

# Monitoring Spatial Patterns of Adverse Drug Events and Morbidity in New York City Using Syndromic Data Streams

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## Objective

This presentation describes how multiple syndromic data sources from emergency medical services (EMS) ambulance dispatches and emergency department (ED) visits can be combined to routinely monitor citywide spatial patterns of adverse drug events and drug morbidity. This information can be used to target information, treatment and prevention services to drug “hotspots,” to provide early warning for drug-related morbidity, and to detect potential increased risk for overdose death.

## Background

Drug-related deaths have increased over the past decade throughout the United States (US) [1]. In New York City (NYC), every year there are approximately 900 psychoactive drug-related fatalities with the majority involving opioids [2]. Unintentional drug overdose is the fourth leading cause of early adult death in NYC [2], and high rates of drug-related morbidity among drug users are evidenced by over 30,000 drug mentions in NYC emergency departments each year [3]. Moreover, non-fatal overdose may be common among chronic drug users [4,5]. Despite the relationship between fatal and non-fatal overdose clusters [6,7] and continued increases in drug-related morbidity and mortality, no regular surveillance system currently exists. The implementation of a drug-related early warning system can inform and target a comprehensive public health response addressing the significant health problem of overdose morbidity and mortality.

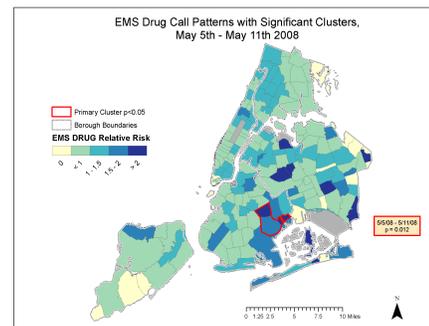
## Methods

Daily EMS ambulance dispatch call data are transmitted electronically from the NYC Fire Department to DOHMH and include all medical 911 calls coded into 52 broad call-types. ED data come from 50 of 62 NYC hospitals covering >90% of total ED visits and including chief complaints. To define drug events in the EMS data, “drug” call types are used. The ED drug visits are derived from chief complaint text strings and drug-related icd-9 codes. The ED drug syndromes are grouped into one general category, and 3 sub-categories. The relative risks (RR) for drug events (drug calls or visits) are calculated by zip code as the drug events/total rate for the previous week divided by the rate of all drug events/total for the baseline previous four months. Spatial analysis is performed using SaTScan for the drug event ratio in the recent week as cases, and the drug event ratio in the previous four-month baseline period as the comparison

population. This process is automated to run analyses on a weekly basis and an ArcGIS geoprocessing model is used to output the spatial data in weekly maps.

## Results

The map below shows a one-week spatial pattern of EMS drug calls in NYC. Significant clusters are indicated by the zip codes contained inside the SaTScan detection



radius. Consecutive significant clusters in overlapping zip codes are retained each week as alerts. The RRs are mapped by zip code, and are compared to each previous week for monitoring spatial trends.

## Conclusions

The syndromic monitoring system is a necessary and logical next step for monitoring drug morbidity and mortality in NYC. The data will guide the implementation of follow-up protocols for targeting vulnerable areas or immediate local responses to possible overdose clusters.

## References

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