

IBM Capstone Project

The Battle of Neighborhoods

1. Introduction

There is a crisis of opioid addiction across America and the situation only appears to be getting worse. This epidemic began with a significant increase in prescribed opioid medications for pain management in the 1990's. More recently, deaths from opioid overdose have increased sharply over the past few years following the introduction of Fentanyl, a powerful synthetic opioid [1].

Boston is the state capital and largest city in Massachusetts. It's also the Massachusetts city with the greatest amount of incidents of opioid overdose [2] and this problem is likely to continue to increase [1]. A recent study projects that the annual number of deaths by opioid overdose will increase from 33,100 in 2015 to 81,700 in 2025, a 147 percent increase [1]. This being the case, it seems prudent to explore what treatment options are available in Boston, where they are located, and what can be strengthened, in light of a probable increase in need for these services.

The current model of opioid addiction treatment ideally begins with physical detox, possibly following an emergency department admission for intoxication or overdose. This is often followed by Medication-Assisted Treatment (MAT) using Methadone or Buprenorphine, which ideally coincides with a progression from a CSS, to a TSS, and ultimately to a Halfway House. Details for these forms of treatment are given below [3]:

Acute Treatment Services (ATS or Detox)

Length: 3–7 days

Detox is the medical supervision of withdrawal from opiates. This is necessary to manage the sometimes life-threatening withdrawal effects of detox. These facilities are inpatient units that provide 24hr evaluation and management of withdrawal symptoms.

Medication-Assisted Treatment (MAT)

MAT includes the use of medication often coupled with counseling and other supports. Medication also can reduce cravings and withdrawal symptoms. This is a long-term treatment engaged in throughout CSS, TSS, and Halfway House placements.

Clinical Stabilization Services (CSS)

Length: ~14 days

Clinical Stabilization Services (CSS) provide short-term inpatient treatment, stabilization, and referral services for clients who don't qualify for medically monitored detoxification or who have already completed a detoxification program. Stabilization programs include a comprehensive assessment, individual and group counseling, health education, some medical support, and planning for longer-term support services.

Transitional Support Services (TSS)

Length: 2-4 weeks

Transitional Support Service (TSS) are short-term residential programs that accept clients from detoxification, clinical stabilization services (CSS) programs, or from the community if there isn't a risk for physical withdrawal. In order to enter a TSS program, the person must plan to enter a long-term program, such as a Halfway House.

Halfway House

Length: 4-6 months.

Halfway houses are licensed and overseen by the Massachusetts Department of Public Health. The goal of treatment is to help the person gain a deeper understanding of addiction, recovery, and the practical skills needed to live addiction free. These provide a drug free living environment, case management services, and recovery support meetings in the house and in the community where members can find mutual or "peer" support.

I will explore the number of these facilities around Boston and their location and proximity to each other. In consideration of an expected continued increase addiction problems and overdoses, I will also explore whether there seem to be any gaps in treatment options and what could be recommended for the future.

2. Data

This project will make use of the following data sources:

Location data for Boston

Web scraping will be utilized to pull zip code, city, and county data from the <https://www.zip-codes.com/state/ma.asp> website. This will be cleaned and reduced to show only zip codes and cities within Boston, or Suffolk County. Another website will be used to get all of the latitude and longitude coordinates by zip code (<https://gist.githubusercontent.com/erichurst/7882666/raw/5bdc46db47d9515269ab12ed6fb2850377fd869e/US%2520Zip%2520Codes%2520from%25202013%2520Government%2520Data>). These two data frames will be merged to create one data frame with zip code, city, latitude, and longitude for all Suffolk County zip codes.

Addiction Treatment Services in Boston

Foursquare's API will be used to pull all Emergency Department data for Boston. Emergency Department names and latitude and longitude will be called from the API.

Further addiction services locations are not available on Foursquare's API, so it was necessary to create a dataset with this information. A list of addiction services was used from MOAR (Massachusetts Organization for Addiction Recovery) at https://docs.wixstatic.com/ugd/8256b8_c57f31e039d547cbb67e13fb84c6ceed.pdf. These facilities were searched for on Google maps for zip codes, latitude, and longitude.

Finally, all three data frames were either merged or concatenated to form a single data frame with columns for zip code, city, latitude, longitude, treatment facility name, facility category, facility latitude, and facility longitude.