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Overdose Surveillance in Hospital Emergency Departments in Northern New Mexico: a pilot study

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Introduction

New Mexicans statewide are familiar with the devastating effects of drug use on individuals, families and communities. In August 2003, drug overdose in New Mexico became a reportable condition to the New Mexico Department of Health (DOH) in order to measure and monitor trends related to drug use (Control of disease and conditions of public health significance, 7.4.3 NMAC).

Two northern New Mexico counties ranked among the top 20 counties in the US for rates of unintentional drug overdose death from 2000-2002 (CDC Wonder). Therefore, two northern New Mexico hospitals initiated a pilot project for overdose surveillance in the emergency departments (EDs) during 2004. These hospitals serve residents of large urban areas as well as rural, outlying areas. This report characterizes these overdose reports during July 2004-August 2005, and examines intent of overdose in particular.

Methods

Subject to the same regulations and processes as any reportable communicable disease such as HIV and West Nile Virus infection, all reported drug overdose data remain confidential and are maintained according to HIPAA regulations. Overdose cases were identified in two ways: (1) retrospectively from patients in the ED log with an indication of a substance, poison or gas/vapor overdose; (2) and concurrently from patients presenting to the ED with an indication of a substance, poison or gas/vapor overdose. A standard surveillance form was completed using diagnosis data and the patient medical record, and was returned to DOH. Inclusion criteria were that the patient resided in New Mexico and was treated in the ED between July 1, 2004 and August 31, 2005.

The qualitative detection of major metabolites of drugs (methadone, benzodiazepines, cocaine, amphetamine/methamphetamine, opiates, barbiturates, THC and tricyclic antidepressants) in urine occurred through rapid immunoassay in both EDs, according to drug-specific cut-off concentrations recommended by the Substance Abuse and Mental Health Services Administration. Specific substances known to have caused the overdose were also recorded.

Covariates of interest included patient demographics, intent of overdose, route of administration, substances involved, date/time of ED visit and discharge status. Types of overdoses were categorized into mutually-exclusive groups and the intent of the overdose was determined using information from the medical record, EMS, and the patient when possible.

Logistic regression was used to identify correlates of attempted suicide overdose over the entire 14-month period, with all models adjusted for hospital ED regardless of statistical significance. The first visit only was analyzed for patients who were treated more than once during this time period ("repeaters"), resulting in analysis of 506/561 total ED visits. Covariates associated with suicide attempt ($p<0.15$) in the hospital-adjusted models were entered into the multivariate model.

Results

Patient-based analysis (n=506)

There were 561 ED visits due to overdose or poisoning reported to DOH during these 14 months, representing 506 unique patients. The mean number of overdose visits per person was 1.1, where 472 patients had one visit, 21 patients had two visits, 10 patients had three visits and 3 patients had between 4-8 visits during this time period. Forty-eight percent (n=242) were female and the median patient age was 34.7 years. For race/ethnicity, 63% (n=321) were Hispanic, 28% (n=141)

were White, non-Hispanic, 4% (n=18) were American Indian, 2% (n=9) were Black and 2 patients were Asian/Pacific Islander. Race/ethnicity was unknown for 15 patients. Sixty-eight percent of patients resided in a metropolitan area.

In general, patients who were "repeaters" (n=34), those treated for overdose multiple times during this time period, were similar to non-repeaters. Forty-four percent of repeaters were female patients, 79% were Hispanic, 21% were White non-Hispanic, and 65% resided in a metropolitan area. Repeaters had a median age of 36.1 years. The only significant difference between the groups was that repeaters were more likely to be Hispanic compared to non-repeaters (79% versus 62%, p=0.05).

Visit-based analysis (n=561)

Among the 561 ED overdose visits reported, 47% were determined to be attempted suicide, 35% were unintentional and 18% were of unknown intent. The distribution of ED overdoses was similar by days of the week, ranging from 12-18%, with 33% percent occurring on the weekend. Forty-three percent of these visits occurred between 3PM and 11PM, 32% were between 7AM and 3PM and the remaining 24% were between 11PM and 7AM. Interestingly, the largest proportion of overdose visits occurred in summer (37%), while the fewest occurred in winter (18%). The majority of patients ingested drugs involved in the overdose (87%), 13% injected drugs and 5% had an unknown route of administration.

Figure 1 on the last page shows the breakdown of the types of overdoses treated in the two EDs. Forty-nine percent of overdoses involved prescription drugs without illicit drugs (with or without over-the-counter [OTC] drugs), 16% involved illicit drugs without prescription drugs (with or without OTC drugs), 13% involved OTC drugs without prescription/illicit drugs, 12% involved both prescription and illicit drugs (with or without OTC drugs), and the remaining 10% of overdoses involved alcohol only/other poisons (i.e. household cleaners).

The five most common substances/combinations involved in overdoses were tranquilizers/muscle relaxants either with or without OTC drugs (15%), alcohol only (11%), OTC drug only (10%), other prescription drugs only (i.e., antiarrythmics, anticonvulsants, antihypertensives, antipsychotics, diabetes-related, COX-2 inhibitors; 9%) and antidepressants only (8%).

Two or more types of drugs were involved in at least 56% of these overdose visits. The following drugs were found either alone or in combination with other substances: 38% involved alcohol, 32% involved tranquilizer/muscle relaxants, 18% involved OTC analgesics (salicylate, acetaminophen, ibuprofen), 16% involved antidepressants, 15% involved prescription opioids other than methadone, 15% involved cocaine, 13% involved heroin, 5% involved antihypertensive/anticonvulsants, 3% involved amphetamine/methamphetamine and 2% involved each of methadone, diphenhydramine and barbiturates. Overdoses from isopropyl alcohol (n=6) and hallucinogenic mushrooms (n=3) were also treated. Only 5% of reported overdose visits involved marijuana.

Roughly half (n=268) of all overdose ED visits were admitted and hospitalized. Forty-one percent (n=229) were discharged, 7% (n=38) were transferred to another facility, 2% (n=10) left the hospital against medical advice and 2% (n=14) were missing data on discharge. Two patients were dead on arrival or died in the ED. When linking patients who were hospitalized with 2004 death records (2005 not yet available), it was found that one patient subsequently died.

Modeling suicide among ED overdoses

In order to understand overdose more clearly, it is important to examine these data by intent since 47% of patients were treated for an attempted suicide overdose. Table 2 presents correlates for suicide overdose attempts. In models controlling for hospital only, attempted suicide overdoses were significantly associated with female gender, being less than 46 years old, involvement of at least two types of drugs, a prescription drug, alcohol, an OTC drug, and more specifically tranquilizer/muscle relaxants and antidepressants, compared to overdoses of unintentional/unknown intent. Overdoses occurring in summer months (compared to winter) and involvement of any illicit drug, heroin and cocaine in particular, were significantly less common among suicide attempts relative to unintentional/unknown overdoses.

In the multivariate model, female gender (adjusted odds ratio (aOR)=3.31, 95% confidence interval (95% CI): 2.12-5.15), being 23-<46 years old (46+ years

old=referent; 23-<35 years old aOR=2.36, 95%CI: 1.24-4.53; 35-<46 years old aOR=2.16, 95%CI: 1.15-4.05), involvement of alcohol (aOR=2.26, 95%CI: 1.39-3.66), an OTC drug (aOR=3.81, 95%CI: 2.23-6.50), tranquilizer/muscle relaxants (aOR=1.89, 95% CI: 1.17-3.05) and antidepressants (aOR=3.40, 95%CI: 1.82-6.38) were independently associated with attempted suicide overdoses. Compared to unintentional/unknown overdoses, heroin remained significantly less likely among overdose suicide attempts (aOR=0.16, 95%CI: 0.06-0.44).

Discussion

These two northern New Mexico hospitals treated an average of 1.3 overdoses per day. Overall, 48% of these patients were female, 63% were Hispanic and patients had a median age of 35 years. Overdoses resulting from use of prescription drugs seemed to be a routine presentation in the ED.

The number of overdose suicide attempts treated in the ED is noteworthy, 258 of 561 total visits. This issue is of growing concern, especially among females, and consumes valuable medical resources alongside the suffering of these patients and their families. Compared to unintentional overdoses, attempted suicide overdoses were more likely to be female patients, 23-35 years old and involve OTC drugs, alcohol, tranquilizer/muscle relaxants and antidepressants. Similar findings have been described in numerous ED overdose studies in the US and abroad.

Heroin was six times more common among unintentional overdoses relative to attempted suicides. The situation and characteristics of ED patients treated for unintentional overdose mirror most closely with those of overdose decedents in New Mexico. Though death data were not shown in this report, overdose deaths in general are caused more often by illicit drugs and potent prescription opioids, compared to overdoses treated in the ED; it is not unexpected that overdoses caused by substances of lower relative toxicity are overrepresented among survivors compared to decedents. This difference probably reflects the intent and environmental, individual and drug-related circumstances of the overdose. Suicides are often attempted using certain prescription (i.e., benzodiazepines) and OTC drugs that are more easily obtained and ubiquitous than illicit drugs. It is important to realize that illicit drug users are inherently at great risk of overdose death given the frequency of using drugs in combination, using drugs alone or in unsafe/unfamiliar locations, injection drug use (versus ingestion), variation in drug purity and higher relative drug toxicity. It is also known that many illicit drug overdose events are handled by witnesses, without aid or transport to the ED. This may explain the predominance (and lack thereof) of certain types of drugs found in ED overdoses.

Although this approach has not been evaluated, it may be worthwhile to provide targeted overdose prevention material to overdose patients prior to hospital release, since studies show that drug users start using again within 24-48 hours of overdose. In addition, encouraging ED/hospital staff to offer information on drug treatment may be effective and thus reduce "missed opportunities" in the medical setting.

There are some caveats with these data. First, the number of overdoses presented here is a conservative representation given the possibility of not capturing overdose patients as they were treated or identified retrospectively. It should also be clear that all substances detected may or may not have been present in levels to cause impairment, since results from confirmatory and quantitative tests (i.e., gas chromatography and mass spectrometry) were not available. In some cases, it was known that the overdose resulted from a combination of drugs, even if the individual drugs were not present in toxic levels. Therefore, conclusions regarding the types of drugs involved in ED overdoses must be interpreted with caution.

The importance of this public health surveillance cannot be overemphasized. There is now better understanding of ED overdoses in northern New Mexico. Given the successful implementation of this surveillance project and the valuable information provided, there is incentive to gradually expand overdose surveillance into other New Mexico hospitals.

Table 1. Description of patients treated for overdose in two northern New Mexico hospital emergency departments, New Mexico, July 2004 – August 2005

	ED Overdoses (%)
Patient-based ED data	**n=506 individuals**
Gender	
Female	47.9
Male	52.1
Median age of patient (1st, 3rd Interquartile range)	34.7 (22.3, 45.5)
Race/ethnicity	
White, non-Hispanic	27.9
Hispanic	63.4
American Indian	3.5
Black	1.8
Asian/Pacific Islander	0.4
Unknown	3.0
Urbanization level of patient residence	
Metropolitan area	66.0
Non-metropolitan area	31.2
Unknown county of residence	2.8
Patients treated 2+ times for overdose	6.7
Visit-based ED data	**n=561 visits**
Intent of overdose	*(data for 552 visits)*
Unintentional	35.2
Suicide	46.7
Unknown	18.1
Overdosed on a weekend	33.0
Time patient seen in ED	*(data for 515 visits)*
11PM-<7AM	24.3
7AM-<3PM	32.2
3 PM -<11PM	43.5
Season of overdose occurrence	
Winter (Dec, Jan, Feb)	18.2
Spring (March, April, May)	23.0
Summer (June, July, August)	37.2
Fall (Sept, Oct, Nov)	21.6
Substances involved in overdose	**n=556 visits**
Two or more types of drugs	56.5
Any illicit drug	28.6
Any Rx drug	60.8
Any alcohol *	38.1
Any OTC drug *	21.9
*Illicit drugs**	
Heroin	13.3
Cocaine	15.1
Methamphetamine	2.9
*Rx drugs **	
Methadone	2.5
Rx opioid other than methadone	15.5
Tranquilizer/muscle relaxant	32.0
Antidepressant	16.0
Barbiturate	2.5
Alcohol, no illicit/Rx drugs	9.9

** Not mutually exclusive, where a substance was found either alone or in combination with another substance*

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Figure 1. Types of overdoses (%) treated in two northern New Mexico hospital emergency departments (n=556), July 2004 – August 2005