Community-level characteristics associated with Over-The-Counter Pharmacy Sale of Naloxone and Opioid-related Overdose Fatalities in Massachusetts

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Introduction

Deaths from opioid-related overdoses have doubled in Massachusetts (MA) since 2012, with 1,379 statewide fatalities in 2015, up from about 660 annually between 2000-2012 [1]. The state-wide rate of all deaths per person was the highest ever for consecutive years in the state’s history [2]. One factor contributing to this trend has been an increase in the use of potent opioids, particularly fentanyl [3,4]. A concurrent increase in fentanyl-related overdose deaths is likely due to increases in fentanyl use and misuse [5,6].

Previous neighborhood-level studies have found naloxone distribution in areas of concentrated opioid use and overdose risk is associated with increased overdose reversals in those areas, but gaps remain to support this spatial assessment in areas of less overdose burden [7]. There is increased interest in identifying emerging and persistent geographic clusters of fatal overdose. Though efforts elsewhere focus on building exercise, prompting public health practitioners to investigate the positive and negative deviant towns [8]. This project assesses the availability of naloxone in MA through pharmacies participating in the OEND and standing order programs. Additionally, I analyzed associations between community-faceted fatal overdose rate and community-level risk factors for opioid use and overdose [9].

Methods

The Online Geocoding Service used for this study was the online geocoding service (http://geoservices.tamu.edu). Initial descriptive maps were made of 2015 overdose rates by distance maps (set at 5km) for any point known to distribute or stock naloxone sites and pharmacies that reported stocking naloxone are employed in MA: free distribution and training through the Massachusetts Department of Public Health (MDPH) Overdose Education and Naloxone Distribution (OEND) Program, and a standing order enabling individual purchase of naloxone at pharmacies statewide without a prescription.

Naloxone Availability

Two methods for distributing naloxone were being utilized to increase the availability of naloxone to community members [2]. Two main methods for distributing naloxone are employed in MA: free distribution and training through the Massachusetts Department of Public Health (MDPH) Overdose Education and Naloxone Distribution (OEND) Program, and a standing order enabling individual purchase of naloxone at pharmacies statewide without a prescription.

Results

Overdose Rates by City/Town

Overdose rate varied greatly by city/town in MA (Figure 1), and the variation in rate is compounded by the small population size of many towns (as of July 31, 2015, 399 city/towns in MA have a population <5,000).

Linear Regression

Of 31 initial model explanatory variables (6 unique variables and quartile terms for each), it is significant predictors of city/town fatal opioid-related overdose rates were identified (Figure 3). Model fit was marginal (r^2 = 0.43). City/towns with model residuals more extreme than -1.5 standard deviations from the residual mean were identified as negative deviants because they had a lower overdose rate than predicted (negative residual). City/towns with model residuals more extreme than 1.5 standard deviations from the residual mean were identified as positive deviants because they had a higher overdose rate than predicted (positive residual). Model residuals by city/town was compared by standard deviation from residual mean (Figure 3).

Linear regression was conducted on all MA city/towns with population >5,000 (n=245). All data in the model were at the city/town level. The response variable was 2015 fatal opioid overdose rate. Explanatory variables (all included in the model initially as binary and linear terms) were taken from American Community Survey data, 2011-2013 (estimates of sex, age, race, income, education, and household type); 2013-2015 MA Department of Children and Families child abuse service utilization; 2013-2015 MA Department of Health and Human Services child abuse service utilization; 2011-2013 MA Department of Public Health STI incidence; 2012-2013 MA Department of Public Health annual report of child abuse; 2000 Census of MA community-level demographic data; and Massachusetts Lab and Workforce Development unemployment rates (March 2013).

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Discussion

This analysis served two broad purposes. First, pharmacies that were not participating in the statewide naloxone standing order but were in an area of high overdose burden were identified. The naloxone stocking pharmacies identified (Table 1) are more powerful than similar pharmacies located in low overdose burden areas. This sets us up for the possibility of a future focused intervention to re-engage this pharmacy subset to alert them to our findings and measure the knowledge influences them to change their policy.

Second, in the setting of the state-wide fatal opioid overdose public health emergency and related legislative action, there is increased interest in identifying emerging and persistent geographic clusters of fatal overdose. The overdose data gathered were at the city/town level, and the state-wide overdose burden was used to identify trends and relationships in geographic clusters of overdose risk. The overdose data were used to identify significant relationships between overdose rate and a number of demographic, social, and economic variables.

References