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Illicit and prescription drug misuse as reported to the Maine Diversion Alert Program

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ABSTRACT

Background: The opioid epidemic is rapidly evolving and new tools are needed to combat drug abuse. The Maine Diversion Alert Program (DAP) is an informational resource that facilitates communication about drug arrests between the criminal justice and healthcare fields. The objectives of this report were to: (1) describe the illegal and prescription pharmaceuticals reported to the DAP; (2) determine if the drugs implicated in arrests changed from the first to latter half of 2016; (3) identify the demographic and other characteristics of arrestees; and (4) outline the strengths and limitations of the DAP for other areas considering implementing similar programs.
Methods: The arrests (N = 2,368, 31.4% female, mean age = 33.7, SD = 9.9, Min = 18, Max = 71.5) reported to the DAP were examined. Drugs were classified by Drug Enforcement Administration Schedule (I–V, non-controlled prescription) and into families (opioids, stimulants, sedatives, hallucinogens, and other). A comparison between the first and second half of 2016 and arrest by county was completed.
Results: Arrests involved 2,957 substances (drugs and paraphernalia). Most arrests (80.6%) involved a single drug. One-third (33.2%) of arrests involved illicit drugs (i.e. Schedule I) and three-fifths (59.8%) were for controlled prescription medical drugs (i.e. Schedule II–V), and a minority (6.8%) involved non-controlled prescription drugs (e.g. gabapentin, bupropion). Opioids (e.g. heroin, buprenorphine, and oxycodone) accounted for over-half (51.3%) of arrests followed by stimulants (29.0%, e.g. cocaine), and sedatives (7.6%). Arrests for oxycodone significantly decreased (51.9%) and alprazolam increased (89.3%) during 2016. Arrestees for non-controlled prescription drugs were older than arrestees for illegal drugs. Arrests, correcting for population, were most common in more urban (e.g. Androscoggin and Cumberland) counties.
Conclusions: Opioids (illicit and prescription) account for over half of all arrests. However, arrests for oxycodone decreased while arrests for benzodiazepines, and especially alprazolam, increased in 2016. The DAP is a novel source of information for healthcare decisions and can empirically inform law enforcement about drug misuse and addiction.

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The state of Maine in the north-eastern United States has implemented some unique strategies to combat drug misuse and its sequelae. The Diversion Alert Program (DAP) is a database to alert healthcare providers of patients with a history of arrests for prescription or recreational drugs [1,2] so that their care plans can incorporate this information. The DAP also provides public health information [3,4] to complement other indices of drug misuse like self-report [5] or overdoses [6,7]. For example, prescription opioid arrests decreased while heroin arrests increased from 2014 to 2015 [4] and less than one-quarter of persons arrested for trafficking prescription drugs had a record for the same agent in the Maine Prescription Monitoring Program [3]. Although males accounted for two-thirds of arrests, females were under-represented for Schedule I drugs and over-represented for

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Schedule IV drugs [4]. In addition to relatively persistent drugs of abuse (heroin, oxycodone, methamphetamine, cocaine), the DAP can also identify new trends in drug misuse like cutting agents [8,9].

The state government also passed SP067 — LD 1646, *An Act To Prevent Opiate Abuse by Strengthening the Controlled Substances Prescription Monitoring Program*, henceforth referred to as LD 1646, in April of 2016 [10]. There are several components of this legislation including limits on opioid prescriptions to 100 morphine equivalents per day, limits on prescription length for acute pain to seven days and for chronic pain to thirty days, mandated use of state's Prescription Monitoring Program by prescribers and pharmacists, mandated electronic prescribing of opioids, and greater provider education about opioids. In addition, Maine also has an active needle exchange program [11] which is important because hepatitis C incidence rates in this state were over-twice the national average [12] and injection drug use is a primary risk factor. Therefore, the objectives of this report were to: (1) extend upon prior research showing how the opioid epidemic has evolved [2–4] and provide an update on the agents involved in drug arrests reported to the DAP in 2016; (2) determine if there are any changes within 2016 in drug arrests; (3) identify the demographic profile (e.g. age, sex, number of drugs) of those involved in arrests, and (4) outline the strengths and limitations of the DAP for other areas considering implementing similar programs.

1. Methods

1.1. Subjects

The sample included all arrests (N = 2368) reported to the Maine DAP in 2016. The DAP database only includes adults (age > 18). Information (offense, arrest date, drug(s), sex, town of residence) were collected by city, county, state, and federal law-enforcement personnel. There were 3,140 registrants of the DAP on 1/6/2017. Among actively licensed medical professionals in Maine, 41.5% of nurse practitioners, 35.2% of MDs, 33.1% of physician assistants, 18.0% of DOs, 18.0% of pharmacists, and 11.5% of dentists were registered with the DAP.

1.2. Procedures

The drugs listed in arrests were categorized by US Drug Enforcement Agency (DEA) Controlled Substance Act of 1970 classification on May, 2017 as Schedule I–V, prescription, or other (e.g. pseudoepedrine) (Supplementary Table S1). The more restrictive classification was entered for drugs available in different formulations (e.g. over the counter versus prescription naproxen). As arrests can involve multiple drugs (max reported = 7), analyses examined number of agents per arrest by DEA Schedule. Drugs were also classified into five families: (1) opioids (e.g. heroin, oxycodone); (2) stimulants (e.g. cocaine/crack cocaine, amphetamines, methylphenidate); (3) sedatives (e.g. benzodiazepines, zolpidem); (4) hallucinogens (e.g. cannabinoids, methylenedioxyamphetamine (MDA), methylenedioxymethamphetamine (MDMA or "ecstasy"), alpha-pyrrolidinopentiophenone (α-PVP, or "flakka"), bath salts); or (5) miscellaneous pharmaceutical (drugs not included in 1-4, like gabapentin, but which are typically synthesized by a pharmaceutical company). Note that although marijuana is very unlike classic (i.e. serotonin agonist) hallucinogens, it was included in this family due to the relative infrequency of arrests and because it may acutely distort auditory processing [13]. MDMA, although sometimes categorized as an entactogen [14], was placed in this category for simplicity. Arrests involving >2 drugs were examined to determine if particular

combinations of families (opioid/stimulant) were present. A speedball was defined as the presence of heroin (or opium or morphine) and a cocaine product (cocaine, cocaine base, or crack). Drugs were also grouped by common sources of production as originating from a pharmaceutical company (e.g. buprenorphine, amphetamine, benzodiazepines) or from a non-pharmaceutical clandestine source (e.g. heroin, crack cocaine). Although pharmaceutical grade cocaine, methamphetamine, and fentanyl are available for medical purposes, these agents were categorized as non-pharmaceutical [15,16]. The Wright Center's Institutional Review Board approved this study.

1.3. Data-analysis

Data were analyzed with Systat, version 13.1. The original spreadsheet was organized with each arrestee having a single row per offense. In order to facilitate analysis on the subset of participants (18.3%) whose arrests involved >1 drug, this was converted to one row for each unique drug. Figures were constructed with GraphPad Prism, version 7.01. The identity of the chemical is sometimes reported at the time of arrest as "Scheduled Drug" or variations on unknown (N = 268) and awaits further analysis from a forensic laboratory. These arrests were excluded from percentage calculations. However, agents that were listed as "suspected" (e.g. "suspected cocaine") were included with arrests where the submission was more certain of the drugs identity. Although LD 1646 was passed on April 19, 2016, it was hypothesized that any potential impact on the street availability of pharmaceuticals might be delayed so analyses examined the arrests in the first versus second half of 2016. Maine is divided into sixteen counties with much of the population in the southwestern portion of the state (Supplementary Fig. S1) including Cumberland (home of Portland, the largest city), and Androscoggin (home of Lewiston) Counties. A regional analysis was conducted by calculating the ratio of the arrests (# arrests/total arrests statewide) to population (residents/state total as reported by the 2010 Census) in each County. An alpha of <0.05 was considered significant although analyses that met more conservative thresholds ($p < 0.01, 0.005$) were noted. Significant parametric findings were expressed in terms of the Cohen's *d* measure of effect size ($d = 0.20$ is small, 0.50 is medium, and 0.80 is large). Non-parametric analyses were completed with chi-square.

2. Results

There were 2,368 arrests (68.6% males) reported to DA in 2016. The average age was 33.7 (SD = 9.9, Min = 18, Max = 71.5). Most arrests (80.6%) involved a single drug, 13.9% involved two agents, 4.1% involved three or more drugs, and 1.4% involved only drug paraphernalia. Among arrests involving two or more drugs, 56.8% involved an opioid and a stimulant and, of these, 60.5% were speedballs (heroin/cocaine). Another common drug pair was heroin and fentanyl. The most common offenses were possession (56.0%), trafficking (21.4%), aggravated trafficking (5.6%), and possession with intent to distribute (3.1%), distribution (2.7%), manufacturing (1.8%), furnishing (1.4%), operating under the influence of drugs (1.0%), and violating condition of release (1.0%).

Organization of the data such that each row represented a single drug resulted in 2,957 records. The organization making arrests involved city/town police departments (45.4%) followed by state (30.8%), county (14.9%), and federal (8.7%) agencies. Over two-fifths (42.7%) of drugs were Schedule II, followed by I (33.2%), IV (8.5%), III (8.4%), and prescription/non-controlled (6.8%). Pharmaceutically manufactured drugs accounted for 37.9% and non-pharmaceutically produced 62.1%. Among all arrests, opioids accounted for over half (51.3%), followed by stimulants (29.0%),