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Beyond Overdose: Surveillance of Recreational Drug Use and Corresponding Toxicology Testing

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Objective

Implement a novel surveillance system for recreational substance use, including toxicology testing, to enable situational awareness and more accurately assess the health care burden related to recreational substance use.

Introduction

Drug overdose deaths are increasing nationally and in Minnesota (MN). This is only a fraction of the overall burden that recreational drug use exacts on emergency departments (ED) and hospitals. In addition to opioids and other drugs, three outbreaks of synthetic cannabinoids and cathinones have occurred in MN recently. ICD codes do not adequately identify patients treated for drug use. Also, toxicology data for these patients are limited: routine toxicology testing is not performed at hospitals as results are not timely enough to be useful for clinical care. Even when such testing is performed, hospital laboratories are unable to detect newer synthetic drugs. In order to more quickly respond to clusters of substance use, identify substances causing atypical symptoms or severe illness, and understand the burden of overdoses and substance use in MN, the MN Department of Health (MDH) developed the MN Drug Overdose and Substance Abuse Pilot Surveillance System (MNDOSA). MNDOSA data collection began in November 2017 and includes two pilot sites in Northeastern MN, and one in the Twin Cities Metropolitan Area.

Methods

All patients who present to a participating ED where the principal diagnosis is attributed to the recreational use of drugs or other substances (excluding alcohol alone and suicide attempts) are included. Reports are sent to MDH daily with a few key data variables. Specimens for a subset of "Patients of Special Interest" (PSI) are sent to the MDH Public Health Laboratory to be tested for a wide range of substances. PSI include patients who die in the ED, are hospitalized, have an unusual clinical presentation, and/or are part of a cluster. Medical records of the PSI are reviewed, and a standardized data abstraction form is completed.

Results

Through August 24, 2018, 963 ED visits were reported to MNDOSA. The median age was 34 years for males, 33 for females. The majority of cases were male (68%) (Table 1). Among all patients reported to MNDOSA through August 24, 2018, 23% were hospitalized. A slightly higher percentage of females were hospitalized compared to males (27% vs. 22%; p=0.054).

Opioids were one of the substances most frequently suspected by clinicians to be related to the health care encounter (28% of all reports for males and 37% for females). Heroin was more frequently suspected for females than males (27% for females, 19% males, p=0.012). Methamphetamine (27% of all reports for males and 28% for females) and synthetic cannabinoids and cathinones (24% for males and 6% females, $p < 0.001$) were also commonly suspected. Female patients were significantly more likely to have non-benzodiazepine prescription medication suspected (10% for females, 4% males, $p < 0.001$).

Forty-one urine specimens from MNDOSA cases have been analyzed thus far (Table 2). One of the most frequently detected substances was methamphetamine, which was found in 26 samples (63%); however, only 20 (49%) were suspected by clinicians to have methamphetamine on board. Specimens of seven patients suspected to have been exposed to heroin were tested, yet only two tested positive for the major metabolite of heroin, while six were positive for fentanyl and two for acetyl fentanyl. With the exception of synthetic cannabinoids and cathinones, all substances were detected more frequently in toxicology testing than were suspected by the healthcare providers who made the MNDOSA report.

Conclusions

MNDOSA is unique as it collects real-time data rather than relying on data sources with long delays in reporting. This allows for a near real-time response and notification of key stakeholders, such as the Poison Center, clinicians, local public health, and the public, when a new or concerning substance or cluster is identified. This innovative surveillance system has the potential to improve population health through describing patterns of drug overdose and substance use in MN communities, identifying clusters of drug overdoses in near-real time, identifying the specific substances causing severe illness and/or death, and describing at-risk populations to guide prevention efforts. Most importantly, MNDOSA can better estimate the overall health care burden related to recreational substance use, beyond the typical enumeration of overdose deaths.

Toxicology lab results indicate that patients have substances such as methamphetamine, opioids, marijuana and cocaine on board more frequently than the attending provider suspects. Additionally, the number of substances detected in these specimens indicates that polysubstance use is highly prevalent among these cases. Having a better understanding of the substances that may be involved in a patient's ED visit or hospitalization can help improve patient care. Improved toxicology testing of non-fatal cases would allow us to better describe the current landscape of substances used in our communities and provide situational awareness to public health professionals. This pilot is identifying surveillance challenges, determining feasibility, and establishing best methods for expansion to other sites. Lessons learned thus far include that active identification and reporting of MNDOSA patients are burdensome to ED staff; thus, an informatics-based approach to passively identify and report MNDOSA patients is vital to continued surveillance. Laboratory methods must be robust enough to resolve an ever-growing number of drugs and metabolites over a wide range of potential blood and urine concentrations. As the number of drugs, metabolites, and adulterants continues to grow, the toxicology panels used for testing need to continue expanding. MNDOSA next steps include incorporating an informatics-based approach to surveillance, expanding MNDOSA to other hospitals, evaluating the surveillance system against other data sources, and incorporating non-targeted toxicology testing to improve the ability to detect emerging and novel substances.

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Table 1. MNDOSA reports, November 2017 – August 24, 2018

Number of ED visits reported	963	
Deceased	<1%	
Hospitalized	23%	
Atypical clinical presentation	6%	
	Male	Female
Number of MNDOSA reports, % of all reports	68%	32%*
Age		
Median age	34	33
Age range	14-70	13-80
Race, % by gender, non-exclusive categories		
Black	39%	19%*
White	37%	38%
American Indian/Alaska Native	11%	25%*
Asian, Native Hawaiian/Pacific Islander	1%	5%*
Other race	4%	2%
Unknown or missing race	9%	12%
Hospitalized, %	22%	27%

* Chi-square p-value < 0.001

Table 2. Substances suspected vs. detected in MNDOSA lab specimens (n=41)

Analyte	Substances suspected (from MNDOSA reports)	Substances detected (from MDH lab testing)
Methamphetamine	49% (20)	63% (26)
Opioids		
Heroin or 6-MAM	17% (7)	5% (2)
Specimens with at least one commonly prescribed opioid	10% (4)	46% (19)
Specimens with at least one fentanyl or fentanyl analogue	2% (1)	29% (12)
Specimens with at least one benzodiazepine**	15% (6)	73% (30)
THC	12% (5)	44% (18)
Cocaine	7% (3)	10% (4)
Synthetic cannabinoids or cathinones	12% (5)	0%

**May include substances given as clinical care