—	0	1	—	—	—	0	1	—	—	—	0	1	—	—
Rhode Island	—	0	3	—	—	—	0	0	—	—	—	0	1	—	—
Vermont	—	0	1	—	1	—	0	0	—	—	—	0	0	—	—
Mid. Atlantic	8	19	49	157	51	2	0	2	3	—	—	1	7	4	2
New Jersey	—	0	24	49	—	—	0	0	—	—	—	0	0	—	—
New York (Upstate)	6	6	35	46	15	—	0	1	—	—	—	0	2	—	—
New York City	1	8	28	54	26	—	0	0	—	—	—	0	3	2	2
Pennsylvania	1	2	13	8	10	2	0	2	3	—	—	0	3	2	—
E.N. Central	10	14	40	124	90	—	0	2	1	—	—	2	10	2	3
Illinois	—	4	16	—	34	—	0	1	—	—	—	1	4	1	2
Indiana	—	1	6	—	9	—	0	1	1	—	—	1	5	1	—
Michigan	1	3	11	20	17	—	0	1	—	—	—	0	1	—	—
Ohio	9	6	27	104	30	—	0	2	—	—	—	0	2	—	1
Wisconsin	—	0	0	—	—	—	0	0	—	—	—	0	0	—	—
W.N. Central	1	5	18	34	57	—	0	4	—	—	—	4	24	3	4
Iowa	—	0	3	2	4	—	0	0	—	—	—	0	2	—	—
Kansas	1	1	6	17	13	—	0	0	—	—	—	0	0	—	—
Minnesota	—	0	0	—	—	—	0	0	—	—	—	0	0	—	—
Missouri	—	3	14	13	38	—	0	2	—	—	—	4	22	3	4
Nebraska	—	0	2	2	1	—	0	3	—	—	—	0	1	—	—
North Dakota	—	0	0	—	—	—	0	1	—	—	—	0	0	—	—
South Dakota	—	0	2	—	1	—	0	1	—	—	—	0	0	—	—
S. Atlantic	41	75	134	216	301	1	1	9	6	4	1	6	57	18	13
Delaware	—	0	2	—	—	—	0	1	—	—	—	0	4	1	—
District of Columbia	—	0	5	1	5	—	0	1	—	—	—	0	1	—	—
Florida	22	50	98	126	181	—	0	1	—	1	—	0	2	4	—
Georgia	9	13	26	57	52	1	1	8	6	1	—	0	0	—	—
Maryland	10	2	7	17	13	—	0	1	—	1	—	0	3	2	1
North Carolina	—	3	19	7	32	—	0	4	—	1	—	0	49	3	8
South Carolina	—	1	54	2	7	—	0	2	—	—	—	0	2	—	1
Virginia	—	2	7	6	11	—	0	1	—	—	1	3	14	8	3
West Virginia	—	0	2	—	—	—	0	0	—	—	—	0	1	—	—
E.S. Central	12	19	51	151	49	—	0	2	—	—	2	4	25	6	5
Alabama	2	6	21	43	22	—	0	1	—	—	1	1	8	2	3
Kentucky	6	4	22	70	4	—	0	1	—	—	—	0	2	—	—
Mississippi	2	4	24	27	6	—	0	0	—	—	—	0	2	—	1
Tennessee	2	4	11	11	17	—	0	2	—	—	1	4	20	4	1
W.S. Central	20	54	129	144	123	—	0	3	—	—	—	2	52	1	1
Arkansas	—	2	7	8	3	—	0	3	—	—	—	1	52	—	—
Louisiana	—	4	21	12	18	—	0	0	—	—	—	0	2	1	—
Oklahoma	6	4	28	32	7	—	0	1	—	—	—	0	25	—	—
Texas	14	43	99	92	95	—	0	1	—	—	—	0	4	—	1
Mountain	—	14	41	34	90	—	0	3	—	4	—	1	7	3	4
Arizona	—	6	27	23	38	—	0	3	—	4	—	0	6	—	4
Colorado	—	1	8	2	13	—	0	0	—	—	—	0	1	—	—
Idaho	—	0	3	1	3	—	0	0	—	—	—	0	2	2	—
Montana	—	1	15	3	5	—	0	0	—	—	—	0	1	—	—
Nevada	—	0	4	1	6	—	0	0	—	—	—	0	1	—	—
New Mexico	—	2	7	3	20	—	0	0	—	—	—	0	0	—	—
Utah	—	1	4	1	5	—	0	0	—	—	—	0	1	1	—
Wyoming	—	0	1	—	—	—	0	0	—	—	—	0	2	—	—
Pacific	14	19	44	63	143	—	0	2	1	—	—	0	1	1	—
Alaska	—	0	2	2	—	N	0	0	N	N	N	0	0	N	N
California	11	15	41	53	125	—	0	2	1	—	—	0	1	1	—
Hawaii	—	1	3	—	9	N	0	0	N	N	N	0	0	N	N
Oregon	—	1	4	5	6	—	0	0	—	—	—	0	0	—	—
Washington	3	1	9	3	3	—	0	0	—	—	—	0	0	—	—
Territories															
American Samoa	—	0	0	—	1	N	0	0	N	N	N	0	0	N	N
C.N.M.I.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Guam	—	0	1	—	—	N	0	0	N	N	N	0	0	N	N
Puerto Rico	—	0	0	—	—	N	0	0	N	N	N	0	0	N	N
U.S. Virgin Islands	—	0	0	—	—	—	0	0	—	—	—	0	0	—	—

C.N.M.I.: Commonwealth of Northern Mariana Islands.
U: Unavailable. —: No reported cases. N: Not reportable. NN: Not Nationally Notifiable. Cum: Cumulative year-to-date counts. Med: Median. Max: Maximum.

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† Illnesses with similar clinical presentation that result from Spotted fever group rickettsia infections are reported as Spotted fever rickettsioses. Rocky Mountain spotted fever (RMSF) caused by *Rickettsia rickettsii*, is the most common and well-known spotted fever.

TABLE II. (*Continued*) Provisional cases of selected notifiable diseases, United States, weeks ending February 11, 2012, and February 12, 2011 (6th week)*

Reporting area	*Streptococcus pneumoniae*,† invasive disease										Syphilis, primary and secondary				
	All ages					Age <5									
	Current week	Previous 52 weeks		Cum 2012	Cum 2011	Current week	Previous 52 weeks		Cum 2012	Cum 2011	Current week	Previous 52 weeks		Cum 2012	Cum 2011
		Med	Max				Med	Max				Med	Max		
United States	190	252	464	1,596	2,174	15	21	41	110	124	77	265	308	792	1,410
New England	2	13	31	60	130	1	1	4	3	3	3	7	23	23	39
Connecticut	—	6	20	27	64	—	0	3	—	—	—	0	12	—	4
Maine	—	2	8	13	21	—	0	1	—	—	—	0	2	—	2
Massachusetts	2	0	3	5	4	1	0	2	2	2	1	5	10	19	24
New Hampshire	—	1	8	7	15	—	0	1	1	—	—	0	3	1	3
Rhode Island	—	1	6	—	22	—	0	1	—	1	2	0	7	3	6
Vermont	—	1	6	8	4	—	0	2	—	—	—	0	2	—	—
Mid. Atlantic	41	16	53	242	137	3	1	10	12	5	9	29	53	90	191
New Jersey	—	0	16	42	—	—	0	2	4	—	—	4	13	—	23
New York (Upstate)	33	1	28	131	12	3	1	10	7	5	2	4	9	12	14
New York City	8	12	24	69	125	—	0	9	1	—	—	14	24	32	114
Pennsylvania	N	0	0	N	N	N	0	0	N	N	7	7	17	46	40
E.N. Central	29	64	122	345	460	1	3	10	16	22	2	29	48	48	177
Illinois	N	0	0	N	N	—	0	0	—	—	—	11	24	25	67
Indiana	2	13	36	42	106	—	1	4	1	2	2	3	8	10	21
Michigan	8	13	26	77	91	1	0	2	5	7	—	4	12	1	31
Ohio	19	28	43	177	199	—	1	7	7	10	—	8	17	10	51
Wisconsin	—	8	23	49	64	—	0	2	3	3	—	1	6	2	7
W.N. Central	3	2	28	24	18	—	0	2	1	1	—	6	13	3	45
Iowa	N	0	0	N	N	N	0	0	N	N	—	0	3	2	1
Kansas	N	0	0	N	N	N	0	0	N	N	—	0	4	—	1
Minnesota	—	0	0	—	—	—	0	0	—	—	—	2	8	—	23
Missouri	N	0	0	N	N	—	0	0	—	—	—	2	8	—	19
Nebraska	3	2	9	24	18	—	0	2	1	1	—	0	2	1	1
North Dakota	—	0	25	—	—	—	0	1	—	—	—	0	1	—	—
South Dakota	N	0	0	N	N	—	0	0	—	—	—	0	0	—	—
S. Atlantic	62	65	143	443	690	7	6	15	37	42	45	66	90	259	306
Delaware	—	1	5	6	13	—	0	0	—	—	—	0	4	7	3
District of Columbia	—	1	5	1	9	—	0	1	1	1	2	3	8	26	22
Florida	29	21	55	168	285	2	2	8	14	18	2	24	36	96	143
Georgia	14	19	38	126	189	2	1	5	10	15	15	12	37	48	22
Maryland	10	9	29	46	102	1	1	3	3	5	6	8	20	23	34
North Carolina	N	0	0	N	N	N	0	0	N	N	7	8	21	35	29
South Carolina	7	8	22	64	92	1	0	3	3	3	—	4	14	—	34
Virginia	N	0	0	N	N	—	0	0	—	—	13	4	12	24	19
West Virginia	2	1	48	32	—	1	0	4	6	—	—	0	2	—	—
E.S. Central	12	23	45	139	196	—	2	4	8	18	5	15	31	34	73
Alabama	N	0	0	N	N	N	0	0	N	N	2	4	11	12	29
Kentucky	3	4	12	28	35	—	0	3	—	5	3	2	8	10	11
Mississippi	N	0	0	N	N	—	0	0	—	—	—	3	22	—	9
Tennessee	9	19	42	111	161	—	1	4	8	13	—	5	11	12	24
W.S. Central	27	31	126	171	215	3	3	10	16	12	1	36	50	122	166
Arkansas	—	4	14	20	36	—	0	4	2	2	—	4	10	—	22
Louisiana	—	2	13	26	44	—	0	2	2	2	—	8	25	17	22
Oklahoma	N	0	0	N	N	—	0	0	—	—	1	1	6	5	6
Texas	27	24	112	125	135	3	3	9	12	8	—	23	38	100	116
Mountain	12	26	72	159	305	—	2	8	11	20	1	12	20	24	65
Arizona	11	12	45	112	163	—	1	5	7	9	—	4	10	9	21
Colorado	—	9	23	18	66	—	0	4	1	4	—	2	6	7	13
Idaho	N	0	0	N	N	—	0	0	—	—	—	0	4	2	3
Montana	N	0	0	N	N	N	0	0	N	N	—	0	1	—	3
Nevada	N	0	0	N	N	N	0	0	N	N	—	2	9	—	16
New Mexico	1	4	12	26	42	—	0	2	3	3	1	1	4	3	5
Utah	—	1	8	—	29	—	0	3	—	4	—	0	2	3	4
Wyoming	—	0	3	3	5	—	0	0	—	—	—	0	0	—	—
Pacific	2	2	11	13	23	—	0	2	6	1	11	57	74	189	348
Alaska	2	2	11	13	23	—	0	2	6	1	—	0	2	2	—
California	N	0	0	N	N	N	0	0	N	N	5	44	62	157	284
Hawaii	—	0	1	—	—	—	0	1	—	—	—	0	3	—	—
Oregon	N	0	0	N	N	N	0	0	N	N	1	4	14	9	21
Washington	N	0	0	N	N	N	0	0	N	N	5	5	11	21	43
Territories															
American Samoa	N	0	0	N	N	—	0	0	—	—	—	0	0	—	—
C.N.M.I.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Guam	—	0	0	—	—	—	0	0	—	—	—	0	0	—	—
Puerto Rico	—	0	0	—	—	—	0	0	—	—	6	5	15	25	21
U.S. Virgin Islands	—	0	0	—	—	—	0	0	—	—	—	0	0	—	—

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† Includes drug resistant and susceptible cases of invasive *Streptococcus pneumoniae* disease among children <5 years and among all ages. Case definition: Isolation of *S. pneumoniae* from a normally sterile body site (e.g., blood or cerebrospinal fluid).

TABLE II. (*Continued*) Provisional cases of selected notifiable diseases, United States, weeks ending February 11, 2012, and February 12, 2011 (6th week)*

Reporting area	Varicella (chickenpox)					West Nile virus disease†									
						Neuroinvasive					Nonneuroinvasive§				
	Current week	Previous 52 weeks		Cum 2012	Cum 2011	Current week	Previous 52 weeks		Cum 2012	Cum 2011	Current week	Previous 52 weeks		Cum 2012	Cum 2011
		Med	Max				Med	Max				Med	Max		
United States	84	261	350	1,177	1,540	—	0	60	—	1	—	0	31	—	—
New England	13	23	50	124	157	—	0	3	—	—	—	0	1	—	—
Connecticut	—	5	16	27	30	—	0	2	—	—	—	0	1	—	—
Maine	7	4	11	31	28	—	0	0	—	—	—	0	0	—	—
Massachusetts	2	9	18	47	57	—	0	2	—	—	—	0	1	—	—
New Hampshire	—	2	10	—	13	—	0	0	—	—	—	0	0	—	—
Rhode Island	—	0	6	1	6	—	0	1	—	—	—	0	0	—	—
Vermont	4	1	9	18	23	—	0	1	—	—	—	0	0	—	—
Mid. Atlantic	11	22	54	227	109	—	0	11	—	—	—	0	6	—	—
New Jersey	—	0	44	142	—	—	0	1	—	—	—	0	2	—	—
New York (Upstate)	N	0	0	N	N	—	0	5	—	—	—	0	4	—	—
New York City	—	0	0	—	—	—	0	4	—	—	—	0	1	—	—
Pennsylvania	11	19	42	85	109	—	0	2	—	—	—	0	1	—	—
E.N. Central	26	63	114	340	449	—	0	13	—	—	—	0	6	—	—
Illinois	1	18	38	89	92	—	0	6	—	—	—	0	5	—	—
Indiana	—	5	20	38	33	—	0	2	—	—	—	0	1	—	—
Michigan	7	18	44	88	152	—	0	7	—	—	—	0	1	—	—
Ohio	18	21	47	125	172	—	0	3	—	—	—	0	3	—	—
Wisconsin	—	0	1	—	—	—	0	1	—	—	—	0	1	—	—
W.N. Central	2	11	32	48	93	—	0	9	—	1	—	0	7	—	—
Iowa	N	0	0	N	N	—	0	2	—	—	—	0	2	—	—
Kansas	—	7	21	28	45	—	0	1	—	—	—	0	0	—	—
Minnesota	—	0	1	—	—	—	0	1	—	—	—	0	1	—	—
Missouri	—	3	14	14	43	—	0	2	—	1	—	0	2	—	—
Nebraska	2	0	2	3	1	—	0	4	—	—	—	0	3	—	—
North Dakota	—	0	7	—	1	—	0	1	—	—	—	0	1	—	—
South Dakota	—	1	6	3	3	—	0	0	—	—	—	0	1	—	—
S. Atlantic	2	36	66	149	200	—	0	10	—	—	—	0	5	—	—
Delaware	—	0	2	—	1	—	0	1	—	—	—	0	0	—	—
District of Columbia	—	0	2	—	3	—	0	3	—	—	—	0	3	—	—
Florida	—	17	38	95	111	—	0	5	—	—	—	0	2	—	—
Georgia	N	0	0	N	N	—	0	2	—	—	—	0	1	—	—
Maryland	N	0	0	N	N	—	0	5	—	—	—	0	3	—	—
North Carolina	N	0	0	N	N	—	0	1	—	—	—	0	0	—	—
South Carolina	—	0	9	—	—	—	0	0	—	—	—	0	0	—	—
Virginia	2	10	27	25	38	—	0	2	—	—	—	0	0	—	—
West Virginia	—	6	32	29	47	—	0	1	—	—	—	0	0	—	—
E.S. Central	4	5	15	27	30	—	0	11	—	—	—	0	5	—	—
Alabama	3	5	14	24	26	—	0	2	—	—	—	0	0	—	—
Kentucky	N	0	0	N	N	—	0	2	—	—	—	0	1	—	—
Mississippi	1	0	2	3	4	—	0	5	—	—	—	0	4	—	—
Tennessee	N	0	0	N	N	—	0	3	—	—	—	0	1	—	—
W.S. Central	22	56	149	190	189	—	0	4	—	—	—	0	3	—	—
Arkansas	—	5	26	7	17	—	0	1	—	—	—	0	0	—	—
Louisiana	—	2	6	7	8	—	0	1	—	—	—	0	2	—	—
Oklahoma	N	0	0	N	N	—	0	1	—	—	—	0	0	—	—
Texas	22	48	144	176	164	—	0	3	—	—	—	0	3	—	—
Mountain	1	21	68	66	284	—	0	11	—	—	—	0	5	—	—
Arizona	—	4	50	13	84	—	0	7	—	—	—	0	4	—	—
Colorado	—	7	32	22	80	—	0	2	—	—	—	0	2	—	—
Idaho	N	0	0	N	N	—	0	1	—	—	—	0	1	—	—
Montana	—	1	15	—	65	—	0	1	—	—	—	0	0	—	—
Nevada	N	0	0	N	N	—	0	4	—	—	—	0	2	—	—
New Mexico	1	1	8	13	9	—	0	1	—	—	—	0	0	—	—
Utah	—	3	26	16	44	—	0	1	—	—	—	0	1	—	—
Wyoming	—	0	1	2	2	—	0	1	—	—	—	0	1	—	—
Pacific	3	2	9	6	29	—	0	18	—	—	—	0	7	—	—
Alaska	1	1	4	3	10	—	0	0	—	—	—	0	0	—	—
California	2	0	4	2	10	—	0	18	—	—	—	0	7	—	—
Hawaii	—	0	4	1	9	—	0	0	—	—	—	0	0	—	—
Oregon	N	0	0	N	N	—	0	0	—	—	—	0	0	—	—
Washington	N	0	0	N	N	—	0	0	—	—	—	0	0	—	—
Territories															
American Samoa	N	0	0	N	N	—	0	0	—	—	—	0	0	—	—
C.N.M.I.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Guam	—	2	4	—	1	—	0	0	—	—	—	0	0	—	—
Puerto Rico	—	2	10	9	26	—	0	0	—	—	—	0	0	—	—
U.S. Virgin Islands	—	0	0	—	—	—	0	0	—	—	—	0	0	—	—

C.N.M.I.: Commonwealth of Northern Mariana Islands.
U: Unavailable. —: No reported cases. N: Not reportable. NN: Not Nationally Notifiable. Cum: Cumulative year-to-date counts. Med: Median. Max: Maximum.

* Case counts for reporting year 2011 and 2012 are provisional and subject to change. For further information on interpretation of these data, see http://www.cdc.gov/osels/ph_surveillance/nndss/phs/files/ProvisionalNationa%20NotifiableDiseasesSurveillanceData20100927.pdf. Data for TB are displayed in Table IV, which appears quarterly.

† Updated weekly from reports to the Division of Vector-Borne Infectious Diseases, National Center for Zoonotic, Vector-Borne, and Enteric Diseases (ArboNET Surveillance). Data for California serogroup, eastern equine, Powassan, St. Louis, and western equine diseases are available in Table I.

§ Not reportable in all states. Data from states where the condition is not reportable are excluded from this table, except starting in 2007 for the domestic arboviral diseases and influenza-associated pediatric mortality, and in 2003 for SARS-CoV. Reporting exceptions are available at http://www.cdc.gov/ncphi/disss/nndss/phs/infdis.htm.

TABLE III. Deaths in 122 U.S. cities,* week ending February 11, 2012 (6th week)

Reporting area	All causes, by age (years)						P&I† Total
	All Ages	≥65	45–64	25–44	1–24	<1	
New England	574	423	102	31	5	12	46
Boston, MA	143	100	28	9	2	3	17
Bridgeport, CT	37	23	10	2	1	1	2
Cambridge, MA	22	16	5	1	—	—	2
Fall River, MA	19	15	3	1	—	—	—
Hartford, CT	49	35	9	3	2	—	1
Lowell, MA	22	13	4	5	—	—	1
Lynn, MA	9	7	2	—	—	—	1
New Bedford, MA	27	24	2	1	—	—	3
New Haven, CT	38	24	7	3	—	4	2
Providence, RI	59	51	5	—	—	3	2
Somerville, MA	4	3	1	—	—	—	—
Springfield, MA	44	35	8	1	—	—	2
Waterbury, CT	33	27	5	1	—	—	1
Worcester, MA	68	50	13	4	—	1	12
Mid. Atlantic	1,854	1,319	396	89	29	21	95
Albany, NY	54	39	10	3	—	2	7
Allentown, PA	31	23	7	—	1	—	3
Buffalo, NY	72	43	22	6	—	1	7
Camden, NJ	27	16	6	1	1	3	3
Elizabeth, NJ	27	19	5	2	—	1	—
Erie, PA	48	34	9	4	1	—	—
Jersey City, NJ	18	11	6	—	1	—	—
New York City, NY	1,017	739	211	47	13	7	48
Newark, NJ	32	14	15	3	—	—	1
Paterson, NJ	21	14	5	1	1	—	—
Philadelphia, PA	138	93	30	9	5	1	5
Pittsburgh, PA§	45	40	4	—	—	1	2
Reading, PA	38	31	5	1	1	—	2
Rochester, NY	93	64	23	1	3	2	2
Schenectady, NY	28	21	5	2	—	—	1
Scranton, PA	30	20	7	3	—	—	3
Syracuse, NY	81	64	9	5	—	3	7
Trenton, NJ	22	13	7	1	1	—	—
Utica, NY	17	10	6	—	1	—	1
Yonkers, NY	15	11	4	—	—	—	3
E.N. Central	2,024	1,378	484	106	24	32	129
Akron, OH	59	41	14	1	2	1	5
Canton, OH	42	32	8	2	—	—	2
Chicago, IL	237	153	63	15	1	5	19
Cincinnati, OH	100	60	26	8	2	4	8
Cleveland, OH	273	203	57	6	2	5	16
Columbus, OH	209	139	56	11	—	3	14
Dayton, OH	120	92	24	3	1	—	13
Detroit, MI	137	72	49	10	3	3	4
Evansville, IN	60	41	15	3	1	—	8
Fort Wayne, IN	84	57	23	2	2	—	2
Gary, IN	8	6	1	1	—	—	—
Grand Rapids, MI	42	37	5	—	—	—	1
Indianapolis, IN	213	133	54	21	3	2	12
Lansing, MI	46	30	11	2	1	2	2
Milwaukee, WI	94	61	24	7	1	1	5
Peoria, IL	61	42	14	4	—	1	7
Rockford, IL	52	36	12	2	1	1	2
South Bend, IN	45	34	6	2	3	—	4
Toledo, OH	83	59	14	6	1	3	3
Youngstown, OH	59	50	8	—	—	1	2
W.N. Central	601	404	142	36	10	9	36
Des Moines, IA	119	76	29	11	1	2	7
Duluth, MN	31	18	6	1	2	4	2
Kansas City, KS	17	11	6	—	—	—	2
Kansas City, MO	81	54	23	3	1	—	5
Lincoln, NE	51	44	7	—	—	—	2
Minneapolis, MN	61	35	20	5	1	—	7
Omaha, NE	83	65	14	2	1	1	7
St. Louis, MO	32	19	6	5	2	—	1
St. Paul, MN	44	26	13	3	1	1	1
Wichita, KS	82	56	18	6	1	1	2
S. Atlantic	1,049	660	281	58	22	28	52
Atlanta, GA	161	88	54	11	2	6	10
Baltimore, MD	133	73	40	11	5	4	7
Charlotte, NC	108	77	22	4	3	2	5
Jacksonville, FL	9	5	1	3	—	—	—
Miami, FL	108	81	23	3	1	—	6
Norfolk, VA	41	24	11	3	—	3	4
Richmond, VA	66	40	19	5	2	—	2
Savannah, GA	74	50	16	5	2	1	4
St. Petersburg, FL	62	43	16	2	1	—	2
Tampa, FL	161	113	35	7	3	3	6
Washington, D.C.	117	60	42	3	3	9	6
Wilmington, DE	9	6	2	1	—	—	—
E.S. Central	930	589	246	61	20	14	85
Birmingham, AL	167	101	48	14	1	3	16
Chattanooga, TN	119	89	22	6	2	—	13
Knoxville, TN	111	71	28	9	3	—	14
Lexington, KY	65	47	10	4	2	2	2
Memphis, TN	182	108	46	16	4	8	23
Mobile, AL	122	76	37	7	2	—	7
Montgomery, AL	21	15	4	1	1	—	2
Nashville, TN	143	82	51	4	5	1	8
W.S. Central	1,083	679	251	78	45	30	76
Austin, TX	96	65	22	3	2	4	11
Baton Rouge, LA	59	39	13	6	1	—	—
Corpus Christi, TX	72	45	19	4	3	1	4
Dallas, TX	208	124	60	18	4	2	17
El Paso, TX	66	47	11	4	1	3	4
Fort Worth, TX	U	U	U	U	U	U	U
Houston, TX	124	56	11	17	25	15	4
Little Rock, AR	74	50	17	6	—	1	8
New Orleans, LA	U	U	U	U	U	U	U
San Antonio, TX	208	132	53	12	7	4	16
Shreveport, LA	61	43	14	4	—	—	5
Tulsa, OK	115	78	31	4	2	—	7
Mountain	1,227	819	287	73	30	18	68
Albuquerque, NM	130	81	35	6	7	1	11
Boise, ID	64	46	17	1	—	—	4
Colorado Springs, CO	66	49	10	4	3	—	1
Denver, CO	95	66	21	4	1	3	5
Las Vegas, NV	324	221	79	17	5	2	21
Ogden, UT	27	20	5	—	—	2	1
Phoenix, AZ	206	113	60	21	7	5	10
Pueblo, CO	34	22	8	3	1	—	1
Salt Lake City, UT	126	91	23	8	3	1	10
Tucson, AZ	155	110	29	9	3	4	4
Pacific	1,865	1,302	415	80	40	28	167
Berkeley, CA	15	9	5	1	—	—	2
Fresno, CA	120	81	28	7	4	—	7
Glendale, CA	32	27	4	1	—	—	6
Honolulu, HI	88	66	17	3	—	2	12
Long Beach, CA	64	45	15	1	—	3	9
Los Angeles, CA	284	187	65	14	11	7	32
Pasadena, CA	21	17	3	1	—	—	2
Portland, OR	175	121	35	12	5	2	7
Sacramento, CA	222	148	61	7	3	3	18
San Diego, CA	196	135	49	7	5	—	20
San Francisco, CA	120	83	25	6	2	4	11
San Jose, CA	241	182	48	4	4	3	25
Santa Cruz, CA	29	17	7	3	—	2	4
Seattle, WA	101	63	24	8	4	2	2
Spokane, WA	46	33	11	2	—	—	3
Tacoma, WA	111	88	18	3	2	—	7
Total¶	**11,207**	**7,573**	**2,604**	**612**	**225**	**192**	**754**

U: Unavailable. —: No reported cases.

* Mortality data in this table are voluntarily reported from 122 cities in the United States, most of which have populations of >100,000. A death is reported by the place of its occurrence and by the week that the death certificate was filed. Fetal deaths are not included.

† Pneumonia and influenza.

§ Because of changes in reporting methods in this Pennsylvania city, these numbers are partial counts for the current week. Complete counts will be available in 4 to 6 weeks.

¶ Total includes unknown ages.

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Intranasal Naloxone Is a Viable Alternative to Intravenous Naloxone for Prehospital Narcotic Overdose

Tania Mieke Robertson, MD, Gregory W. Hendey, MD, Geoff Stroh, MD, Marc Shalit, MD

ABSTRACT

Objective. To compare the prehospital time intervals from patient contact and medication administration to clinical response for intranasal (IN) versus intravenous (IV) naloxone in patients with suspected narcotic overdose. **Methods.** This was a retrospective review of emergency medical services (EMS) and hospital records, before and after implementation of a protocol for administration of intranasal naloxone by the Central California EMS Agency. We included patients with suspected narcotic overdose treated in the prehospital setting over 17 months, between March 2003 and July 2004. Paramedics documented dose, route of administration, and positive response times using an electronic record. *Clinical response* was defined as an increase in respiratory rate (breaths/min) or Glasgow Coma Scale score of at least 6. Main outcome variables included time from medication to clinical response and time from patient contact to clinical response. Secondary variables included numbers of doses administered and rescue doses given by an alternate route. Between-group comparisons were accomplished using t-tests and chi-square tests as appropriate. **Results.** One hundred fifty-four patients met the inclusion criteria, including 104 treated with IV and 50 treated with IN naloxone. Clinical response was noted in 33 (66%) and 58 (56%) of the IN and IV groups, respectively ($p = 0.3$). The mean time between naloxone administration and clinical response was longer for the IN group (12.9 vs. 8.1 min, $p = 0.02$). However, the mean times from patient contact to clinical response were not significantly different between the IN and IV groups (20.3 vs. 20.7 min, $p = 0.9$). More patients in the IN group received two doses of naloxone (34% vs. 18%, $p = 0.05$), and three patients in the IN group received a subsequent dose of IV or IM naloxone. **Conclusions.** The time from dose administration to clinical response for naloxone was longer for the IN route, but the overall time from patient contact to response was the same for the IV and IN routes. Given the difficulty and potential hazards in obtaining IV access in many patients with narcotic overdose, IN naloxone appears to be a useful and potentially safer alternative.

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Key words: naloxone; narcotic overdose; emergency medical services; intranasal

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Introduction

Naloxone (Narcan) is a competitive antagonist of the mu-opioid receptor.[1] It has long been used in the emergency setting to reverse the effects of opioid toxicity, and can be lifesaving for patients who have significant respiratory and mental status depression. There are a number of possible modes of administration for naloxone, including intravenous (IV), intramuscular (IM), subcutaneous (SQ), endotracheal, sublingual, inhaled, and intranasal (IN).[2,3] The IV route is the most commonly used because it is both rapid and predictable in its clinical effects.

To date, there have been only a handful of studies comparing the different modes of naloxone administration. Wanger et al. compared the prehospital use of naloxone by the IV and SQ routes.[4] They found that although the IV route had a more rapid effect once given, SQ naloxone was administered more quickly, and the overall time from patient contact to clinical effect was nearly the same. A prospective study of 30 patients in Denver evaluated IN naloxone as the first-line agent in the prehospital setting in narcotic overdose.[5] Of the 11 patients who responded to either IN or IV naloxone, 91% responded to IN naloxone alone. Of those treated with IN naloxone, 64% did not require IV access in the field. Kelly and Koutsogiannis compared IN naloxone with IM naloxone in Australia. In a preliminary report, they noted a 100% response rate with IN naloxone for six trial patients.[6] In a subsequent prospective randomized trial, Kelly et al. found the IM route to be faster than IN administration (6 vs. 8 minutes).[7] The success rate for the patients treated with IN naloxone was 74%, and there was no difference between the groups in rescue doses needed.

Additionally, IN administration of naloxone may reduce the risk of needlestick in a clinical setting where hepatitis, human immunodeficiency virus (HIV), and difficult IV access are common. Patients with altered mental status or narcotic overdose may require IV access for other reasons. However, as noted by Barton et al., those with isolated narcotic overdose who rapidly respond to IN naloxone may not require IV access at all.[5]

The main objective of our study was to compare the IV and IN routes of naloxone administration with respect to the time from patient contact and medication administration to clinical effect in patients with suspected narcotic overdose. We also sought to assess the positive clinical response rate, need for repeat or rescue doses, and whether any needlesticks occurred during the care of the study patients.

METHODS

We performed a retrospective review of electronic emergency medical services (EMS) records. In March 2004, the local EMS protocol was changed, making IN naloxone the first-line route of administration in patients with suspected narcotic overdose. (See Table 1 for the protocol.) The study period included March 2003 through July 2004. Thus, in the first year of the study period, IV naloxone was the first-line agent, and in the final five months, IN naloxone was the first-line agent. The patient population selected for this study included those patients transported by EMS during the study period who were treated with naloxone for suspected narcotic overdose. In our system, patients must be clinically suspected of opiate intoxication and have a respiratory rate (RR) of 8 breaths/min or less to receive naloxone. Exclusion criteria consisted of failure to be treated with naloxone and altered mental status that was not thought to be secondary to narcotic overdose.

The prehospital record is entirely electronic, with all patient care data uploaded into a single EMS database. We extracted the data relevant to our study, including all prehospital times, vital signs, patient assessments, and medications administered. We imported the extracted data into a Microsoft Excel 2000 spreadsheet (Microsoft Corp., Redmond, WA) and stripped it of unique patient identifiers.

Main outcome measures included time from naloxone administration to clinical response and time from patient contact to clinical response. Secondary outcome measures included numbers of doses administered, rescue doses given by an alternate route, and needlesticks reported during the care of study patients. We defined a positive *clinical response* as an increase in RR of at least 6 breaths/min or improvement in the Glasgow Coma Scale (GCS) score of at least 6 points.

Between-group comparisons were accomplished using t-tests and chi-square tests as appropriate. The study was approved by the hospital institutional review board and the Central California EMS Medical Control Committee.

TABLE 1. Intranasal Naloxone Protocol from the Central California EMS Agency

Naloxone

Intranasal (IN)—Administer 2 mg intranasally (1 mg per nostril) using a mucosal atomizer device (MAD) if suspected narcotic intoxication and respiratory depression (rate 8 breaths/min or less) are present. This dose may be repeated in 5 minutes if respiratory depression persists. Respirations should be supported with BVM until the respiratory rate is >8 breaths/min.

Intramuscular (IM)—Administer 1 mg if unable to administer intranasally. May repeat once in 5 minutes.

Intravenous (IV)—Administer 1 mg via slow IV push if there is no response to intranasal or intramuscular administration after 10 minutes.

Pediatric dose—Administer 0.1 mg/kg intranasally, if the patient weighs less than 10 kg and is less than 1 year old.

BVM = bag–valve–mask; EMS = emergency medical services.

TABLE 2. Characteristics of the Study Group

	IN Naloxone	IV Naloxone	p-Value
All patients (*N*)	50	104	
Age—mean (range), years	41 (18–72)	44 (3–96)	0.21
Gender—male (%)	71%	60%	0.14
Initial GCS score—mean	6.2	6.9	0.28
Initial RR—mean, breaths/min	8.6	10.9	0.06
Initial SBP <100 mmHg (%)	10%	20%	0.11
Responders only (*n*)	33	58	
Initial GCS score—mean	5.2	5.8	0.36
Initial RR—mean, breaths/min	7.0	9.1	0.08

GCS = Glasgow Coma Scale; IN = intranasal; IV = intravenous; RR = respiratory rate; SBP = systolic blood pressure.

RESULTS

There were 154 patients during the study period who met inclusion criteria. Characteristics of the study group are reported in Table 2. Per protocol, 104 received IV naloxone as first-line therapy, and 50 received IN naloxone. Positive clinical response, as previously defined, was seen in 33 of 50 (66%) patients in the IN group and in 58 of 104 (56% patients in the IV group ($p = 0.3$). Changes in GCS score and RR in patients with a positive clinical response to naloxone are reported in Table 3.

Time intervals are reported in Fig. 1. It took longer for the IN naloxone to take effect (12.9 vs. 8.1 min, $p = 0.02$), but the total time from patient contact to

TABLE 3. Changes in Mean Glasgow Coma Scale Score and Respiratory Rate after Treatment of Positive Responders to Naloxone

	Pretreatment	Posttreatment	p-Value
Intranasal ($n = 33$)			
GCS score	5.2	13.1	0.0001
RR, breaths/min	7.0	16.9	0.0001
Intravenous ($n = 58$)			
GCS score	5.8	12.7	0.0001
RR, breaths/min	9.1	17.8	0.0001

GCS = Glasgow Coma Scale; RR = respiratory rate.

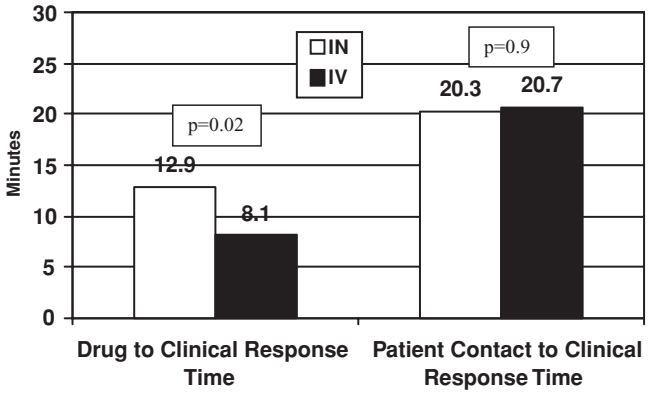

FIGURE 1. Time intervals in minutes. IN = intranasal; IV = intravenous.

clinical response was the same for the two groups (20.3 vs. 20.7 min, p = 0.9). We performed a post-hoc power calculation based on our data and found that we had a power of 83% to detect a difference of 20% (4 minutes) in the time from patient contact to clinical response.

In the IN group, 34% (17/50) of patients were given a second dose of naloxone, while in the IV group, 18% (19/104) required a second dose (p = 0.05). In addition, three patients in the IN group received a rescue dose of naloxone by an alternate route, while no patients (6% vs. 0%, p = 0.19) in the IV group received a rescue dose by another route (Fig. 2). No needlestick injuries were reported by EMS providers in either group.

DISCUSSION

We found that the administration of naloxone by the IN route is a useful alternative to the IV route in the prehospital setting. Prior to the initiation of the protocol change, there were some concerns by the medical control committee and the medics themselves regarding the efficacy of IN naloxone. However, IN administration of naloxone is now well received by our prehospital community. In addition, the EMS system has implemented protocols that utilize IN midazolam and glucagon.

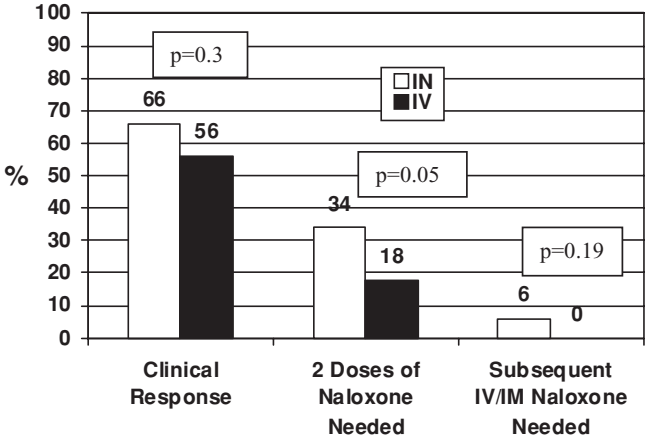

FIGURE 2. Clinical response rates (%) and rescue doses needed. IM = intramuscular; IN = intranasal; IV = intravenous.

There are a number of potential advantages to the IN administration of naloxone in the prehospital setting, in the emergency department, in the clinic, and even in layperson applications. IN naloxone offers a needleless alternative that may be lifesaving or spare a patient intubation if IV access cannot be quickly established. Other potential applications include clinics for drug users, rehabilitation programs, patients at home on high-dose opioids, methadone clinics, drug resource centers, or needle exchange programs. Such uses would require careful study, because it may create other problems, such as emboldening users to be more cavalier with narcotic dosing. IN naloxone could potentially be used by laypersons in emergency situations when access to health care is limited or unavailable. This has already been done with IN glucagon in diabetic patients.[8] However, one potential concern is that a false sense of security that lay rescue naloxone will cure "any case" of altered mental status could lead to harmful delays in EMS activation when the change in mental status is not secondary to narcotic intoxication.

With respect to prehospital personnel safety, body fluid exposures are a significant concern. A study done by the St. Louis EMS system reported 44 needlestick injuries in a 38-month period.[9] This equated to 145 injuries per 1,000 employee-years. Two of those employees developed clinically apparent hepatitis B during the study period. After accidental percutaneous exposure, the Centers for Disease Prevention and Control (CDC) reports a transmission rate of 1.8% for hepatitis C, 6–30% for hepatitis B, and 0.3% for HIV.[10] These statistics underscore the importance of implementing alternative methods of medication administration.

LIMITATIONS AND FUTURE RESEARCH

There were a number of limitations to our study. First, because of the retrospective design of the study, we encountered missing data points for some patients. The time intervals we calculated were based on documentation by paramedics. The time intervals were longer than expected; however, the data-collection methods could have led to error in either direction. This observation is likely due to the fact that ongoing patient care is the top priority, and documentation frequently occurs after hospital arrival, with providers relying on memory and notes. The electronic record automatically records interactions with the dispatch

center, such as the en route and hospital arrival times, but medication times and clinical responses are input individually. However, it seems unlikely that this type of error would bias the study results, as it presumably affected the IV and IN groups equally. Future studies in this area would be improved by accurate, real-time recording of treatment and clinical response times.

Another potential limitation is the inadvertent inclusion of cases that were not narcotic overdoses. We included all suspected cases of narcotic overdose in which paramedics treated the patient with naloxone, and we did not require confirmation of narcotics by toxicologic assays. However, the cases of misdiagnosis were likely spread equally between the two groups, thus enabling comparison without significant bias. Furthermore, our selection methodology may have missed some cases of narcotic overdose or cases in which naloxone was not administered. Although our choice to include all patients with suspected narcotic overdose per the assessment of the paramedic on scene may have resulted in some inaccuracies, it bolsters the external validity by mirroring the actual practice of prehospital medicine.

Our definition of a "positive response" to naloxone was arbitrary. We chose to define it in such a way that would represent a large, clinically significant change that was relatively objective by chart review. Although our definitions might have caused us to misclassify some responses as positive or negative, it is unlikely that the bias would favor either the IV or IN group. Also, our sample size was too small for meaningful subgroup analysis or to detect any needlesticks. Finally, we included only the more urban regions of our system, because these use an electronic record, which was used for data collection. Thus, patients in rural settings were disproportionately underrepresented. Inclusion of such patients might have altered the data in a number of ways, including more time to observe for clinical effects, establish IV access, or administer multiple doses of medication.

CONCLUSIONS

We found that although IN naloxone had a slower onset of action than the IV route, the overall time from patient contact to clinical effect was the same. Intranasal naloxone represents a more gradual and potentially safer way to reverse the effects of opioid overdose. Intranasal naloxone is a useful alternative in patients with suspected narcotic overdose in the prehospital setting and it potentially offers a decreased risk to the EMS providers caring for patients with difficult IV access and a relatively high prevalence of blood-borne pathogens.

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Research paper

"I felt like a superhero": The experience of responding to drug overdose among individuals trained in overdose prevention

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ABSTRACT

Background: Overdose prevention programs (OPPs) train people who inject drugs and other community members to prevent, recognise and respond to opioid overdose. However, little is known about the experience of taking up the role of an "overdose responder" for the participants.
Methods: We present findings from qualitative interviews with 30 participants from two OPPs in Los Angeles, CA, USA from 2010 to 2011 who had responded to at least one overdose since being trained in overdose prevention and response.
Results: Being trained by an OPP and responding to overdoses had both positive and negative effects for trained "responders". Positive effects include an increased sense of control and confidence, feelings of heroism and pride, and a recognition and appreciation of one's expertise. Negative effects include a sense of burden, regret, fear, and anger, which sometimes led to cutting social ties, but might also be mitigated by the increased empowerment associated with the positive effects.
Conclusion: Findings suggest that becoming an overdose responder can involve taking up a new social role that has positive effects, but also confers some stress that may require additional support. OPPs should provide flexible opportunities for social support to individuals making the transition to this new and critical social role. Equipping individuals with the skills, technology, and support they need to respond to drug overdose has the potential to confer both individual and community-wide benefits.

In 2010, poisoning deaths (the majority of which are attributable to drug overdoses) were the second leading cause of unintentional death in the United States (Centers for Disease Control and Prevention, 2005). In 2010, age-adjusted death rates for drug poisoning in the US ranged from 3.4 to 28.9 per 100,000 population (Centers for Disease Control and Prevention, 2012b). Among people who inject drugs (PWID), overdose (usually related to heroin) is the leading cause of death (Sporer, 1999; Tyndall et al., 2001), even surpassing HIV-related morbidity (Tyndall et al., 2001). Community studies in the US and elsewhere estimate that between one quarter to over half of PWIDs have ever experienced a drug overdose (Bradvik, Hulenvik, Frank, Medvedeo, & Berglund, 2007; Latkin, Hua, & Tobin, 2004; Philbin et al., 2008; Pollini, McCall, Mehta, Vlahov, & Strathdee, 2006; Seal et al., 2001; Sergeev, Karpets, Sarang, & Tikhonov, 2003; Sherman, Cheng, & Kral, 2007).

In the absence of other clinical interventions, the recommended response for bystanders witnessing an opioid overdose is to provide rescue breathing and summon emergency medical assistance. However, PWID report considerable barriers to calling emergency help, mostly centered on a fear of police involvement (Bennett, Bell, Tomedi, Hulsey, & Kral, 2011; Davidson, Ochoa, Hahn, Evans, & Moss, 2002; Lankenau et al., 2012; Tobin, Davey, & Latkin, 2005). In an effort to address the barriers that exist to seeking timely medical care and, more broadly, to respond to the growing epidemic of opioid overdose deaths, many communities have begun

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implementing overdose prevention programmes (OPPs) to train PWIDs to respond to opioid overdose (Bennett et al., 2011; Enteen et al., 2010; Galea et al., 2006; Gilbert et al., 2011; Maxwell, Bigg, Stanczykiewicz, & Carlberg-Racich, 2006; Seal et al., 2005; Strang et al., 2008; Tobin, Sherman, Beilenson, Welsh, & Latkin, 2008; Wagner et al., 2010). These programmes include instruction on how to prevent opioid overdose (e.g., by not mixing drugs, not combining opioids and alcohol, and using less after a period of abstinence) and how to respond effectively to witnessed overdoses (i.e., by safely stimulating the victim, safely calling for emergency medical services, administering rescue breathing, and administering naloxone). Naloxone (brand name Narcan) is an opioid antagonist that reverses the effects of opioids and allows the patient to resume breathing. Naloxone has no other uses, no dangerous side effects, and no effect on patients who have not used opioids (Sporer & Kral, 2007).

In the US, OPPs have historically been developed at the local level, usually implemented by not-for-profit organizations or state or local health departments (Centers for Disease Control and Prevention, 2012a). As of 2012, 188 community-based OPPs were active in 15 US states and the District of Columbia (Centers for Disease Control and Prevention, 2012a). These programmes have trained over 50,000 individuals as "overdose responders" since the first programme began in 1996 and have received reports of at least 10,171 overdose reversals using naloxone (Centers for Disease Control and Prevention, 2012a). An evaluation of a state-supported OPP in Massachusetts found that communities that implemented overdose education and naloxone distribution had significantly reduced overdose death rates compared to communities without such programs (Walley et al., 2013). At the individual level, participants in OPPs have been found to increase their knowledge about naloxone and overdose (Green, Heimer, & Grau, 2008; Wagner et al., 2010). Trained responders also report using more recommended behaviours in response to witnessed overdoses after being trained (Galea et al., 2006; Seal et al., 2005; Tobin et al., 2008; Wagner et al., 2010), though some structural and situational barriers exist to implementing some response techniques (e.g., when one's naloxone is confiscated or lost; Lankenau et al., 2012).

Though OPPs are a relatively new intervention, they share similarities with other public health interventions that rely on training bystanders to respond to a medical emergency. Cardiopulmonary Resuscitation (CPR) training is one such intervention. CPR training is offered to bystanders who might witness an individual experiencing cardiac arrest. Like OPPs, CPR training teaches laypeople to recognize the medical crisis and to respond with appropriate pre-clinical care. CPR has been found to significantly improve the chances of survival for cardiac arrest victims (Sasson, Rogers, Dahl, & Kellermann, 2010). CPR trainings have been offered in broad community settings (Vaillancourt, Stiell, & Wells, 2008) as well in more targeted groups such as those most likely to witness cardiac arrests (e.g., family members of patients with heart disease; Dracup, Guzy, Taylor, & Barry, 1986). There has been concern that teaching CPR to family members of patients at risk for cardiac arrest might lead to deleterious psychological outcomes among the family members, such as increased depression or anxiety, or an increased sense of burden associated with the new responsibility (Dracup et al., 1986). Results from two randomized controlled trials conducted with cardiac patients and their family members found statistically non-significant trends pointing towards increased anxiety, depression, and hostility among family members trained in CPR (Dracup, Moser, Guzy, Taylor, & Marsden, 1994; Dracup, Moser, Taylor, & Guzy, 1997). Two other studies found reductions in anxiety among trained family members three months after CPR training (McLauchlan et al., 1992) and higher levels of perceived control among trained spouses one month after CPR training (Moser & Dracup, 2000).

Though they are a comparatively new type of intervention, some investigators have also examined the effects of participating in OPPs on training participants. In two qualitative studies, OPP participants report enhanced confidence and self-esteem after being trained (Maxwell et al., 2006; Sherman et al., 2008), positive psychological changes that might translate into other pro-health behaviors. In fact, two studies have found that participating in an OPP appears to be associated with reports of favorable changes in drug use behavior. For example, in a prospective study, Seal and colleagues (2005) reported a statistically significant decrease in the frequency of heroin injection among trainees over the six month study period. Wagner and colleagues (2010) found that half of the participants in an OPP reported that their drug use decreased in the three month period following the training.

Taken together, the findings from research on the effects of CPR training and OPPs suggest that participating in such trainings might have meaningful effects not only for patients in the community, but also for the trained "responders" themselves. However, a more comprehensive understanding of the psychological and social effects of being trained and subsequently responding to a medical crisis (i.e., a drug overdose) is needed. Particularly for PWIDs, who generally occupy a marginalised and stigmatised role in society, the act of taking up a new social role as an "overdose responder" could be accompanied by both positive effects that should be reinforced and negative emotions that may require additional support.

In this paper we explore the experiences of 30 PWIDs who participated in an OPP and used their new skills to respond to overdoses in their community. In this analysis we use the sociological concept of the "social role" to examine the processes through which people take up and occupy the role of "overdose responder". Social roles, in their most basic form, refer to the ways in which people are expected to behave given their "status" in a society – for example a person might have a status of "father"' with respect to one child and a status of "uncle" to another, his social role in each case is the behavior expected of him with respect to those two different children. Individuals in society take up social roles through their interactions with others, and may occupy multiple roles that are shaped by various social contexts (Lopata, 1994; Goffman, 1959). In this case, we examine the interactions amongst PWIDs, the training programs, peers, and bystanders at overdose events, with the goal of understanding the experience of becoming an overdose responder in this community.

Methods

Setting

This analysis is based upon data collected for a larger study designed to evaluate OPPs offered by two community-based syringe exchange programmes (SEPs) in Los Angeles, California, USA. The OPPs included instruction on how to prevent overdose, recognise the symptoms of an overdose, and implement appropriate response techniques including giving rescue breathing, calling for emergency medical services, and administering naloxone (Maxwell et al., 2006). Training curricula included both a didactic instructional component and a hands-on component in which participants used a CPR dummy and engaged in role-playing exercises to practice the response techniques. Participants who successfully completed the training met with a medical provider and received a small nylon bag containing two or three 1cc doses of naloxone with a prescription attached, syringes for intramuscular injection, alcohol wipes, latex gloves, a rescue breathing mask, and a small instructional card summarising the response techniques and containing programme contact information.

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Recruitment and eligibility

Recruitment occurred between December 2008 and March 2010. We used convenience sampling at the SEP sites to enroll both persons who had received OPP training and untrained persons. The study interviewer approached potential participants in the waiting areas of the two programmes and used a brief screening survey to determine eligibility, based on the following criteria: aged ≥18 years, self-reported injection drug use in the past 30 days, enroled as a client of either SEP, and witnessed an overdose within the past 12 months. Among trained participants, the witnessed overdose had to have occurred after receiving overdose prevention training (training status and date of training was confirmed using programme records). We recruited a total of 106 participants (76 untrained, 30 trained). We conducted this analysis using qualitative data from the 30 trained participants who, by design, had all witnessed an overdose and responded in some way since being trained. The Institutional Review Board at Children's Hospital Los Angeles approved all study procedures.

Data collection

The study interviewer conducted interviews using an instrument containing both closed-ended and open-ended questions. In the sections used for this analysis, participants were asked to describe in detail the most recent overdose that they had witnessed. Follow-up probes included questions about the effect of responding to that overdose on their sense of self, their sense of themselves in their community, and on others' perceptions of them. The instrument was programmed with Techneos Entryware 6.3 (Techneos Systems Inc, 2009) and administered by the interviewer on a laptop computer while simultaneously being recorded with a digital recorder to capture qualitative responses. The interviewer conducted the interviews in programme offices or in semi-private settings (e.g., coffee shops or park benches) at the participants' discretion. Participants received $25 cash remuneration and were provided with referrals for services (including the overdose prevention training programme, if they were untrained) at the completion of the interview.

Analysis

Audio recordings were transcribed verbatim and transcripts were loaded into ATLAS.ti version 6.2.27 (Scientific Software Development, 2011) for organisation and coding. We employed an exploratory and inductive coding process. Two authors read the transcripts in their entirety and developed a series of open codes and memos to characterize emergent themes and document initial impressions (Miles & Huberman, 1994). We organized these codes into a codebook that we then applied to the entire set of transcripts and the memos were further developed to describe the content and relationships among the themes. We output the data from ATLAS.ti and organised the thematically coded data into a set of higher-order conceptual categories. All names used in this report are pseudonyms.

Results

Sample characteristics

Respondents in this sample were predominantly older (median age 42 years; interquartile range [IQR]: 31–47; range: 21–59), mostly male (60%), homeless (57%) and had been injecting drugs for an average of 19 years. By design, all participants had witnessed at least one overdose within the past year and since being trained. The median number of witnessed overdoses in the participants' lifetimes was 8.5 (IQR: 4–12; range: 2–100), while the median number of witnessed overdoses in which participants had tried to help was 5.5 (IQR: 3–10; range: 1–20). Ninety-three percent of respondents believed they had saved someone's life by responding to an overdose.

Positive effects

Participants described a number of positive effects that were associated with being trained as an overdose responder and responding to overdoses. Most used words such as "inevitable" to explain the experience of witnessing overdose in their everyday lives. They attributed this to a sense that drug overdose is a "normal" part of the life of a drug user. After being trained in overdose prevention, however, respondents expressed a new sense of confidence in their ability to deal with the frequent overdoses that they witnessed. Some also experienced a sense of heroism after using their skills to save an overdose victim. And, many noted that others recognized their new expertise, which re-enforced their new role as an "overdose responder" in the community.

Increased confidence/gaining control

Though overdose was often described as an "everyday thing", it was typically described as stressful and sometimes frightening. Through their participation in the overdose prevention training, participants learned new skills and obtained a medication – naloxone – that allowed them to bring control to otherwise out-of-control situations. Being trained and feeling confident in their ability to respond to an overdose helped the participants to feel empowered in the situation, in contrast to previously feeling helpless. While they still sometimes used older and potentially less effective "home remedies" to attempt to revive the victim (e.g., applying ice, cold water, or inflicting pain), trainees now also had knowledge of more effective techniques (e.g., sternum rub, used to stimulate the victim without causing harm) and most also had naloxone. Here, Felicity emphasizes that it was not the new knowledge alone that increased her confidence, but also that she had "the medicine" (i.e., naloxone) she received at the OPP training:

> I'm just glad I can help. That made me feel really good, like I was more in control in the situation. . .That it wasn't just all on me, whether my knowledge was good enough, but I had the medicine that was really gonna do the trick. . .Because not always can you bring somebody out of that with your knowledge. Sometimes they did too much. It's beyond your control. And you need that medicine to get 'em out of it. I think it's a great idea you guys give that stuff out. (Felicity)

Clive also talked about how he managed the chaotic nature of the situation, and how having naloxone made him less worried about the outcome:

> I wasn't scared. I'm pretty calm in every situation. But you just gotta keep your head on straight, that you don't mess up and they don't die. . .But it wasn't hard to use and as long as you kinda know what you're doing, it's pretty easy. [You have] a lot less worry with the Narcan [naloxone]. Cause you know it's there and hopefully the antidote. (Clive)

As we have reported previously (Lankenau et al., 2012), not all participants in this sample of trained respondents administered naloxone during the overdose event they described. Some respondents no longer had their naloxone that they received at the training because it had been lost or stolen. In some cases authorities had confiscated the naloxone, even though it is legal to possess with

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a prescription. Others did not use it because other response techniques (e.g., stimulation) elicited a response and the victim was revived. However, even in the absence of naloxone, many respondents were able to implement other response techniques they learned at the training, such as rescue breathing. Sandy said she initially had some concern about giving rescue breathing, but the hands-on practice using the CPR dummy in the training alleviated her concerns, "Once I took the class, I felt more confident. Like I could do it. Cause we got to practice. Like, the practicing made me feel more confident." Some participants also said that they would like to receive a refresher training to review the skills that they learned in the original training.

Heroism and pride

Participants described a range of positive feelings that resulted from helping to rescue an overdose victim, which were sometimes described in terms of heroism:

> I felt like a superhero or something, you know? You know how a superhero come and save the day? So you feel like you did something righteous and unselfish. . ..And that's how you feel when you have to save somebody's life and you're able to do it, and utilize new techniques that you know. And a life is saved. It gives you a good feeling. (Charles)

> I guess in that crowd, I became, I looked like a hero. I don't wanna act like, or feel like a hero. But they were, like, thanking. . .In a thanking way. That made me feel good for, you know, for the day, that I did something cool for somebody. (Paul)

In these descriptions, we see the value that participants placed on their ability to save lives. They described themselves not only as heroes, but also as valued members of their community who are capable of and recognized for their good deeds. This identity runs counter to prevailing stereotypes of drug users as immoral, irresponsible, or uncaring. Often, participants explicitly contrasted themselves with others who fulfilled those negative stereotypes:

> I see myself as kind of the type of person that, if I see someone that has overdosed and they really need help, I'm not gonna do like everybody else and walk past. I'm not gonna just sit down and let 'em die. I'm gonna try to get 'em some help. (Quentin)

Particularly if they had long histories of drug use and witnessed overdoses throughout their lives, some described scenarios in which others dragged overdose victims outside and left them to die, or scenarios in which people simply stepped over an overdose victim on the sidewalk. Like Quentin, most participants in this study specifically rejected that type of behaviour and identified themselves as the "kind of people who help". One participant, who initially said that he had only participated in the training to earn a small incentive payment, said that after being trained he carried his naloxone with him every time he went to parts of town characterized by drug use and overdose. These two examples demonstrate some of the complexity of the responder role. Some people, like Quentin, already identified as caretakers or helpers, which may have motivated them to become trained. For them, the training, added knowledge and skills to their existing role. For others, such as the man who initially only participated to receive the incentive but subsequently adopted a more active role as a responder, the transition into the social role is more clearly observed. In both cases, however, the trainees are actively adopting the role of responder. This was not the case for all trainees, however. Some individuals who participated in the OPP did not appear to fully take up the role of responder during the period of this study, even if they did respond to an overdose after being trained.

Earning recognition from others/acknowledging expertise

As a result of acting in a way that re-affirmed or promoted a new identity as a responder or caretaker, some participants described receiving approval from others (usually other drug users, but also from official people like paramedics, police officers, or case managers). Though few participants described having in-depth interactions with paramedics at the scene of the overdoses, there were a few who reported positive encounters with paramedics or police officers. For example, Phil explains:

> See, the police, and I realize this now, the police and especially the paramedics, they want you to save a life. They don't want nobody to die. And I don't think there's anybody out there in the world that would disapprove of somebody using Narcan. So I mean, they [the paramedics who responded to the call] were pretty well satisfied about what I did. (Phil)

Approval from other drug users, usually bystanders at the overdose, was more common. Paul described the response he received after responding to an overdose:

> They were like, patting me on the back, like "Hey, that's cool." And some guy gave me a forty ouncer of beer. Another guy gave me, like, five bucks. (Paul)

Charles, who previously described how he felt like a "superhero" when he responded to an overdose, felt that responding to the overdose allowed people to see him in a different light – not as just a drug user, but as a competent, responsible person:

> When a whole lot of people are around, they see you at work [to respond to an overdose], it's like "Wow, look at this dude! This dude's shooting heroin and doing this and that, but look at him in a whole other element." It's like, I put on my cape and it was like [thumps chest], like I just went right to what I needed to do. There wasn't no hold up. (Charles)

Charles goes on to say that this experience might help others believe in him more or treat him with more respect, which could translate into other positive developments, like employment: "Oh, that's that old boy right there, he's just the dude, man. Give him a couple days work, dude." Like Charles, Clive thought that his successful use of naloxone would encourage people to see him differently – as someone who can be trusted:

> They thought it was pretty cool that we had it [naloxone] and we actually used it. There's a difference between having it – I mean, it's good just to have it. But when you actually use it, it's a whole other story (Clive)

Particularly among those who had responded to overdoses in public settings before, respondents said that others in the community now looked to them for help in the event of overdoses. For example, Claire said, "If someone's overdosing, people will come and get me. Some people will come running from down the block. 'There's someone overdosing! Come help fast!'" This approval from others helped to reinforce and solidify their new social role in the eyes of others – a critical part of the socialization process that shapes social roles. Charles and Clive also showed how this new role might be leveraged into other forms of social capital – specifically, into opportunities for work. These positive experiences were reinforcing, as participants' new roles were validated by others and integrated into their identities as helping people – identities often forged in contrast to others who were regarded as unhelpful or, even, immoral.

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Negative emotions

Though positive emotions were common, participants also reported a range of negative emotions that were both diverse and complicated. Some participants described feeling burden, regret, fear, and anger. These negative emotions appear to be largely associated with the stressful nature of witnessing and responding to overdoses, though they might be heightened when individuals take up the responsibility for responding to overdoses in their community.

Burden and regret

Being a person others sought out for help in the event of an overdose not only conferred a new sense of empowerment, but also a new set of burdens. In the following passage, Felicity talks about how being an overdose responder has created added responsibility:

> Everybody comes to get me right away, because they know I'm not gonna walk away from it. And that's not really a good thing, either. That puts a lot on me. 'Cause I can't just, I can't handle it. It's really draining. I just wish they'd leave me alone sometimes. But then again, I don't wanna see nobody die either. So I always go. (Felicity)

Though none of the overdose victims in this study were reported to have died, many participants knew people who had died of drug overdose in the past. Among these individuals, there was a sense of regret that they were unable to prevent those deaths, which highlights the recurring strain associated with witnessing multiple overdose deaths throughout one's lifetime.

> I wish that I could've had this [naloxone] six months before my buddy went away [died]. I came back from work and I found candles and flowers [in the stairwell]. It was a good friend of mine. . ..I know if I would've been there and I would've had that little thing [the naloxone], it wouldn't have happened. You know? (Paul)

Quentin talked about his regret associated with the death of a dear friend who was "like a dad" to him, "I had already had one friend die on me. Because I didn't see the signs." After attending the training, though, he was better equipped to recognise the overdose: "With her [the subsequent overdose], I saw the signs. With her, I knew she was in trouble." Quentin's narrative highlights some of the ambivalence or conflict experienced by responders. He felt both regret at not being able to help previously and increased confidence in his ability to recognize an overdose after being trained. Paul also highlights the opposing feelings - happiness at being able to help this time, but regret that he was unable to help before, "It made me feel good that it worked on the person and then I did it, you know? But it made me feel sad that I didn't have that chance when others [overdosed]." PWIDs who have been exposed to multiple overdose deaths throughout their lives may in fact be experiencing a type of reoccurring trauma, which might indicate a need for additional support to enhance coping resources.

Fear and anger

Despite increased confidence developed through participating in the OPP, Felicity also talked about the unpredictable nature of an overdose, "You never feel like you're doing the right thing. I don't care how many of them you do, you just don't know if it's gonna work. It's scary. You never know if it's gonna work." Tina also described being fearful when she responded to an overdose, but says that the confidence she gained in the training helped buffer that fear:

> But it's like obviously not someone's choice to overdose, you know? But that's what I thought about. It was a little scary. But that's also why I took the training and stuff because I've seen – I've heard a lot of stories of people going out [overdosing]. And I knew it was gonna happen sooner or later around me. And it did. (Tina)

As illustrated above, Tina tried to avoid blaming the overdose victim for the event. However, others felt angry with the victim for overdosing, or disappointed in the victim for not knowing his/her limit. Some expressed that the victim "should have known better" than to overdose. In these cases, participants usually attributed the overdose to the victim being abstinent before the overdose (usually from being in jail or drug treatment), or to being "greedy" and using more heroin than he/she should.

Cutting social ties

Some respondents reported cutting ties to the overdose victims, which appeared to be an attempt to cope with the stress and anger associated with witnessing and responding to overdoses. This seemed particularly true when the respondents had responded to multiple overdoses from the same person:

> And we kept telling him, "That's what you get for drinking and. . .I stopped hanging around with him because it was always the same thing. His tolerance was too weak. He had three overdoses at that same place. (Carlos)

Others said that after responding to the most recent overdose they restricted their drug using network to one or two intimate people, usually a spouse, partner, or trusted friend – people whom they trusted to help them in the event of an overdose. Still others tried to educate their peers about the risks for overdose:

> I told him just like this "I keep telling you son of a bitch, that you can't drink vodka and shoot heroin. That's a deadly combination." They don't understand how deadly it is. I've seen too many people die behind that shit. (Mary)

Though not all of the respondents discussed cutting social ties as a coping mechanism for reducing exposure to overdoses, those who did seemed to be describing an effort to reduce their exposure to particularly risky network members who had a propensity to overdose repeatedly.

Discussion

The precedent for people who use drugs to play an active role in health-related matters for themselves and their communities has a long history rooted in the emergence of the viral hepatitis and HIV epidemics (Aitken, Kerger, & Crofts, 2002; Broadhead et al., 1998; Carruthers, 2007; Crofts & Herkt, 1995; Friedman et al., 1992; Grund et al., 1992; Wood et al., 2003). Scholars have commented on the role of this involvement in creating a new public image for drug users: that of "public health allies" serving not as victims or patients, but as collaborators (Henman, Paone, Des Jarlais, Kochems, & Friedman, 1998; Stoller, 1998). Henman and colleagues (1998) describe a "growing awareness [among drug users] of their own autonomous capacity to limit the harm caused by injection drug use" (p. 403), and "an 'empowering' of the drug injector in which drug use per se is becoming depathologized and replaced by an emphasis on choice in social behavior" (p. 403). Our findings suggest that OPPs might be tapping into the same capacity within communities of PWIDs to minimise harm and promote pro-social behaviour through a process that encourages

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some trainees to occupy new social roles as "overdose responders."

This is particularly important because socially marginalised groups, such as homeless persons, often lack access to social roles that allow them to develop self-worth (Snow & Anderson, 1987; Stephens, 1991). In this study, we observed a group of similarly marginalised individuals who underwent overdose prevention training and responded to overdoses in their community. As a consequence, many experienced a sense of heroism, satisfaction, increased self-esteem, and improved self-worth associated with their new role. In this role, identities as caretakers were developed or re-affirmed, while negative stereotypes often applied to PWIDs were rejected. Others have found that some OPP participants report a reduction of drug use after participation, which may in part be a result of the positive emotional changes observed here (Seal et al., 2005; Wagner et al., 2010). If these positive effects of being trained in overdose prevention translate into a reduction in overdose risk among trainees due to reduced drug consumption, mathematical modeling suggests that the impact of the intervention on morbidity and mortality among PWIDs would be dramatically enhanced (Coffin & Sullivan, 2013).

However, some also experienced tension in the responder role, since there were also emotions such as guilt, fear, stress, and anger that resulted from responding to overdoses. For example, some participants in this study experienced a new sense of burden associated with becoming recognised in their community as someone who can help. This experience is similar to the reports from studies with family members trained in CPR, who sometimes developed an increased sense of responsibility for the lives of their at-risk family members, which resulted in a host of negative emotions (Dracup et al., 1986). Laypeople who assume a responder role, whether it is for CPR or overdose prevention, might need additional support from peers and other community members, including the service providers who offer trainings, to cope with the responsibility of helping to save lives.

Consistent with the theoretical understanding of social roles, the salience of the "responder" role appeared to vary amongst study participants (Stephens, 1991). For some, the new role of "responder" was very salient, and they described being sought out by others for their expertise and ability to help. Many of these individuals had responded to multiple overdoses, both before and after being trained. For them, the role of responder appeared to become part of their day-to-day lives and one that was recognised by others in their community. For others, particularly those who had not had the opportunity or who had not chosen to respond to many overdoses, the responder role might be less central to their identity. For these individuals, responding to overdose might be more of a limited action, or they may be earlier in the process of assuming a new social role. It is important to keep in mind that the role of overdose responder is just one of many roles that individuals occupy and not all trained responders will identify this way. In the current study, we were unable to examine the number of overdoses that participants had responded to since being trained since our questions primarily focused on the most recently observed overdose, though other research suggests that some trainees respond to multiple overdoses while others do not (Wagner et al., 2010). More research will be needed to more thoroughly explore which factors predict whether PWIDs assume the role of responder.

Our findings have important implications for how OPPs can be most effectively implemented. In addition to focusing on the new skills and knowledge transfer, training programmes should also acknowledge that they are, either implicitly or explicitly, training people to take on the role of responder and should prepare participants for the possibility that this can be accompanied by both positive and negative emotions. Allowing sufficient time for questions and discussion during the trainings could help prepare participants for the potentially stressful nature of responding to drug overdoses. Trainings should also acknowledge that not everyone in the community will immediately accept the trainees in their new role. While negative experiences are not likely to be equally distributed among all training participants, our findings suggest that they are important for some participants and need to be acknowledged.

It is important to note that the positive and negative emotions described herein appear to have slightly different etiologies. The positive and empowering effects of developing increased confidence and a sense of control, for example, appear to be more strongly tied to the skills and knowledge (and naloxone) obtained through the training. The feelings of heroism and pride appear to originate from the process of successfully responding to an overdose and being recognised for that accomplishment. The feelings of stress, fear, and burden, on the other hand, seem to be most strongly tied to the overdose events themselves. For some, those negative emotions may be buffered by the positive emotions that are also experienced as a result of implementing the effective response techniques. For others, the stressful nature of responding to overdose may result in cutting social ties to risky individuals, which is discussed in more detail below.

The primary recommendation that stems from the current findings is that trainees might achieve even more successful outcomes, both in terms of preventing their own potential overdoses and in responding to witnessed overdoses, if they are provided with ample social support from peers, training programmes, and other health professionals. It has been suggested that one of the factors that influences the salience of a role is the degree of support by others for the role (Stephens, 1991). Increased social support, then, might help trained responders maintain their newly assumed role. Though it is likely that many PWID will be able to cope with these emotions on their own without intervention, programmes should consider providing opportunities for trainees to discuss experiences of overdose in both formal and informal settings. Informal conversations when trainees return to the program for refills of naloxone or to report an overdose reversal may prove sufficient for some, whereas others may prefer to offer more formalized one-on-one meetings or peer group discussions. Integrating discussion of overdose prevention into other services (e.g., opioid substitution therapy and other drug treatment programs, incarceration discharge planning and reintegration services, primary health care, pharmacies) could provide opportunities to reinforce skills and discuss experiences in other settings.

One way that some participants coped with the stressful aspects of responding to overdoses was to cut ties with individuals perceived to be at high risk for experiencing subsequent overdoses. This appeared to be an attempt to minimize future exposure to another stressful experience. These findings are reflected in an analysis of social network data collected from 30 trained respondents and 106 untrained respondents, in which participants trained by the OPP appeared to be over-represented in the group that reported having zero drug using contacts (Wagner et al., 2012). This phenomenon could be protective for the trainees, particularly if it results in individuals shifting their social networks to include fewer drug using peers and more pro-social influences (Rhoades et al., 2011; Wenzel et al., 2009). However, it could also diminish the network's overall capacity to respond to overdose. Trained responders will be less likely to be rescued if they overdose while using drugs alone, and those who have been trained will be less likely to witness overdoses. Several approaches for increasing drug using networks' capacity to prevent overdose deaths could be considered. First, as mentioned previously, opportunities for enhanced social support, in the form of informal one-on-one or group sessions to discuss experiences, might help responders cope with the stressful nature of overdose events and might increase their

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willingness and ability to continue responding. Second, train-the-trainer models in which responders are offered additional training on how to communicate effectively with their peers about overdose prevention might increase the diffusion of information through networks, decreasing the probability of overdose within the network. Third, network-based approaches in which highly connected or influential individuals in the network are recruited for more intensive training might help ensure that those most likely to witness overdoses are reached. Finally, increasing the capacity of training programs to reach more individuals at risk for overdose would provide redundancy in case some trained individuals leave the community.

Several participants said that practicing rescue breathing on CPR dummies and engaging in role-playing exercises during training helped solidify their knowledge and skills, which increased their confidence when they had to put the skills into practice. This confidence, in turn, appeared to translate into experiences with witnessed overdoses that were more positive overall, and served as a buffer for the stress that can accompany responding to an overdose. Offering trainings that allow ample time for role playing and skill development have the advantage of preparing participants to use their new skills under stressful conditions (Lankenau et al., 2012) and may help reinforce this confidence among those who have taken up the role of overdose responder. But overly long, structured or scheduled trainings can also increase barriers to participation for some people, particularly those who may be ambivalent about participating or who may not readily take up the role of responder. On the other hand, shorter trainings can increase OPPs' capacity to train more people and decrease some barriers to participation, but might also be limited in their ability to provide sufficient time for questions and skills development. Many OPPs operate with little or no funding. Particularly in these cases, staff time and programmatic resources might be severely limited, forcing OPPs to make difficult compromises in terms of resource allocation. Providing booster sessions when trainees return for naloxone refills is one way to help solidify skills.

These findings should be considered in light of some limitations. Because all participants were both trained and had responded to an overdose since being trained, it is difficult to differentiate the effects of training versus response. Whether people who respond to overdoses are formally trained by OPPs or not, the stressful and chaotic nature of a medical crisis such as drug overdose is likely to confer some emotional stress. Importantly, our findings are limited to a sample of mostly homeless drug injectors who primarily inject heroin. The experience of people using prescription opioids and those responding to overdoses in that population will likely differ and will require additional research. Data were collected from two programmes in a large US metropolitan area, so conclusions might not be representative of the experiences of OPP participants in other communities. Data were based upon self-report, which can be affected by social desirability bias, recall bias, and reporting errors. Finally, we specifically asked people to recount their most recent overdose experiences, which might overestimate the salience of these events in the context of their daily lives and might not be representative of the entirety of their experience responding to overdoses.

Conclusions

Criticisms of overdose prevention programmes have sometimes focused on the fact that such programmes appear to provide a "safety net" for drug users (Ashworth & Kidd, 2001) and remove the negative consequences of drug overdose. Respondents in this study provide a somewhat different perspective. Our findings suggest that the experience of building competence and increasing perceived control during an overdose, becoming recognised as a caretaker in one's community, and experiencing a host of positive emotions associated with saving a life might also contribute to an increased sense of self-worth among some of society's most marginalised members, resulting in the uptake of a new prosocial role as "overdose responder." Our findings also suggest that the experience of becoming an overdose responder is complex and can encompass a host of emotions, some of which might require additional support from peers and service providers. We emphasize, however, that our findings do not remove the imperative to train as many people as possible to respond to overdose and administer naloxone, even when only brief trainings are feasible. The literature on the social and emotional impacts of CPR training does not suggest that family members of high-risk individuals should not be trained in CPR, even if training might cause distress, since the potential of the training to save a life is rightly considered of higher importance. Likewise, on the same ethical grounds, our work should not be taken as a justification to withhold overdose prevention training and naloxone distribution from those who are not willing or able to participate in multi-hour trainings, since the needs of each community will differ and will dictate the most feasible training approach that maximizes benefits while minimizing negative social and emotional sequelae. Equipping PWIDs with the necessary skills, technology, and support to respond to the epidemic of drug overdose in their community has the potential to confer both individual and community-wide benefits. Flexible program implementation that meets the needs of local communities, organisations, and individuals will be critical to maximizing the success of these efforts.

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Contributors

Dr. Wagner was primarily responsible for the conceptualization of the analysis, data analysis, and drafting of the manuscript. Drs. Lankenau, Wagner and Iverson, designed the study, wrote the study protocol, supervised data collection, and provided input on the analysis and interpretation of results. Ms. Burke contributed to the analysis and interpretation of results. Mr. McNeeley collected the data for the study and contributed to the analysis. Ms. Jackson-Bloom was responsible for the management of the data and contributed to the data analysis and interpretation of results. Drs. Davidson and Washburn contributed to the conceptualization of the analysis, preparation of the manuscript and interpretation of results. Dr. Kral contributed to the design of the study and the interpretation of the results. All the contributors reviewed the final draft of the manuscript, provided substantive input, and approve of the final manuscript.

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Conflict of interest statement

The authors have no conflict of interest to declare.

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