

Data Driven Approaches to Fighting the Opioid Crisis

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INSTITUTE FOR EXCELLENCE IN GOVERNMENT

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Executive Summary

The past decade has seen a national scourge of opioid misuse, addiction, and overdose deaths, resulting in the President declaring a public health emergency in October of 2017. The problem is vast and complicated enough to defy precision, with estimates of national opioid addiction ranging from [2 million](#) to [5 million](#). And as stated in the most recent DEA threat assessment: “The opioid threat (controlled prescription drugs, synthetic opioids, and heroin) has reached epidemic levels and currently shows no signs of abating, affecting large portions of the United States.” The opioid crisis is not a global phenomenon but a uniquely American one – our residents use an estimated [30 times](#) more opioids than is medically necessary, and we consume [99%](#) of all hydrocodone in the world.

The impact is felt not just by those who succumb to the drug, but also by their family, friends, and community. The problem is diverse in how it strikes – in some regions it hits worse in rural areas than urban; In some areas the misuse of prescription opioids is more prevalent while in others it is illicit street drugs that prevail. This varied and complex national problem will not be solved easily or quickly. While much work remains, there are some successful approaches to the problem which merit attention and replication. Armed with data-driven approaches, mayors, county executives and governors can turn the tide against opioids.

One of the most easily replicable effective approaches is to map the hotspots of activity, as has been done in Cincinnati with great success. That city was once the epicenter of the opioid crisis and has now achieved a 1/3 drop in EMS calls for suspected overdoses, because of data-driven approaches that leverage the so-called “heroin tracker” dashboard and maps.

Other effective approaches include data analytics to understand the most vulnerable groups and to target interventions to them. Massachusetts combined individual-level data across 29 data sources to find insight not available in one source alone. One insight, that those exiting incarceration were 120 times more likely to die of an overdose than the general population has inspired greater focus on drug treatment in corrections.

These and other data-driven approaches are described in case studies in this paper. What is common in all of the successful examples is that data can be a powerful tool for positive change. The three elements common to effective approaches are:

- **Leadership matters.** In each case, a leader took charge and kept focus on the issue. Arizona’s governor used his executive power to declare a public health emergency which created a sense of urgency and enabled streamlined rulemaking and policy implementation. Executives used their power to bring people together as the Lieutenant Governor has done in Utah with the Utah Coalition for Opioid Overdose Prevention and as the County Executive has done in Allegheny County Opioid Stat meetings.
- **Collaboration is key.** Every success case shows how working across agencies is more powerful than working alone. State agencies across many disciplines have collaborated in Utah, forging a common sense of purpose not a single department-focused perspective. In Cincinnati the Office of Performance and Data Analytics worked with emergency responders to gather and publish data for the Heroin Tracker dashboard, and then worked with community groups to help translate the data into intelligence and action. In Allegheny

County the Health Department and the Department of Human Services worked closely with the Chief Medical Examiner on data collection and analysis to understand the problem, and leveraged partnerships with universities for assistance on analytics projects. To put the data into action, all agencies came together in the opioid stat meetings. Massachusetts brought together teams of technologists, data specialists and lawyers to problem-solve on the data privacy challenge, and then forged cross-agency data sharing partnerships, and established ongoing data sharing collaboratives.

- **Continuous experimentation.** The nature of the opioid crisis continues to evolve as has been seen with the rise of fentanyl deaths in recent years. In the best cases, leaders continually investigate and examine emerging data and try new approaches. For example, Allegheny County is applying design thinking to improve its substance use treatment services, and is using customer feedback to inform practice. In Massachusetts, each round of data analysis drives a new set of research questions, and programming is responsive to data. For example as the data showed an increase in the number of overdoses of African American men, a new campaign was created to target that demographic. In Utah a fatality review committee is examining cases on an individual basis to identify lessons to improve prevention and treatment approaches.

The need for using data to address the challenge was well described by Massachusetts Department of Public Health Commissioner Monica Bharel, MD, MPH who said, “We collect a lot of data in government but what we end up with is a lot of data points, not actionable information.” What she and her team did was ground-breaking work to find insight using data, noting, “Addiction has been around since the beginning of civilization. If we want to address this crisis differently than the previous ones, we need to understand it deeply so that we can respond most appropriately.”

Description of the problem

Defining opioids

The term “opioids” refers to a number of narcotic drugs that intercept pain receptors in the brain, spinal cord, and other parts of the body. They have been [used for centuries](#) to treat pain, most commonly as a short term remedy for acute pain, such as after an injury or surgery. Previous spikes in opioid use in the US have occurred after the Civil War and after the Vietnam War, both tied to a rise in battle injuries. However, since the 1990s, opioids have increasingly been used to treat chronic pain from injury or from diseases like cancer. This increase in prescribing has led to widespread opioid availability for both prescribed and illicit use.

In addition to alleviating pain, opioids can cause feelings of euphoria (or “high”) which make them susceptible to misuse. Addiction is well documented even among those who take their medication as prescribed. Overdose is a serious problem related to opioids is, because at high dosages breathing is suppressed, and if suppressed too greatly breathing stops which results in death. The wide range of types of opioids is described in the table below.

A great variety of opioids are available in prescription and illicit form

Type of opioid	Drug type and brand names
Prescription pain relievers	<ul style="list-style-type: none"> • Codeine • Fentanyl (Actiq, Duragesic, Fentora, Abstral, Onsolis) • Hydrocodone (Hysingla, Zohydro ER) • Hydrocodone/acetaminophen (Lorcet, Lortab, Norco, Vicodin) • Hydromorphone (Dilaudid, Exalgo) • Meperidine (Demerol) • Methadone (Dolophine, Methadose) • Morphine (Kadian, MS Contin, Morphabond) • Oxycodone (OxyContin, Oxaydo) • Oxycodone and acetaminophen (Percocet, Roxicet) • Oxycodone and naloxone
Illicit, or street drugs	<ul style="list-style-type: none"> • Heroin • Synthetic fentanyl (often mixed into heroin to make it stronger and more addictive)

Source: WebMD: <https://www.webmd.com/pain-management/guide/narcotic-pain-medications#1>

Origin of the problem

Most experts attribute the start of the epidemic to the late 1990s, as pharmaceutical companies reassured the medical community that patients would not become addicted to opioid pain relievers and healthcare providers began to prescribe them at greater rates. Referring to research that was limited in scope and has since been discredited, this aggressive promotion by pharmaceutical companies resulted in widespread growth in prescribing by physicians. Due to the addictive nature of the drugs, this wide availability of the drugs led to increased misuse of both prescription and non-prescription opioids before it became clear that these medications could indeed be highly addictive. Many states are now pursuing legal action against pharmaceutical companies in an attempt to recover damages from these prior actions.

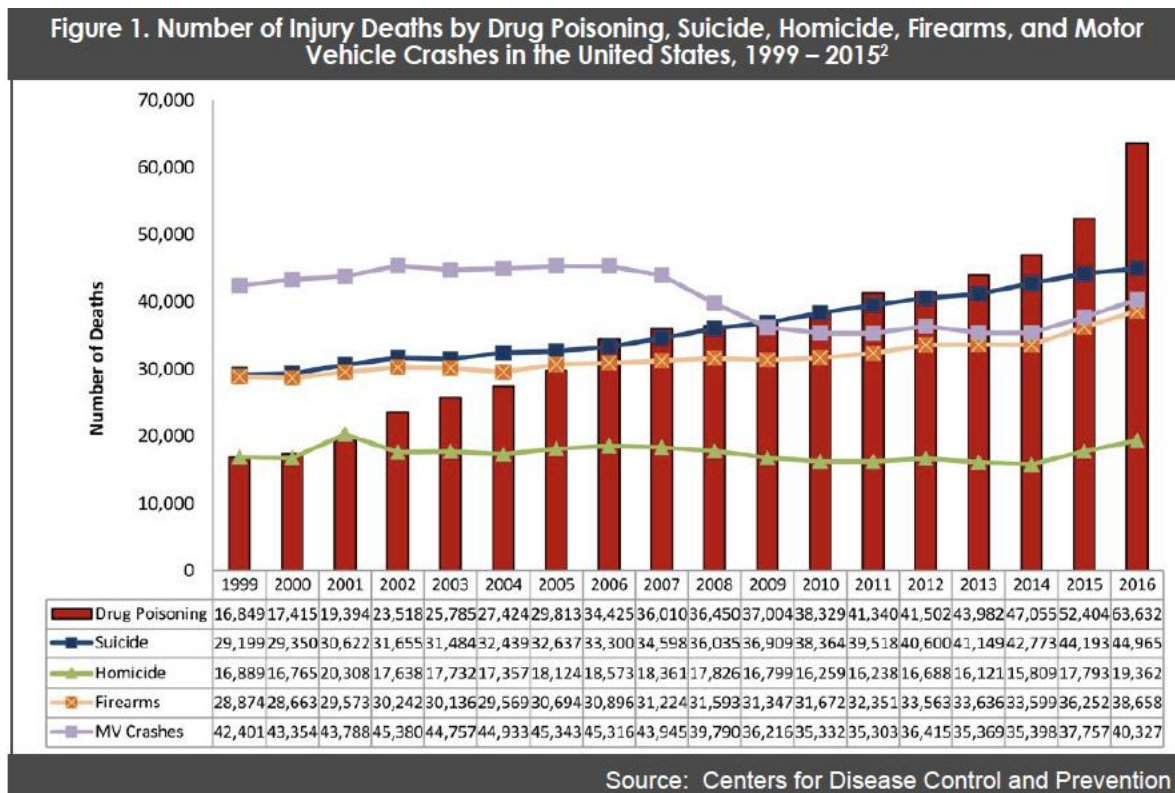
The rising problem of opioids

The opioid epidemic is a national problem, killing [130 people](#) per day across the nation in cities, towns and rural areas and with [300,000 deaths](#) from 2000-2017. In fact, for 2017, [life expectancy declined](#) in the US for the third year in a row, largely driven by opioid overdose deaths. The last time the nation had that many years in a row of annual decline in life expectancy World War I and a global flu pandemic were responsible. The Centers for Disease Control and Prevention estimates that the total economic burden of prescription opioid misuse alone in the United States is [\\$78.5 billion](#) a year, including the costs of healthcare, lost productivity, addiction treatment, and criminal justice involvement.

The problem is national but does have geographic hotspots of intensity. West Virginia led the nation in 2017 with [57.8](#) deaths per 100,000 people, while at the other end of the spectrum is

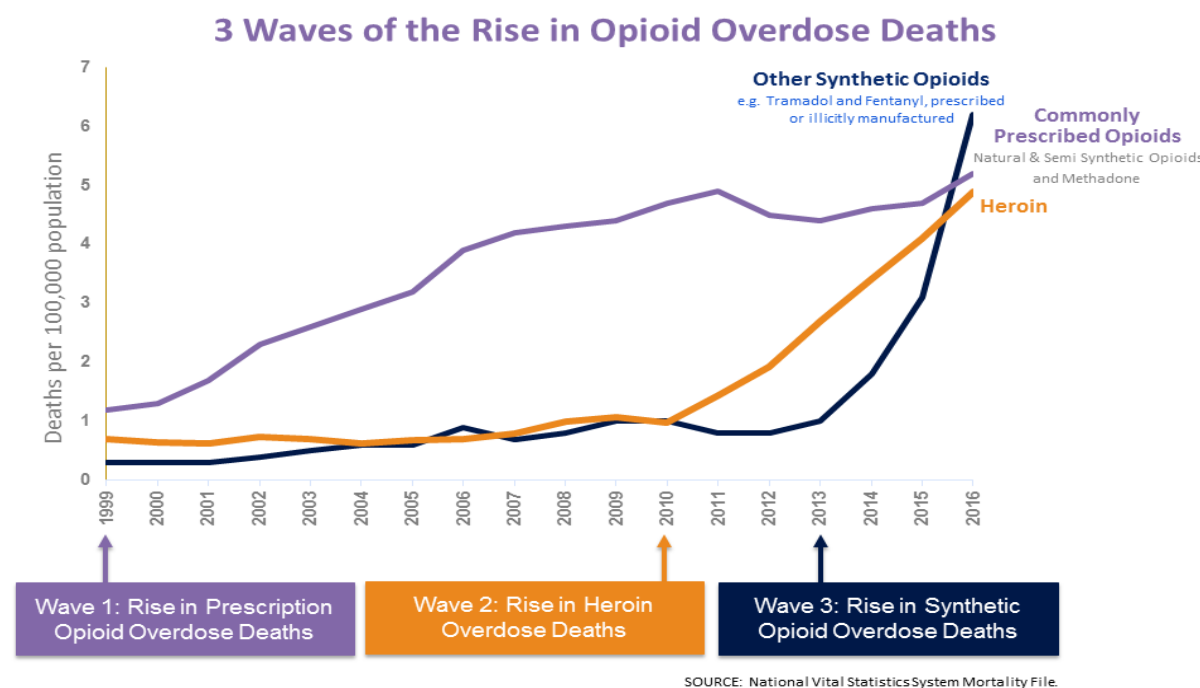
Nebraska with just [8.1](#) drug overdose deaths per 100,000 residents. The problem spans demographic groups, and as a [study](#) in Connecticut showed, is prevalent in all income categories.

As can be seen in the chart below, drug poisoning (including opioid drug poisoning) has been on the increase while the other major injury causes of death in the U.S. have been declining, such as suicide, homicide, and motor vehicle crashes. In the past decade, drug poisoning has overtaken all other types of injury-related deaths in the US.



The problem is in its second decade and has in the last few years come to eclipse other causes of death and garner increased attention from government, including a presidential declaration of a public health emergency in 2017, and a subsequent [5-Point Strategy To Combat the Opioid Crisis](#) from the US Department of Health and Human Services.

As can be seen in the chart below, prescription opioid overdose deaths have historically been the largest driver of opioid overdose death, with heroin becoming more prevalent in the past decade, and a troubling recent trend of the fast rising toll of synthetic opioids.



Research from the National Institute on Drug Abuse (NIDA) shows that use of prescription opioids may be a pathway to illicit opioids such as heroin. For example, research shows that [21 to 29 percent](#) of patients prescribed opioids for chronic pain misuse them and between [8 and 12](#) percent of patients prescribed opioids will develop an opioid use disorder. Looking at heroin users, about [80 percent](#) first misused prescription opioids.

The consulting firm McKinsey has conducted a series of big data analytics projects to uncover patterns and to identify issues that can be addressed in solving the opioid crisis. One of their [findings](#) was that prescribers frequently prescribe opioids to patients who have known risks of potential abuse, such as already having a substance use disorder or having a diagnosed behavioral health illness, or having filled prescriptions from more than four different providers in the last six months.

A note on the national data: An important caveat to national statistics on opioids is that they rely on the state data reported to the [National Vital Statistics System](#) and the lag time can be 12 months or more for data to be updated in that system. Also, every state and local government may be slightly different in how it classifies drug overdose deaths, the degree of specificity in the types of drugs found in the body, and whether results are certified by a physician. Further, even with accurate toxicology, it is not easy to know if prescription drugs found in an autopsy were prescribed for the individual who suffered the overdose. Nonetheless, the national statistics with these caveats paint a picture of a widespread epidemic that is only showing small signs of turnaround in selected locations.

With this vast problem, most jurisdictions are challenged in providing sufficient access to substance abuse treatment. Many state and local governments simply do not have enough treatment capacity. A survey in 2015 found that [89%](#) of the individuals who needed treatment for substance use disorders did not receive treatment. Allegheny County conducted a study, interviewing consumers of substance use disorder services and their friends and families, and found that major barriers to treatment include lack of insurance and difficulty navigating the system.

Case studies of success

The purpose of this paper is to shine a light on promising data-driven approaches and to highlight where those cases are replicable by other jurisdictions. Case studies of success described in this paper include:

- **Cincinnati, Ohio** and the surrounding Hamilton County - where opioid use is declining after three years of using data to drive resource allocation to the geographic “hotspots” of opioid overdoses. Cincinnati has seen a 31% decline in EMS responses to opioid overdoses and Hamilton County reports a 42% reduction of emergency room visits and a 31% reduction in opioid overdose deaths in the 8 months after a data-driven Narcan distribution program began. The key innovation in Cincinnati is a public dashboard updated in near real time with emergency services calls for service for opioid overdoses, the so-called “heroin tracker.” This first in the nation public data portal with detailed drill-downs has provided ammunition to community based providers of social services as well as first responders to more deeply understand and more quickly and strategically address the problem.
- **Allegheny County, Pennsylvania** has suffered for years with opioid overdose death rates higher than the national average, and after years of data-driven response is finally seeing a changing tide. First, descriptive data was used to identify patterns and characteristics of users. Then, looking at autopsy data, the county found that 2/3 of overdose fatalities were individuals who had received county services. Risks were found to be high in the 30 and 90 day windows after receiving services for substance use disorder, incarceration and mental health services, so targeting these populations for anti-overdose medication and substance use disorder treatment is helping to stem the tide. Allegheny County is taking a collaborative and cross-departmental approach with its quarterly Opioid Stat meetings, attended by all county departments that touch the issue in any way. Data sharing and joint problem solving have decreased emergency response time to overdose calls and increased the number of law enforcement agencies carrying overdose reversal drugs to near universal coverage. Allegheny County is now the first in the nation to take on qualitative data collection, with anthropologists studying the opioid problem by talking to community stakeholders and users in order to better treat this addiction.
- **Massachusetts**, where the opioid problem hit early and hard tackled the challenge with a cross-agency data sharing platform that allowed first-ever comparisons of public health and public safety caseloads on an anonymous basis, forging new ground in privacy and security protection for individual data while allowing for sophisticated data analytics. Insights about high risk populations, such as those experiencing homelessness, exiting incarceration, living with mental illness, and experiencing pregnancy are driving new programming. For example, jails are now distributing naloxone to those returning to the community after incarceration,

and the state is siting new substance abuse treatment facilities in the geographic areas hardest hit by overdoses.

- **Arizona** saw a serious opioid problem closely tied to prescribing patterns. In [2016](#), 431 million pills were prescribed in Arizona - enough for every man, woman and child in the state to have a two and a half week supply. The Governor declared a state of emergency, and the Health Director conducted a national scan of best practice before recommending next steps. Those next steps included limitations on prescribing, prescriber education, access to overdose reversal drugs. This was coupled by an unprecedented level of transparency and near-real-time data publication showing progress on key goals. Insights from the data are helping to shape the response. For example, the opioid database has improved hospital discharge planning. Previously only 45% of those in the hospital for a suspected opioid overdose had been referred to mental health or substance abuse treatment. Now, with discharge rules that mandate offering a referral for treatment, 80-85% are discharged from the hospital with a referral to mental health or substance abuse treatment services. Geospatial analysis is helping locate treatment services where they are needed most. Arizona is now experiencing a decline in key drivers of opioid overdose, including a [36 percent](#) decrease in the number of opioid prescriptions written (over a 2 year period) and a [60 percent](#) decrease in the number of patients “doctor shopping” for opioid prescriptions in just one year.
- **Utah** was hit hard by the crisis, and prescription opioids are the major problem rather than street drugs. Early efforts included a unique approach – the state Medical Examiner conducted a research study asking next of kin of those who died of opioid overdoses about the underlying risk factors so that interventions could be responsive. The crisis inspired an exceptionally collaborative approach that spans various branches of government and is beginning to stem the tide with 2018 being the first year of decline in overdose death rates.

Case studies describe in more detail the key elements of the success and reflect lessons learned for other jurisdictions.

Other notable policies and approaches

The range of promising approaches to combat the opioid crisis is as varied as the problem itself. A wide range of innovations are being tried and some are beginning to demonstrate value, as shown in the examples below.

Drug treatment behind bars

An ambitious corrections-based drug treatment program in the state of Rhode Island decreased overdose deaths among the recently incarcerated by 2/3 as shown in a [study](#) published in *JAMA Psychiatry*. The program aims to address the problem uncovered via data analysis in Massachusetts and Allegheny County, namely that those who are exiting incarceration are at significantly increased risk of fatal overdose. Their \$2 million program serves [275 inmates](#) and pretrial detainees who get medication-assisted treatment while they are behind bars.

Rhode Island is a small state with an integrated prison and jail system so it has the unique ability to do system-wide programming. Rhode Island is also the only state (as of early 2019) that screens everyone coming into the correctional system for opioid use disorder. Those found to have an opioid abuse problem are given the chance to receive treatment. Unique to Rhode Island is that the treatment includes medication to assist with the physical component of addiction, including all three types of drugs approved by the Food and Drug Administration to treat addiction — methadone, buprenorphine and naltrexone. Using drugs to help treat substance abuse (medication-assisted treatment, or MAT) is not yet widespread and is controversial as some view it as trading one opiate for another. But in France when the government allowed all physicians to prescribe such drugs, opioid related deaths [declined 79%](#) and the incidence of drug abuse withdrawal symptoms in newborns decreased.

Recognizing the post-incarceration risk identified in the data, inmates in Rhode Island can continue to stay in the treatment program when they exit prison or jail via referral to a program outside the walls, easing the transition and reducing the chance that a delay in treatment will mean a relapse. So far, success is demonstrated by fewer deaths. According to the study, for the first half of 2017 there were nine deaths, compared to 26 for the same period in 2016.

Technology innovation

The state of Ohio sought innovative anti-opioid ideas from outside of government, and received ideas from all over the world – 100+ entrants from 7 countries applied to receive funding for data, technology and innovative solutions to the opioid crisis during the [Ohio Opioid Technology Challenge](#). It was funded by a voter-approved bond issue. The 12 successful proposals range widely, including using artificial intelligence to fight addiction, drug-detecting rubber gloves to protect first responders from dangerous drugs, new technology to soothe babies born to addicted mothers, and apps to help drug users navigate the path to treatment and recovery.

Similar efforts to harness private sector innovation are under way in Canada, where Health Canada has issued the [Drug Checking Technology Challenge](#) to entrepreneurs to develop technologies to help drug users test their drugs. The goal is to accelerate the development of technologies to identify substances that the user is not expecting that could harm them, such as when fentanyl is added to heroin making it far more lethal. In the U.S. the Food and Drug Administration last year issued a challenge, the [FDA Innovation Challenge: Devices to Prevent and Treat Opioid Use Disorder](#). This call to entrepreneurs of medical devices generated significant interest, with over 250 submitting applications and 8 companies selected to work directly with the FDA on their ideas. Innovations selected include those intended to predict the risk of opioid use disorder (OUD), provide pain treatment alternatives to opioids, and detect opioid overdose.

Expanding access to substance abuse treatment via expanded Medicaid

Substance users often cite lack of insurance when asked why they aren't able to seek treatment. Montgomery County, OH used the state's 2015 Medicaid expansion to reach more substance users in need of treatment. Overdose deaths in Montgomery County and in Dayton, its county seat have [dropped](#) since this initiative began. The county had a 54 percent decline in overdose deaths for the first 11 months of 2018 compared to 2017 - by November 30, 2017 there had been 548 overdoses and to that date in 2018 there were only [250](#).

Expanded access to addiction and mental health treatment via Medicaid coverage is part of an overall public health approach to treating the epidemic, which differs from the traditional law enforcement response. As part of their public health approach, Montgomery County has a multi-disciplinary [Community Overdose Action Team](#) which fosters collaboration across sectors of government and with nonprofit service providers. Part of the approach includes widespread availability of overdose-reversing drugs such as naloxone. Many cities distribute these drugs to first responders, but in Montgomery County they are also shared in drug treatment facilities, and at local businesses and schools in an effort to educate a wide range of potential bystanders who could be enlisted to assist.

This turnaround is significant because it demonstrates how far a city can take its change. Dayton had one of the highest opioid overdose death rates in the nation in 2017 and the worst in Ohio. If Dayton can turn the tide, perhaps other cities can too.

Using the Emergency Room as a point of intervention

In Oakland, CA, where the problem has been acute, a special program in one public hospital has [emergency room doctors](#) provide the opioid withdrawal-suppression drug buprenorphine to people who arrive at the hospital suffering from withdrawal symptoms. The doctor who started the program, Dr. Andrew Herring, views the emergency room visit as an opportunity to help the patient see the possible value of drug treatment by experiencing the 24-48 hours of relief from cravings that are provided by withdrawal drugs. In a randomized hospital [study](#) in 2015, drug users given withdrawal-suppression drugs in the emergency room were twice as likely to be in drug treatment 30 days later as were the comparison group, and had much lower levels of reported drug use. Inspired by this research, Dr. Herring persuaded the state of California to try this approach in hospitals around the state. If subjected to study, the results could significantly advance understanding of what works.

Nudging doctors to prescribe fewer opioids

Two different nudge approaches have been shown in research literature to be effective at reducing the prescribing of opioids. In one experiment, San Diego County doctors who received a letter from the county Medical Examiner informing them that a patient to whom they had prescribed opiates had died of an overdose subsequently prescribed less. The standard measure of opiate strength, milligram morphine equivalents (MME) decreased for doctors who got that letter by 9.7% in the 3 months after they got the letter.

In a different type of nudge [study](#), researchers found that by simply lowering the default number for opioids prescribed in an electronic medical record system so that doctors would have to manually override it to prescribe higher amounts, the amount prescribed decreased 15% by lowering the default from 30 pills to 12. One aim of this nudge was to reduce the excess pills that often result from a standard prescription. A 2017 [review of the research](#) published in *JAMA* found that typically 42 to 71 percent of opioid tablets prescribed for surgery patients go unused.

Bringing anti-opioid drugs directly to users

The state of Vermont has taken some [innovative measures](#) to curb opioids, including allowing needle exchange services to provide the drug buprenorphine, a mild and safe opiate used in drug treatment to transition users away from the riskier opioids. Studies have shown that addiction treatment using buprenorphine [cuts fatalities](#) in half.

The perennially progressive San Francisco has been even more proactive than Vermont in providing this drug, as city health workers are taking to the streets to reach out and offer drug treatment prescriptions to addicts who are homeless. The prescriptions for buprenorphine can be filled at a city-run pharmacy.

Recommendations

Recommendations for the federal government to support state and local government in combatting the opioid crisis include the following:

- **The federal government should establish intergovernmental dialog and idea exchange to diminish friction on the spread of effective solutions.** State and local government should not have to waste time or money on what has shown to not work when they could adopt proven approaches from other jurisdictions. Idea exchange could come in the form of conferences and convenings, webinars and funded cohorts of innovators tasked with spreading the insights learned via peer exchange.
- **The federal government should fund additional research on what works,** and should then aggressively translate that research into actionable insights and useful tools for practitioners. Far too little consensus exists today on many key questions about pathways to addiction, how opioids are best addressed, and how to balance the risks and benefits of various approaches.
- **The federal government should provide more tools for replication of successful approaches,** including a best practice hub for practitioners, TA manuals, and a corps of TA professionals who could provide direct assistance to cities and towns strapped for funding but seeking solutions. This would likely have a positive return on investment in terms of lives saved and the redeployment of local resources from ineffective to proven approaches.
- **The federal government should fund data work at the state and local level** perhaps via funded fellowships so that this crisis can be attacked with local intelligence on hotspots of activity.

Recommendations for state and local government include the following:

- **Treatment in jail and prison settings.** Nationally, according to the U.S. Department of Justice, nearly 1 in 5 jail and prison inmates regularly used heroin or opioids before being incarcerated, making jails a logical entry point for intervention. This finding is consistent with the high risk of overdose found in Massachusetts for those leaving incarceration. The state of Rhode Island and Allegheny County are already well along in

treating those addicted to opioids and Massachusetts is implementing Medication Assisted Treatment (MAT) in selected prisons and jails this year.

- **Leverage geographic information systems (GIS) mapping to pinpoint hotspots.** Cincinnati has been effective in reducing calls for emergency response to suspected heroin overdoses largely because of the ability to target interventions to the neighborhoods and communities most in need. The constant updating of their “heroin tracker” dashboard and maps has armed stakeholders across the city with location data to focus their attention. For jurisdictions seeking to better target resources such as overdose reversal drugs, mapping is an excellent approach to prioritizing. Efforts such as the [Opioid Mapping Initiative](#) demonstrate the power of community for advancing ideas on GIS approaches to combatting opioids.
- **Better leverage prescription data already collected.** Every state now has a Prescription Drug Monitoring Program (PMDP) database, and some have begun to mine the data for insight. For example, Utah is providing prescribers with data on where they stand against their peers across the state and within their specialty. Every state should be mining the data to look for outlier prescribers, patients or pharmacies. Also, it is not yet common to provide data to the public on trends in the data. An open data approach to PMDP would be a good next step in transparency, with open data portals that allow the public to explore aggregate level data to seek out patterns and trends.
- **Better leverage Medicaid data.** Data from Medicaid databases can provide significant insight into the opioid crisis. For example, in Utah the Medicaid data was mined for patterns that may indicate fraudulent prescriptions, such as prescriptions from deceased prescribers. Massachusetts and Allegheny County leveraged Medicaid data in their cross-departmental analytics projects and found high risk of opioid overdose among those with Medicaid services for mental health and substance abuse treatment services.
- **Share data, publicly if possible.** A common understanding of the facts is foundational to forging cross-agency solutions. Allegheny County found this in their Opioid Stat meetings, as early on some law enforcement agencies resisted carrying Narcan as they understood they were seldom the first to arrive on the scene of an overdose. When the data was analyzed and shared, it showed that 70% of the time, law enforcement is the first to arrive at the scene of an overdose call. This sharing of data created a common understanding of the circumstances, and led to the near universal adoption among law enforcement agencies in the county for carrying Narcan, overcoming the initial resistance with the data. Arizona goes even further by publicly sharing a great deal of their data on the opioid crisis so that at the local level stakeholders can design appropriate response strategies.

While the opioid problem remains a threat, the promising approaches, if shared could substantially change the national trajectory. The cases that follow provide insight for jurisdictions at the beginning stages of addressing opioids with data and analytics, and provide excellent examples to consider and adapt for local conditions.

Case One: Allegheny County

Summary

Allegheny County, PA has suffered mightily from the opioid crisis with its mix of urban, suburban and rural areas. Taking a data-centric approach, the county mined its data on overdoses and deaths and provided that data on public dashboards, sharing that data to the public in [2016](#) and again in [2018](#). Key to this approach is the partnership between the Allegheny County Health Department and the Allegheny County Department of Human Services (DHS).

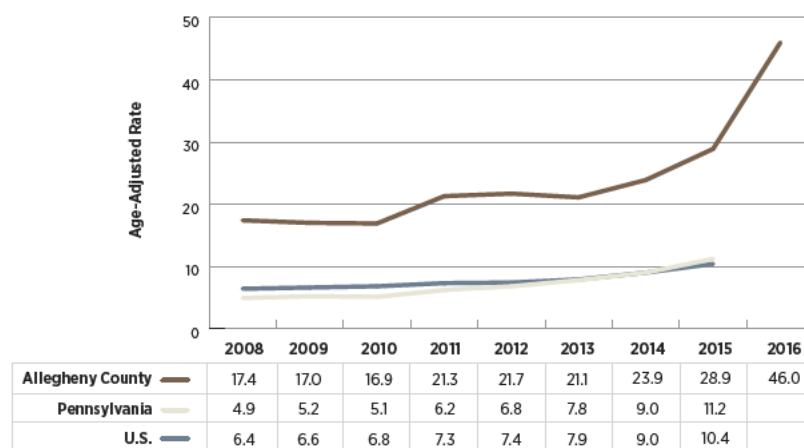
Building on its existing integrated data warehouse, Allegheny County looked at the correlates between county human services and opioid overdose deaths and has uncovered new ways to identify pivotal times when the risk of overdose is high. The county is now integrating data across health, public safety and emergency response and holds Opioid Stat meetings to develop cross-departmental solutions to the problem. Now, years into this approach, the county is anticipating that 2018 will finally see a [downward trend](#) in overdose death rates.

Other state and local governments could emulate this approach to sharing data across departments to both understanding the problem, and proactively addressing it.

Background

Allegheny County, PA, with Pittsburgh as its largest city, endured year after year of rising opioid deaths. As can be seen in the chart below, the rate of death from an opioid overdose in Allegheny County exceeds the rate for the state of Pennsylvania and for the US.

**Age-adjusted Opioid-related Overdose Rates (per 100,000)
in Allegheny County 2008-2016**



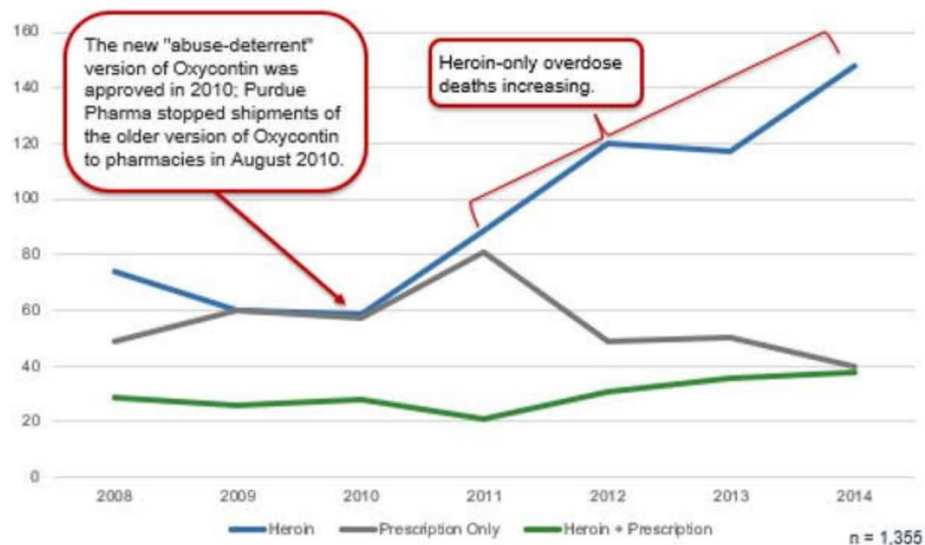
Source: Allegheny County Department of Human Services and Allegheny County Health Department

The year 2016 was the [tenth consecutive year](#) of rising fatal overdoses, and rate of overdoses per 100,000 population roughly [doubled](#) in two years, (from 2014 to 2016 the rate increased from 23.9

to 46.0). The problem was also found to be hyper local with geographic clusters of deaths, and a pattern of individuals who overdose close to home, with [82%](#) dying within a mile of their home.

Since 2010, the trend has been away from prescription opioids as the key driver of opioid overdose deaths, and toward greater presence of heroin as can be seen in the chart below.

Heroin vs prescription opioid medications among opioid-related overdose deaths (2008-14)



Source: Allegheny County Human Services

Data-first approach

Beginning in 2015, the Allegheny County Department of Human Services (DHS) and the Allegheny County Health Department (ACHD), jointly took a deep dive into the data to better understand the problem. An initial report was published in 2016, with a [follow up](#) web-based interactive report with dashboards and maps released in February 2018. Users can define their own criteria and sort, explore, and download data on a wide range of opioid issues, such as:

- Overdose deaths and death rates per 100,000 population for each municipality in the county, including whether fentanyl was found along with other opioids.
- Overdose death data by Pittsburgh neighborhood including the ability to filter by location of residence or of incidence of the overdose, along with death counts and death rates per 100,000 population for each neighborhood.
- Demographics of victims – by age, age and race, and by age and legal sex are also provided on a dashboard that can be customized by neighborhood, municipality, and type of drug found.

Dashboard data is available from 2010 to the present and can be sorted on a variety of demographic characteristics.

In addition to the rich user-defined data dashboards, two types of maps are provided:

- Static Maps that show the location of opioid-related overdose deaths for 2015 and 2016, and
- Heat Maps that allow the user to filter overdose deaths from 2008 through 2017 by time period.

Research insights

The Allegheny County Department of Human Services (DHS) has an integrated data warehouse with 1.4 billion records from 29 different sources across the full range of its services provided from childhood to aging, along with county jail data. All of the data can be matched across the different sources on an individual basis, allowing a level of research and insight rare in the public sector.

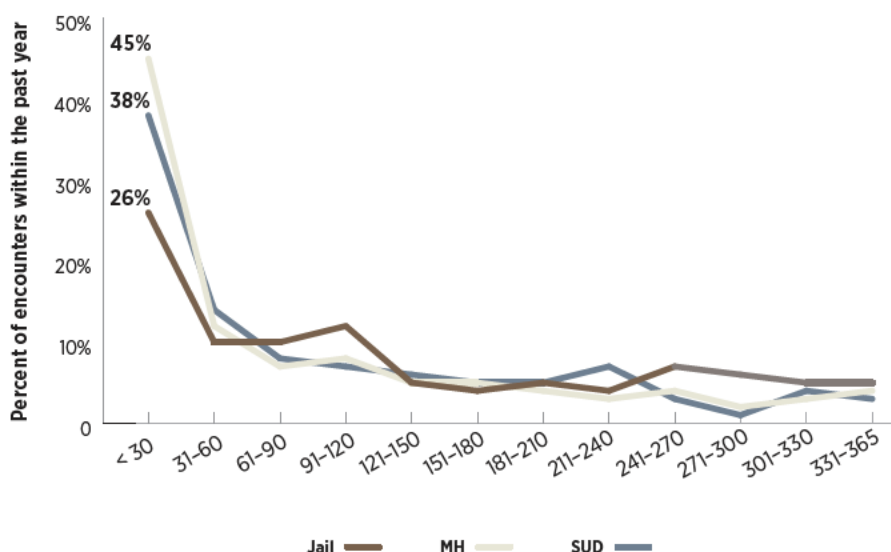
To better understand how DHS might intercept the pathway from use of opioids to misuse to overdose and death, they partnered with the County Medical Examiner who provided data from the autopsy reports of individuals who died of opioid overdoses. Looking back at the history of individuals who suffered fatal opioid overdoses was intended to help identify where DHS had touched individual's lives, in an attempt to discover if there were touchpoints where DHS could take actions that might change the trajectory toward overdose and death. Touchpoints that were considered included use of mental health services and substance use disorder services, Medicaid enrollment, incarceration in the county jail, involvement with child welfare services, and use of homelessness services from the county.

Examining overdose deaths reported via autopsy records from the Medical Examiner, uncovered some interesting insights, most importantly that over [2/3 \(68.4%\)](#) had a prior interaction with DHS, meaning that DHS might be able to intercede and change the pathway for other similarly-situated individuals in the future, if the right moments and touchpoints could be identified.

Digging deeper and looking at the types of services individuals who suffered fatal overdoses had received, of those who had received services from DHS in the year prior to their overdose, the most common was mental health service, which was present for [34%](#) of the overdose deaths. Next most common was having used a substance use disorder services, at [28%](#). Also common was incarceration, [18%](#) of the fatal overdoses having been incarcerated in the prior year, and [49%](#) having been incarcerated at some point in the past.

Next in the analysis they examined how long it had been between the fatal overdose and the last contact with DHS. For those who had contact with DHS in the year prior to their overdose, most had that contact in the 90 days before their fatal overdose, and many had contact with DHS in the 30 days prior to their fatal overdoses, as shown in the graph below:

Time between Overdose Death and Jail Release or Most Recent Mental Health or Substance Use Disorder Encounter Among Those with Past Year Encounters (2015-2016)



Source: Allegheny County Department of Human Services and Allegheny County Health Department

Looking at this insight, DHS saw an opportunity to reach many people as they exit service to protect them from a fatal overdose in the 30 and 90 day period following service. Drug overdose risk rises for individuals who begin using again after a period of abstinence as their tolerance has decreased and they may not realize it – this can make it risky to go back to their prior drug dosage. This can be exacerbated if there has been any change in potency of street drugs during the time of incarceration or inpatient substance use disorder services. To combat this risk, DHS is now promoting distribution of overdose reversal drugs such as naloxone at discharge from the county jail and from county funded substance use disorder treatment. Further, drug treatment in jail is being increased to address and substance use disorder along with transition services to assist prisoners leaving jail in receiving treatment after incarceration.

Comparing data for opioid-related overdose deaths and data on the county Medicaid program showed that [51%](#) of those who died of an overdose were enrolled members 90 days prior to their death. Of those who died and were Medicaid members, nearly one-quarter ([23%](#)) had filled a prescription for an opioid within 90 days before their death and nearly half ([45%](#)) had filled a prescription for medicines such as those to treat depression in the 90 days before their death. These insights point out overlaps among the substance use disorder and mental health populations, and identify areas where proactive identification of potential misuse could occur.

Looking for meaning in the demographic trend data meant finding [curious or surprising patterns](#). For example, while opioid misuse is well-documented among whites ages 25 to 34, the demographic

data also shows that in Allegheny County African-American men ages 35-54 are overdosing in significant numbers.

Another surprising finding was a decline in opioid use among adolescents, along with a rapid rise of overdose among those just past adolescence (24-34). This may indicate onset of drug use as young adults rather than onset in adolescence and continued use into young adulthood. This points to the need to identify the root cause of onset of drug use in young adulthood so that actions can be taken to prevent it. One hypothesis is that young adults who are experiencing negative social determinants of health such as isolation and joblessness may be more susceptible to opioid use. Prevention measures might address ways to bring young adults into lives of meaning with physical and emotional wellbeing.

Predictive model

Erin Dalton, deputy director for the Office of Data Analysis, Research and Evaluation at the Allegheny County Department of Human Services (DHS), wants to be able to locate high-risk opioid users before they become addicted. She hopes the use of a predictive model can help the county become proactive rather than reactive and stop addiction before it takes root. As with most diseases, prevention of opioid addiction is far less costly than treatment both in financial costs and the human toll.

"While other strategies allow us to identify people who are already addicted or actively in need of treatment, exploring predictive models is preemptive and is particularly valuable," said Dalton.

One way the county is seeking to predict and prevent opioid abuse is via a collaboration with the Public Health Dynamics Lab at the University of Pittsburgh Graduate School of Public Health. Researchers there are using predictive risk modeling, forecasting, and spatial-temporal modeling in an attempt to understand where the next hotspot of overdoses will occur, so that prevention activities can be targeted appropriately. The model is still in development, but when finished may offer insights relevant to other jurisdictions as well.

Another predictive modeling effort makes use of the ample public data shared on its dashboards. Allegheny County collaborated with Carnegie Mellon University to bring the power of big data analytics to bear on gaining a deeper understanding of the opioid crisis. Graduate students used their data science and big data talents to examine eight years of Medicaid prescription data and developed a model that predicts which opioid users are at greatest risk of filling a high number of prescriptions.

Looking at dosages and numbers of prescriptions over time, the model groups those with opioid prescriptions into three categories – one for low users, one for high users, and one for those who diminish their drug use over time. The student's model can predict which users will fill a large number of prescriptions with better than [80 percent](#) accuracy.

The model has only recently been developed and is not yet deployed. But if successful it will be important for other state and local governments to watch, as it is based on Medicaid data, something that all states and counties should have access to.

Qualitative research

Allegheny County is alone among the leading state and local governments in using not only quantitative, but also using qualitative research methods to gain insight on how to best address the opioid crisis. Using an anthropologist's approach, the health department is collaborating with researchers who are going out into the community and interviewing stakeholders to document the attitudes and perceptions of those affected by the crisis, the county hopes to better target and tailor services to unique needs of different groups of individuals.

According to Dr. Karen Hacker, Director of the Allegheny County Department of Health, "Opioid addiction is complex, and requires more than statistics to gain a detailed understanding of how this crisis is affecting our community. With grant funding, we now have researchers interviewing community stakeholders, first responders, family members of those affected, and drug users themselves to gain insight into how we can assist communities in overdose prevention."

As a result of this work, the health department has already identified and funded pilot projects to educate and empower the public with creative solutions like pop-up public awareness events, population-specific brochures, and information tents at community gatherings. Pilot projects are also putting prevention resources such as Narcan and clean needles in the locations they are most needed.

Stat meetings

Tying together the data, research insights and turning them into action involves a wide diversity of county departments. Quarterly OpioidStat meetings bring together all departments that touch the crisis, from law enforcement and jails to emergency responders, human services, substance use disorder services, and the medical examiner. Looking at data together provides a common ground for problem-solving.

Joanne Foerster, CountyStat Manager, "the real value is just getting all the involved parties in the room to share information about various initiatives and understand where some collaboration and synergies can occur."

To date, the OpioidStat meetings have widened the catchment area for naloxone distribution and improved channels of communication across departments. At one of the first meetings, there was resistance among some in law enforcement to carry Narcan, and some law enforcement representatives said they were the last to arrive on scene and that the fire department or paramedics typically arrive first. When the data was presented, it showed that approximately 70% of the time the police were in fact the first on scene in some of the communities that were hesitant to have officers carry Narcan. Through sharing of the data and some diplomatic persuasion, now virtually all police departments in the county are carrying Narcan.

Another OpioidStat effort was to examine the time it takes for first responders to arrive at the scene of an overdose call. Although the response times were well within industry standards, this led to a discussion of the urgency of responding quickly, given that the newer strains of fentanyl are so much more potent and can cause permanent brain damage because of how quickly the drugs were

impacting the human brain before could be administered. Efforts to speed response time are always ongoing.

Openness to innovation

DHS uses data as a foundation, but also uses other tools to innovate and deliver services in support of clients. A few examples include:

- [Treatment consumer interviews](#). To gather insight on how individuals come to drug and alcohol treatment, and how that pathway might be improved, DHS interviewed 60 consumers, their friends and family members, and treatment staff. The goal of the sessions was to address the questions like, “How did you learn about treatment?” and “How might we make it easier for someone to access treatment?” Looking for patterns among the answers to these questions, and applying human-centered design, the group came up with “personas” for typical consumers seeking treatment, to help focus the team on ways to improve the pathway to service. Keys to improving the pathway are addressing the perceived barriers, such as a lack of insurance, unfamiliarity with treatment options, a shortage of available treatment slots and concerns that treatment might not work.
- Client satisfaction kiosks. As part of its commitment to continuous improvement, DHS recently sought out client feedback on their experience receiving services in an effort to improve service delivery quality and responsiveness. Clients exiting service used kiosks to answer questions about their satisfaction and with the press of a button could anonymously send feedback on questions ranging from how they felt about the service to whether they felt heard by staff.

Feedback from these two approaches are being used to improve treatment and to reduce opioid overdose risk for residents of the county.

Lessons learned

Lessons from Allegheny County include:

- **Leadership.** The severity of the crisis motivated key leaders to engage and to stay engaged, including the County Manager, the County Executive, the CountyStat manager, the Health Department Director, and the Human Services Department Director. Consistent attention from these key executives, and their instance on collaboration were critical to this success.
- **Bring the lawyers in early to facilitate data sharing.** In forging the integrated data warehouse, and in adding critical additional data sources such as school, court, and death records, the key players were not the data or technology professionals, but the lawyers. It took creativity, insight, and dedication to the important public outcomes to get from “no” to “yes” on data sharing and agreement on privacy and access policies. Without lawyers who were able to surmount obstacles and challenges, the data sharing would never have happened and insight would not have been possible.
- **Collaborate across departments.** The County’s quarterly Opioid Stat meetings bring together every county department involved in fighting the opioid crisis to review standard data on deaths and other key indicators, and to discuss collaborative solutions.

- **Analyze data across government boundaries.** DHS is fortunate to already have integrated data for human services, health services, and the jail all within their data warehouse. However, key additional insight on the path to opioid overdose death came from the Medical Examiner sharing data on autopsy reports. Data sharing across departments can open up great insight.
- **Leverage local universities.** The partnerships with the University of Pittsburgh and Carnegie Mellon provided expert researchers and graduate students to the county at far less cost than a private data science contractor.
- **Leverage grant funding.** Allegheny County has been successful in securing federal grant funding for its naloxone distribution program, and a private foundation for its opioid predictive analytics program.

Case Two: State of Arizona

Summary

Arizona is experiencing a decline in key drivers of opioid overdose, including a [36 percent](#) decrease in the number of opioid prescriptions written (over a 2 year period) and a [60 percent](#) decrease in the number of patients “doctor shopping” for opioid prescriptions in just one year.

No other state has as much timely public data available for problem-solving on the opioid crisis. This investment in user-friendly interactive data sharing has democratized the flow of information and has both created common ground for fighting the crisis at the state level, and also has provided a wide range of stakeholders across the state with the data they need to fight the problem at the local level.

Starting with existing data systems, Arizona built the first in the nation state-level opioid portal with dashboards and maps presenting near-real-time data on the state of the opioid problem. This timely information is unique and stems from an emergency declaration from the Governor that mandated 24 hour turnaround for reporting on key indicators. From the beginning, the approach to fighting the opioid crisis in Arizona has been built on research and data, harvesting best practices from other states, and leveraging data systems already in place. While there is still more progress to be made, there are signs that this approach is beginning to bear fruit, and this model is one that other states can learn from.

Background

Arizona experienced a serious problem with opioid prescriptions and opioid overdoses over the past decade. Prescribing was high -- according to Governor Ducey, [in 2016](#), 431 million pills were prescribed in Arizona - enough for every man, woman and child in the state to have a two and a half week supply. CDC data showed Arizona having a [higher than average](#) rate of opioid prescriptions, but in certain rural areas in Northwest Arizona the rate of prescription opioids was [double the national average](#), and in one county, there were more opioid prescriptions than people. In one egregious case, four Mohave County [practitioners wrote prescriptions for nearly 6 million pills](#) over the course of a single year.

Not surprisingly, the state’s opioid overdoses were similarly higher than national averages. A [2016 opioid report](#) issued by the Arizona Department of Health Services documented nearly 1,500 total drug overdose deaths, half of which were caused by opioids. The report showed that opioid overdoses increased 16% from 2015 to 2016 and had grown 74% from 2012. The report also showed that hospital admissions from opioid problems cost the state \$341 million in 2015 for 41,000 hospital encounters, an increase of 125% from 2009-2015.

A recent online survey of Arizona teens documented the problem of misused prescription opioids - [56%](#) indicated that opioid abuse was a serious problem, and [one in four](#) indicated they had been prescribed an opioid pain medication. Of those prescribed an opioid, [one in four](#) admitted taking them in ways not directed by their doctor.

Faced with this wide-ranging and growing problem, in June of 2017, Governor Ducey declared a public health emergency to galvanize all of state government into a single coordinated, collaborative plan of action.

A research and data-centric approach

As a public health emergency, the key state official named responsible for understanding and solving the opioid crisis was Department of Health Services (DHS) Director Dr. Cara Christ. To identify leading ideas and existing best practices, Dr. Christ tasked her staff with conducting a survey of other states to look for promising approaches, along with a review of relevant research literature for insights on evidence-based practices. The Arizona Department of Health Services completed its [50 State Review of Opioid Related Policy](#) in August, 2017, just a few short months after the Governor had declared the state of emergency. This thoughtful survey of state best practices went beyond simply listing the laws, regulations and policies and looked also at the results achieved in each state. The compilation of best practice was methodical and thorough and since it was made public, it serves as a valuable resource to others in state and local government.

Since that time, several additional public documents have been shared to document this state's journey, including a detailed [Opioid Action Plan](#) released in 2017, with over 100 pages describing the current status and future plans to address the crisis.

Legislation informed by best practice

In January of 2018, using insight from the best practice and scholarly literature review, the legislature unanimously passed the bipartisan [Arizona Opioid Epidemic Act of 2018](#). This law limited the amount of opioids that can be prescribed to first-time users, expanded access to the overdose reversal drug naloxone, mandated education for those who prescribe or dispense opioids, established a Good Samaritan exception so friends and family can call 911 to report an overdose, and added data and reporting requirements that laid the foundation for additional data-driven decision-making.

The dashboard

One of the things that sets Arizona apart from others is its data dashboard. The open data dashboard tracks five key categories of data, as shown below. In June 2017, the Governor used his power of Executive Order to compel data collection by health and public safety agencies within 24 hours of suspected opioid overdoses, suspected overdose fatalities, naloxone dispensed, naloxone prescribed, and suspected cases of Neonatal Abstinence Syndrome (NAS). Rather than waiting for months, or over a year for data as with many national sources, Arizona now has timely data on key drivers that are the foundation of the open data dashboard. The emergency declaration enabled the state Department of Health Services to require hospitals to provide more frequent updates on overdose deaths and opioid-related encounters.

As shown below, the dashboard shows data that is updated on a weekly basis for suspected opioid deaths, suspected opioid overdoses, neonatal abstinence syndrome (NAS), naloxone doses dispensed and naloxone doses administered.



The dashboard development process

The dashboards have developed over time, starting as a one-page PDF file that was updated regularly, and then became a multi-page PDF file tracking the data that is now released. Building to the interactive data-rich site now in place took about a year and was completed in stages by the DHS technology team, launching in the fall of 2018.

The use of the existing disease surveillance and EMS data systems was a key success factor in getting the initial dashboard done quickly and in layering in more detail over time. Since most states have a disease surveillance system, this insight is transferrable to other states. Using existing EMS and hospital systems also helped in avoiding data quality issues as solid data cleaning procedures were already in place on the back end. Also, using the existing system helped at the data input stage and in streamlining user adoption. Adding overdose and NAS data fields to the existing system rather than creating a new opioid tracking system from scratch made sense. For prescription tracking, the existing Board of Pharmacy data was used, and a data sharing agreement was already in place which was simply updated to comply with the new speed of reporting mandated in the public health emergency declaration.

The state has set key progress indicators and shows on the dashboard how they are tracking on various efforts such as increasing the number of naloxone kits ordered for law enforcement, decreasing the number of opioid prescriptions dispensed in a month, and increasing prescriber use of the electronic tracking system for controlled substances.

In addition to providing basic statistics, there are age and geographic breakdowns to help further describe the problem, as shown below. Future enhancements to the dashboards will include zip code level maps.

Opioid Report: June 15, 2017 - present

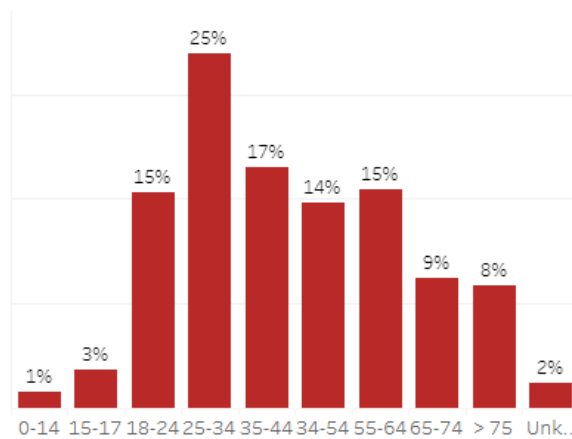
Date Last 1/3/2019

Number of possible opioid overdoses

15,824

Reportdate: 1/3/2019

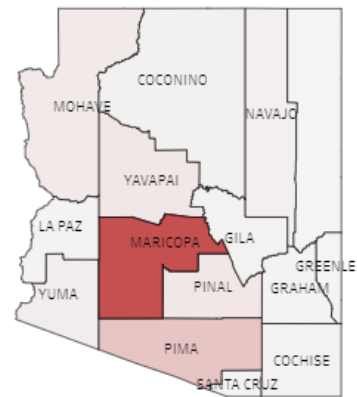
Which age groups had the highest number of possible opioid overdoses?



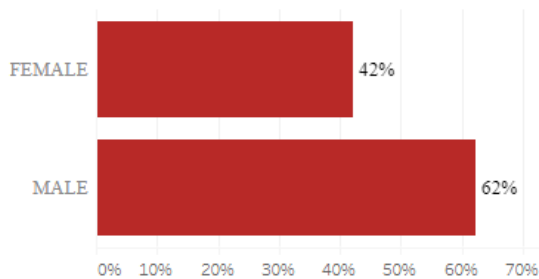
Number of possible opioid deaths

2,264

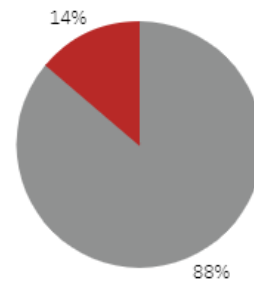
Which counties had the highest number of possible opioid overdoses?



Which genders had the highest number of possible opioid overdoses?



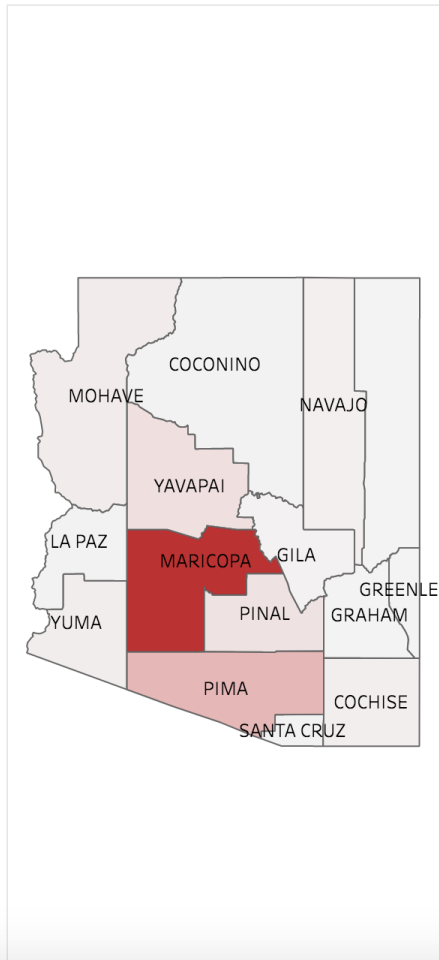
What percentage of possible opioid overdoses resulted in death?



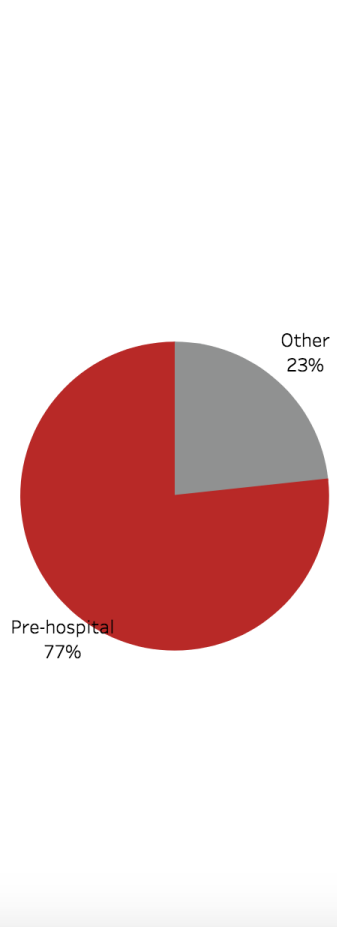
The dashboards also provide drilldowns for more detail on the use of naloxone to combat opioid overdoses including geographic patterns, where the dose was administered and who administered it as shown in the screen shot below.

Naloxone is used across the state by many responders to help reverse opioid overdoses.

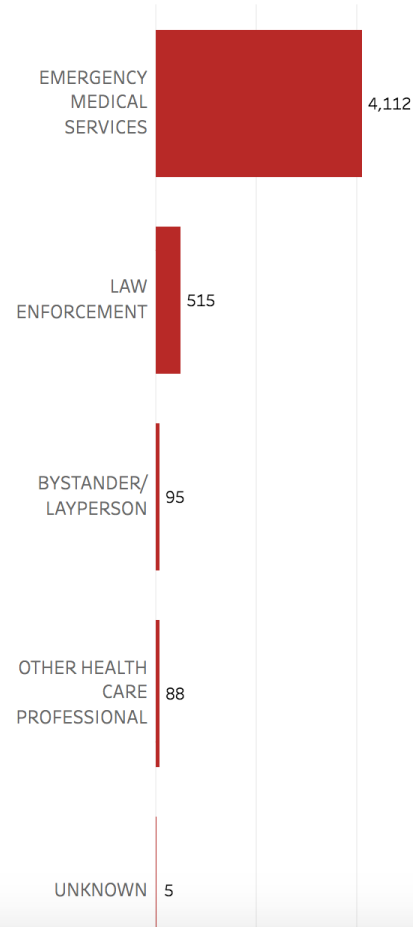
Naloxone has been administered in all 15 counties.



Most possible opioid overdoses received naloxone pre-hospital.



Naloxone was administered by a variety of partners including some bystanders.



Mining the data for insight

The data is used in many ways, mining and comparing data sets for insight across data sets. For example, using suspected opioid overdose data and hospital discharge data, the state examines the relationship between prior opioid hospitalization and subsequent overdose. For the most recent reporting period, [28%](#) of suspected opioid overdoses were for individuals with a prior hospitalization, indicating that the hospital event could be a point for intervention to prevent future overdose fatalities, either via referral to treatment or by providing overdose reversal drugs.

Another analysis looks at prescriptions for opioids among those with a suspected fatal overdose and finds that [43%](#) had a prescription for opioids, and of those [74%](#) had a prescription for more than 5 days of opioids in the two months prior to their fatal overdose.

The opioid data has helped improve hospital discharge planning. Looking at historical hospital discharge data, previously only 45% of those in the hospital for a suspected opioid overdose had been referred to mental health or substance abuse treatment. Starting April 26, 2018, the [Arizona Opioid Epidemic Act of 2018](#) put in place a mandate for hospitals to offer a referral for treatment, and now 80-85% are discharged from the hospital with a referral to mental health or substance abuse treatment services. New data analysis is examining whether patients who overdose are given a prescription for naloxone upon discharge, especially if they do not accept treatment. This may help target naloxone prescriptions to those most in need for them.

Analysis of the types of individuals administering naloxone pointed to the finding that comparatively few bystanders had administered the drug. To address this gap, Dr. Christ issued a [standing order](#) for Arizona pharmacies to dispense overdose drugs to any individual who wants it, significantly widening the availability of the overdose-reversing drug. Mapping data identified the neighborhoods and communities most in need of additional drug-reversal prescriptions and the outreach programs have been targeted there.

Geospatial analysis is under way to identify the areas of the state most in need of treatment services by looking at both treatment availability and the locations of overdoses. This analysis will also include an examination of transportation options for the treatment services by including public transit connections in the analysis.

The value of open data

Simply making the data public has generated considerable interest in using it. For example, the local HIDTA (High Intensity Drug Trafficking Areas) task force distributes the opioid snapshot weekly to its officers. Researchers are making use of the data provided on the site as are both local and national media – to the point that any change in the way the data is presented on the portal inspires a call from media sources. Arizona cities and counties are using the data to compare their trends to the statewide averages. The state Medicaid program is also using the data to track and compare where prescriptions funded by Medicaid occur in relation to opioid overdoses.

Early results

Using this evidence-based and data-driven approach has begun to bear fruit. Dr. Christ reported out publicly on the results recently, noting that there have been significant improvements in 2018, including:

- A [36 percent](#) decrease in opioid prescriptions, compared to 2016.
- A [60 percent](#) decrease in the number of patients “doctor shopping” for opioid prescriptions, compared to July 2017.
- A [296 percent](#) increase in naloxone doses dispensed by pharmacies, compared to September 2017.

As of January, 2019, Arizona requires electronic prescribing of controlled substances in the six largest counties, with the rest following six months later. The goal of this measure is to cut down on fraudulent prescriptions. The state will also begin regulating pain clinics beginning in 2019.

Lessons learned

Lessons from Arizona applicable in other state and local governments include:

- **Leverage best practice.** The data-first approach that Arizona has taken and the use of evidence-based practice are methods other state and local governments should adopt. The 50-state assessment is a helpful reference for all in government.
- **Use emergency powers.** The Governor used his power to declare a public health emergency, which among other things compelled data collection by health and public safety agencies of suspected opioid overdoses, suspected overdose fatalities, naloxone dispensed, naloxone prescribed, and suspected cases of Neonatal Abstinence Syndrome – the data that laid the foundation of the open data dashboard. He also used Executive Order power to limit prescription fills to 7-day supply of opioids for state health programs, in advance of the legislation that imposed that limit more broadly on private health insurance in the state. The Department of Health Services used its emergency rulemaking authority to tighten prescribing and treatment practices for opioids at state licensed health facilities, speeding the time to solutions.
- **Build from existing systems.** The dashboards were built using existing hospital and EMS reporting systems as their backbone which saved time and money and also improved data quality and user adoption of the new reporting requirements. Similarly using the state's existing poison control center, DHS now provides support to professionals for complex pain management advice, and a “warm handoff” to individuals seeking treatment. Arizona's Poison and Drug Information Centers now staff hotlines for healthcare providers seeking consultation for complex patients with pain and opioid use disorder. The poison control center already had on staff many of the right overdose experts -- nurses, toxicologists and so on, and was able to create a dedicated free hotline, the Arizona Opioid Assistance and Referral Line, operates 24 hours a day seven days a week and answered by medical experts at Arizona's Poison and Drug Information Centers to provide opioid-related information and support to medical providers.

Case Three: Cincinnati, Ohio

Summary

Cincinnati, Ohio lies in the heartland of America, and has been at the heart of America's opioid crisis. While recently lauded as the fastest growing [economy](#) in the Midwest, Cincinnati's labor market continues to suffer from absenteeism and a [lack of qualified workers](#), in large part due to the havoc being wreaked upon the younger population by the opioid epidemic. The city is also the county seat for Hamilton County, which comprises suburban and rural areas that have also been severely impacted by this problem. Cincinnati has led its opioid response with data, both by creating the first in the nation open data dashboard of opioid statistics, and also by forging an intergovernmental data exchange for greater real-time insight. Now, three years into this data-driven approach, the tide is beginning to turn with the city marking a [31% decrease](#) in opioid-related EMS trips for the first 11 months of the year compared to the same period last year.

County-wide, the city's work is having an impact too. A data-driven approach to distribution of Narcan is beginning to stem the tide, with Hamilton County reporting a 42 percent reduction of emergency department visits and a 31 percent reduction of opioid overdose deaths in the 8 months since a Narcan distribution program began last fall.

Background

The opioid crisis was steadily rising over the past decade in Cincinnati, but the point of no return came when a record [174](#) heroin overdoses occurred in 6 days during the summer of 2016. At the time a typical week saw [20-25](#) overdoses, so this was approximately 8 times greater than the usual amount, depleting the resources of first responders and sending shock waves through the community. Something had to be done and city government was prepared to lead the charge.

A data-driven city

By the time the opioid crisis hit, Cincinnati was already a strongly data-driven city. The city's Office of Performance and Data Analytics was created in 2014, and was a well-established national leader in data-driven government by the time of the opioid overdose spike.

Chief Performance Officer Leigh Tami and Chief Data Officer Brandon Crowley are both key players in the quest for answers to the opioid crisis in the data. Tami is responsible for overseeing the open data portal, the city's innovation hub, and also the city's performance stat program.

The city's excellent and user-friendly [open data portal](#) makes public over 200 data sets, and is searchable by key performance area of city government. The portal, and the city performance management program are all built around the key goals: Safer Streets, Growing Economy, Thriving & Healthy Neighborhoods, Innovative Government, and Fiscal Sustainability & Strategic Investment.

[CincyInsights](#) is a user-friendly set of performance dashboards on key city government priorities. These dashboards make the data come alive for the public, with data visualizations of summary level data and easy to use drill-downs for more detail and for access to historical data for download. These dashboards are geared around public priorities as well, so for example, during a snowstorm, the snow plow tracker updates [every seven minutes](#).

User-friendly, public opioid dashboards

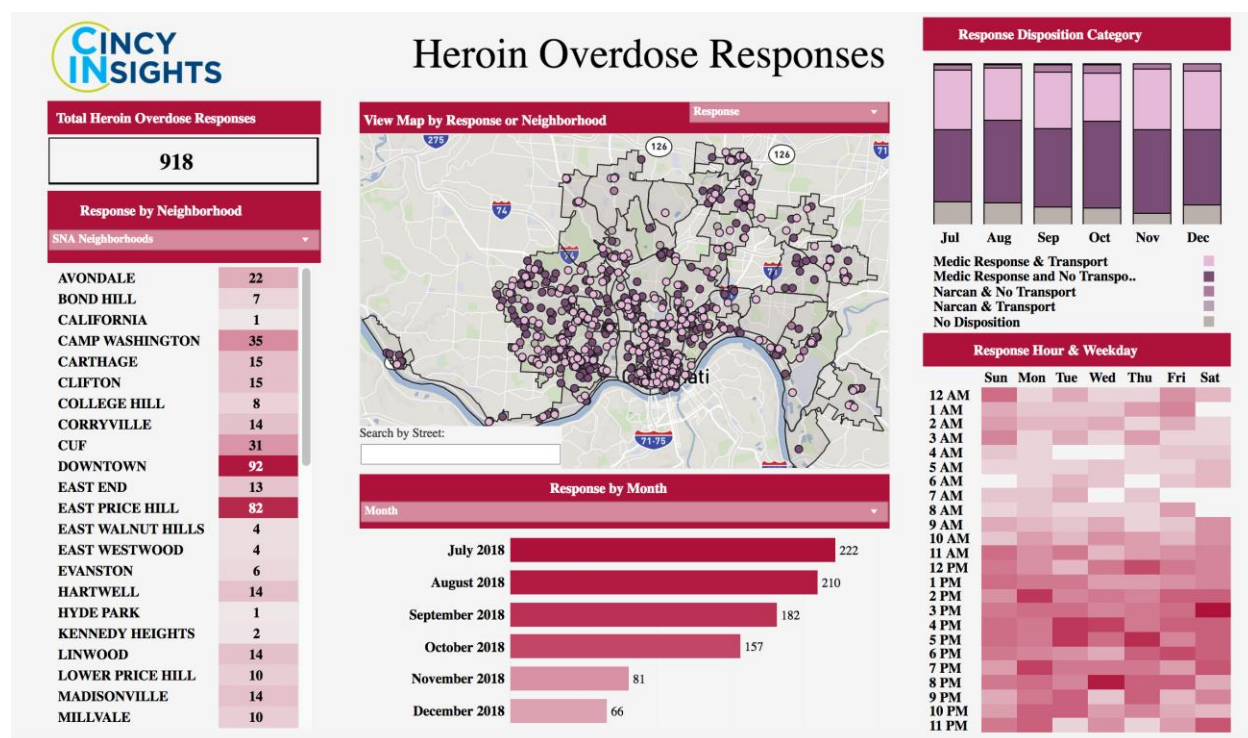
How does a data-driven city respond to a spike in opioid deaths – with a deep dive into the data to look for patterns and to seek solutions. As Cincinnati Chief Data Officer Brandon Crowley said, “Before we could respond effectively, we needed to know just what we were dealing with. We needed data, presented in an analytical way to help us target the city’s limited resources.”

Crowley had quite a task ahead of him to bring together relevant opioid data into a single coherent platform that tells the story. From a technical perspective, he had to normalize the data so that it could be compared geographically and to create a method for continually updating the information to provide ongoing tracking of how the city is doing in addressing opioids.

The result is a first in the nation [data dashboard](#) (known as the Heroin Tracker) that presents Emergency Medical Services (EMS) responses to opioid-related calls into a user-friendly dashboard to tell the city’s data story about the opioid problem.

As shown in the screenshot below, for the most recent six months, the total number of Heroin Overdose Responses is listed on the left, with a map of responses in the center. The map and the

charts showing monthly, day and hour, category of response, and neighborhood are all interactive dashboards that connect to data on the back end. A user can mouse over for summary statistics, or can drill down and see the underlying data which is updated daily. The sheer volume of data is notable and ambitious, as is the daily update of the data from the 911 database. For those who want to use the data for their own analysis, they can download it in a variety of formats, and developers can connect via APIs in the data set.



Users need no data training to gain insight from the dashboards because they have been designed to be user-friendly and accessible to all. For example, it's easy to see which neighborhoods have the highest concentrations of EMS responses, and the clustering of EMS calls in late afternoon and the light volume in the very early morning is clear.

Policy change and results

The geographic nature of the data enables neighborhood-level responses. Public safety and public health officials can use the Heroin Tracker data to see where their services are most needed and can plan accordingly. Using insights from the data, the city has been able to identify high usage locations and “strategically deploy roving medic units so that they can be in those hotspots,” says Crowley.

County Narcan distribution efforts have also been able to follow the data. Hotspots of overdose responses, along with community health fairs, hospital emergency departments, substance use disorder treatment centers, and social service agencies have enabled a wide reach of this prevention program, distributing a total of [25,000](#) doses of Narcan. Since the launch of that program in October of 2017, results have been impressive. Comparing the first 8 months of each year, in 2018 versus 2017, there was a:

- [42](#) percent reduction of emergency department visits,
- [37](#) percent reduction of EMS runs, and a
- [31](#) percent reduction of opioid overdose deaths.

Advancing knowledge via open data

The vast amount of timely data that Cincinnati makes available on its Heroin Tracker dashboard is not just valuable to the city and county, it's providing value to researchers too. Among the nearly [5,000 views and over 1,400 downloads](#) of the raw data are scientists at Research Triangle Institute who used the data to help model the path from drug use to overdose. Their [predictive model](#) linked location-based data from three sources -- EMS data with national survey data about drug abuse, and population data.

They generated heat maps of expected overdoses where they found concentrations of misuse in the drug survey. Their analysis of the data found an interesting pattern for types of locations. They found that areas with higher ratios of EMS calls for opioid overdose to drug users were in commercial areas and that correspondingly lower ratios of EMS calls to drug users were in residential zones. They also found concentrations of EMS calls located in commercial areas that had fast food restaurants, affirming the narrative often found in media accounts of opioid use.

The data exchange

Intergovernmental collaboration has been a hallmark of the fight against opioids in this region. As early as 2013, a cross-agency working group began to share ideas, and in 2015, the Hamilton County Heroin Coalition was formed to bring together an interdisciplinary approach spanning public health, law enforcement, prevention experts and treatment providers, and goes across borders to include public health and law enforcement officials from Ohio, Indiana and Kentucky to jointly address a drug problem that spans their tri-state area. The Coalition meets monthly and has committees addressing the key areas of prevention, treatment, interdiction, and harm reduction, each of which meets regularly.

In late 2018, Cincinnati and surrounding towns came together to sign a first-of-its kind [data sharing agreement](#) with the federal government in hopes of finding new ways to combat the opioid crisis. The new data sharing agreement provides these Ohio communities with access to Department of Homeland Security (DHS) data on drugs being trafficked across the border and detected by Customs and Border Patrol officers. One possible use of the DHS data is to quickly identify particularly dangerous batches of heroin so that users can be warned to avoid using deadly batches. A partnership with the local phone company is supporting a text-messaging effort that is also promoting access to drug treatment and an easier way to report suspected overdoses.

Lessons learned

Cincinnati has led the way on fighting opioids with data, and has been a national leader in making data public to advance transparency and the state of knowledge about the problem. Intergovernmental collaboration has been another innovation in this region and something other governments should emulate.

Case Four: Commonwealth of Massachusetts

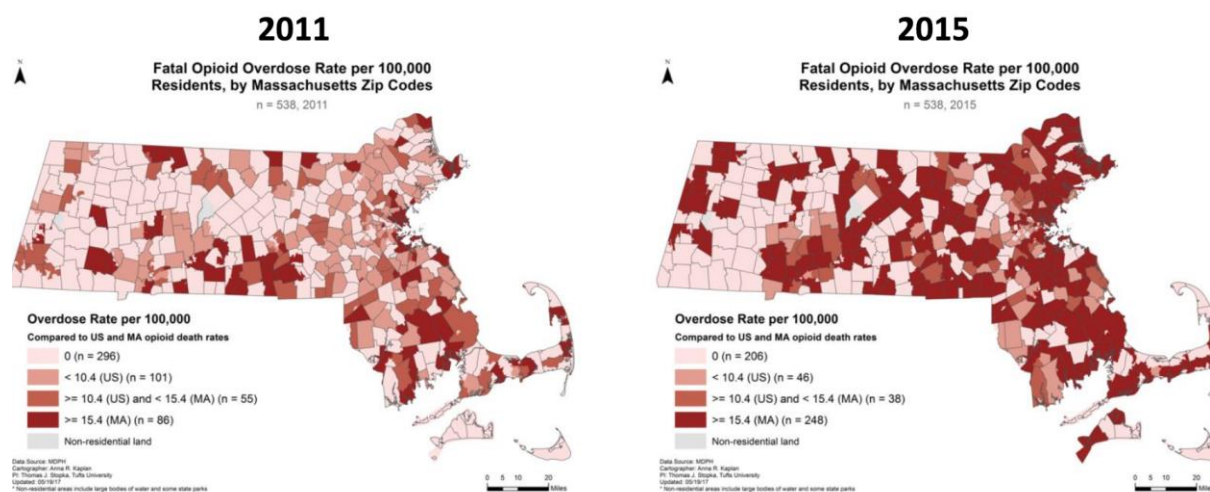
Summary

Massachusetts is an excellent case study of working across the silos of government to address the opioid problem and in establishing a data sharing best practice that preserves privacy. What once was one of the hotbeds of the opioid crisis has become a model of data-driven and interdisciplinary resolve, with results that have begun to turn the tide. It took significant government executive and legislative leadership, the collaboration of 29 different organizations in and out of government, and the consistent energies of public health and public safety professionals. Legislation required answers to seven key questions about the nature and scope of the opioid problem and broke existing statutory barriers to data sharing. Data insight is now driving policy development and program design, and senior executives in government now see that data sharing is valuable. This model is one other states would do well to study.

Background

In 2015, Massachusetts faced a growing number of overdose deaths, and had a rate of overdose deaths [far exceeding](#) the national average. The wave had been building for a while and had shown no sign of abating. By 2015, opioid-related deaths in the state were more than [four times higher](#) than they had been in 2000. And the problem was not isolated to just a few parts of the state, rather it was endemic across regions and types of communities. In 2013–2014, opioid-related deaths occurred in [two-thirds](#) of the cities and towns across the state. Particularly hard hit were economically depressed urban areas outside Boston, such as Springfield in the western part of the state and coastal communities such as Fall River and Gloucester. As the maps below show, the problem expanded from a concentrated area to nearly every community over just a few years.

Increasing and Spreading Opioid-Related Overdose Death Rates in Massachusetts from 2011 to 2015¹



Source: Massachusetts Department of Public Health, August 2017.

[Data Brief: An Assessment of Opioid-Related Overdoses in Massachusetts 2011-2015](#)

Members of the legislature were increasingly concerned by what they heard from constituents. Senator John Keenan, one of the key advocates of addressing the opioid crisis noticed that overdose deaths were hitting all parts of society, and he and his colleagues were “attending too many wakes and funerals.”

Without accurate data on the underlying drivers of the problem, the best way to address the crisis was unclear – more information was needed on who was dying, what circumstances led to fatal overdoses, what the patterns of use were for those who overdosed and or died, and what touchpoints government had to potentially intervene to avoid their opioid death, or to prevent addiction in the first place. Referring to the early days of trying to collect timely and accurate data to understand the problem, Senator Keenan said, “We knew the raw numbers relative to overdose deaths, but we did not have any context, i.e. concrete data as to the path they traveled with their addiction before they became just an overdose death statistic.”

The need for data was well described by Massachusetts Department of Public Health Commissioner Monica Bharel, MD, MPH who said, “We collect a lot of data in government but what we end up with is a lot of data points, not actionable information.” What she hoped to achieve was to gain insight that would help solve the age-old problem of addiction, noting, “Addiction has been around since the beginning of civilization. If we want to address this crisis differently than the previous ones, we need to understand it deeply so that we can respond most appropriately.”

First steps: a working group and ground-breaking data sharing legislation

To address the data gap and to inform policy, Governor Charlie Baker created a Working Group on Opioids with membership from across executive branch agencies as well as key stakeholders from the legislature.

The efforts of the Working Group included recommending improved data sharing across government, which led to a landmark statute that mandated data sharing for the purpose of better understanding the opioid problem in Massachusetts. The law, referred to as Chapter 55, was a first of its kind effort at a state level to pull together relevant data sources and to mine them for insight. Prior to this law, all relevant data existed in separate silos of government and was never brought together to look for patterns, trends, and meaning. The law brought together for the first time information from various sources, including the state’s Prescription Monitoring Program, data from the Department of Corrections, and the Office of the Chief Medical Examiner’s post-mortem toxicology reports. The law spelled out seven research questions and gave the executive branch a year to answer them and produce a public report.

As important, the law addressed the barriers to individual-level data sharing that had been in place for years – some entrenched in statute and others entrenched simply by habit. The statute enabled anonymous matching of individual information across data sets, so that pathways to use, misuse, addiction, treatment, overdose, and death could be analyzed together and understood.

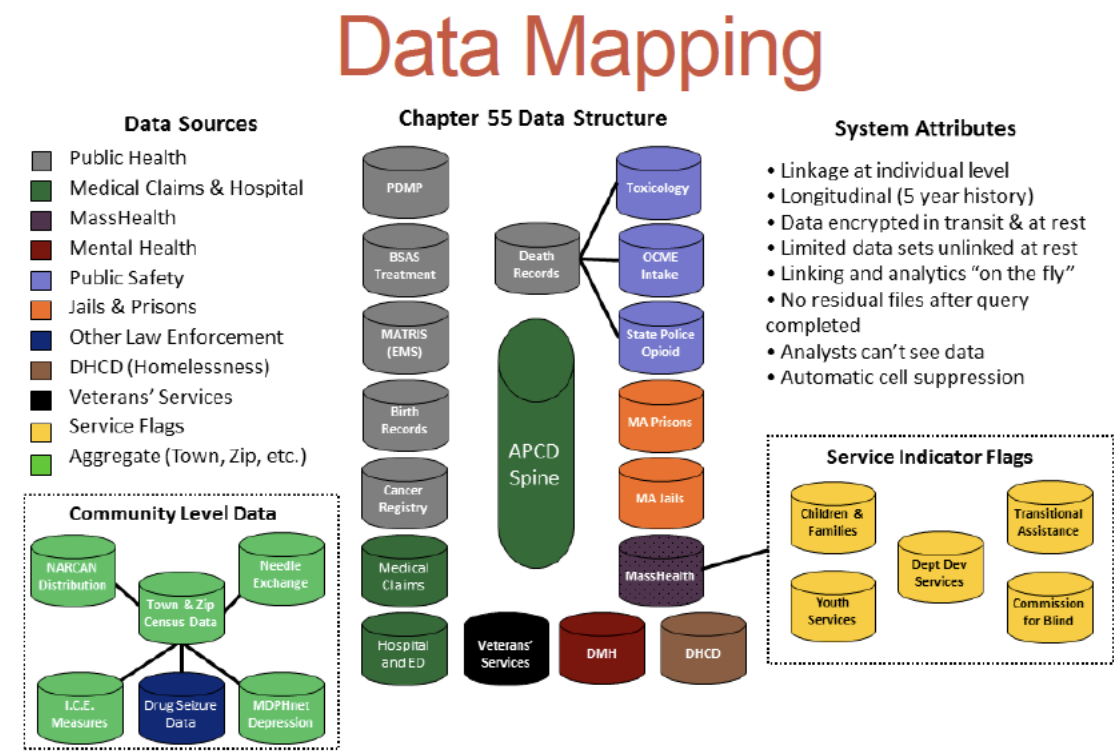
Implementation of Chapter 55: cross-sector data analysis, and public sharing of insight

The law was passed in 2015, and the Massachusetts Department of Public Health (DPH) was designated as the lead agency for compiling data and conducting analyses to discover insight. Executive sponsorship from the Governor and close attention from the legislature were keys to keeping this initiative a top priority. And the statutory requirement to share data helped reduce or eliminate the reluctance to share data that can sometimes occur in government, particularly when there is sensitivity about the quality of the data or what the data might indicate about performance.

The law required public reports on the findings of the analysis. The first report was released in 2016 and an updated report was released in 2017. For the first report, ten government data sets were linked and analyzed and by the time of the second report, over twenty government data sets were linked and analyzed.

A national model for balancing data insight and individual-level data privacy

The reports and underlying analysis drew insight from a database that linked mental health data, jail and prison data, vital records, substance addiction treatment data, ambulance encounter information, the state's all-payer claims database, and others. The chart below shows how the many data sources came together:



Source: Legislative report on Chapter 55, found at: <https://www.mass.gov/files/documents/2017/08/31/legislative-report-chapter-55-aug-2017.pdf>

The ability to conduct analysis on individual-level data from disparate data sets while protecting data privacy required innovation. Individual level data were temporarily linked and never stored in a common database, going back to their original files once the analysis was complete. Data was only temporarily linked and calculations were completed without the source data being available for download. High-level encryption assured that data transfers were secure. The result satisfies HIPPA privacy requirements as well as the federal regulatory (42CFR part 2) requirements that provide additional protections to data about individuals receiving substance abuse services. As noted by Dr. Thomas Land, one of the key data analytics leaders at DPH, “The protections we put on data went far beyond federal and state law.” This method took a great deal of planning and cooperation to get everyone comfortable.

Data visualization for the initial Chapter 55 report

In addition to the written report, the data for the first report is made publicly available on a site with user-friendly [data visualization](#) of a variety of factors.

The site provides detailed drill-downs for 15 years of data, including a town-by-town map showing rates of opioid related deaths from 2001-2015. Providing data by town has helped communities document the extent of the opioid problem so that they can apply for grant funding to address it.

The site brings together in one place background information on opioids and on what the state is doing to combat the problem. There is also trend data on individuals admitted to state funded drug treatment programs, showing how opioids have grown as a percentage of total admissions as other drugs and alcohol have declined comparatively, as well as the % of patients in treatment who list heroin as their primary substance of use.

There is also data on the number of individuals who have prescriptions for opioids, which when combined with toxicology reports from fatal overdoses can show who had a prescription for an opioid drug. Opioids are fairly commonly prescribed, with [one in six](#) adults in Massachusetts having had an opioid prescription in 2015. While many use opioids responsibly and safely, some number of individuals prescribed opioids will misuse them and become dependent or addicted. Looking at toxicology and prescription data and comparing across individuals, more than [two-thirds](#) of people who died from an opioid-related overdose in 2013 or 2014 had a legal opioid prescription at some point from 2011–2014. However, only about [1 in 12](#) of those who died had an opioid prescription in the month before their death.

Data visualizations also show age and gender and the racial and ethnic characteristics of those who die from opioid overdoses. The analysis shows that this crisis is hitting every group in at least some way. The data visualization site is built with open source code, so it could be replicated by other interested jurisdictions.

Turning data into actionable insight

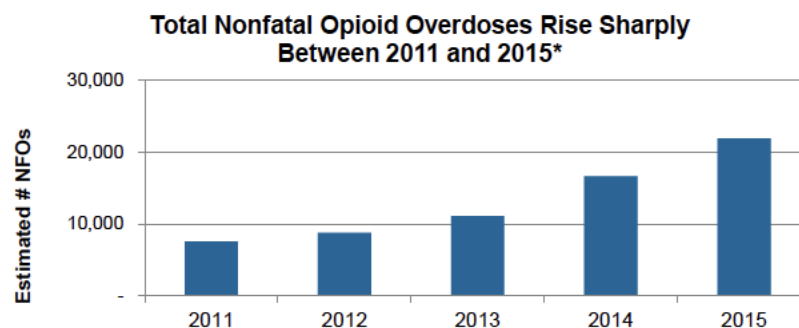
Early in the process of creating a data-driven approach, and well before the Chapter 55 legislation, DPH Commissioner Bharel was frustrated that overdose data was often two years old or more. The data derived from death certificates that were slow in coming. The time it takes to close out a case by the state’s medical examiner is driven by the complexity of toxicology reports, the amount of

documentation required, and the sheer volume of cases. Commissioner Bharel wanted a more timely estimate of the opioid fatality rate, so her team used advanced analytics to develop a predictive model based on suspected cases of opioid overdose and how many will be found by the medical examiner to be confirmed. The model has reduced the wait time for this data from two years to three months. This effort has made all subsequent data efforts more powerful because they are more timely.

Creating the data warehouse and conducting the data analyses was guided by the ethos that all work should be driven by possible policy action. Projects for the first phase were all directly tied to one of the seven research questions spelled out in the legislation. Now with research continuing, Commissioner Bharel says, “Every research question we pursue has to be actionable” so that analytic work is tied directly to policy or programmatic change.

Key insights from the 2017 Chapter 55 [report](#) include the following overall trends:

- Opioid use disorder (OUD) is twice as high as had previously been reported, with approximately [4.4%](#) of individuals age 11 and older experiencing OUD in Massachusetts. The analysis points out that by comparison the rate of diabetes in the adult population in Massachusetts is [8%](#).
- Opioid-related deaths vary predictably across the calendar, with twenty percent more opioid-related deaths occurred per day on weekends and during the first three days of the month.
- As shown in the graph below, not only did fatal overdoses rise, but non-fatal overdoses were also increasing in the same time period, with over [65,000](#) non-fatal overdoses between 2011 and 2015.



Source: Massachusetts Department of Public Health, August 2017.
Data Brief: An Assessment of Opioid-Related Overdoses in Massachusetts 2011-2015

- Looking at longitudinal data it was possible to explore multi-year impacts on individuals who had non-fatal overdoses. Of those who had a nonfatal overdose (NFO) between 2011 and 2015, nearly one in ten ([9.3%](#)) died of a fatal opioid overdose within two years. Repeat overdoses were common, with [14.9%](#) of the sample having one or more overdoses within a year, and nearly one in five ([19.1%](#)) having repeated overdoses within two years.
- Post-overdose treatment works, but is seldom used. The data show that following a non-fatal overdose, patients treated with methadone and/or buprenorphine are 50% less likely to

die. Unfortunately, very few patients (~5%) of those who have a non-fatal overdose get this treatment.

Key insights for specific populations include the following:

- The opioid overdose death rate is [321](#) times higher for pregnant and postpartum mothers with opioid use disorder than for the adult population, and the opioid-related overdose death rate among mothers delivering an infant with Neonatal Abstinence Syndrome (NAS) was 27 times higher than the rate for all other mothers. As a result, Massachusetts is developing a comprehensive strategy for safe care of newborns and their mothers.
- The opioid overdose death rate is [120](#) times higher for individuals with histories of incarceration than it is for the adult population and opioid overdoses represent [50%](#) of the deaths of those released from incarceration in 2015. As a result, new programs for treatment and post-release support are being developed in partnership with the corrections agencies in Massachusetts.
- The opioid overdose death rate is [30](#) times higher for individuals experiencing homelessness than it is for the adult population.
- The opioid overdose death rate is [6](#) times higher for individuals with serious mental illness than for the adult population, and three times higher for those with depression. Based on this insight, the state Medicaid program office is working with the Department of Public Health to create special programming for those most at risk.

As Holly St. Clair, the state's Chief Digital Officer and Chief Data Officer and one of the key architects of the data sharing effort said, the data effort for Chapter 55 was "a lot of work, but it was worth it because the findings were very informative."

Ongoing data release

Having satisfied the legislative requirements of Chapter 55, the Department of Public Health continues to release public data in a timely fashion sharing quarterly data updates on its web site. The data is provided in PDF format. The data released is timely, with just a few months lag, faster than most states are releasing their opioid data. Quarterly data on opioid-related deaths and opioid-related EMS encounters are available for the state as a whole, and by town. Demographics of those who died of overdoses are available aggregated to the state level, along with prescribing data aggregated by county.

Future data priorities of the legislature will look at incorporating socioeconomic data to further understand patterns about fatal opioid overdoses, and incorporating recent Chapter 55 data on overdoses in certain industries into policy discussions.

Data-driven legislation

Based on the insights from the report and data visualizations, the legislature passed and the Governor signed into law new measures to curb opioid abuse and stem the tide of overdose and death. New [measures include efforts to:](#)

- Limit a first-time opioid prescription to seven days (a first in the nation measure)
- Require practitioners to check the electronic Prescription Monitoring Program (MassPAT) database before prescribing opioids
- Expand Good Samaritan protections by shielding individuals administering naloxone to a person during an opiate overdose from civil liability
- Require a substance use disorder evaluation for individuals presenting in the emergency room because of an apparent opiate overdose
- Criminalize trafficking in fentanyl
- Mandate cross-checking for other drugs when prescribing opioids
- Mandate electronic prescribing
- Increase prescriber education requirements to increase co-prescribing naloxone with opioid prescriptions
- Enable concerned family members to involuntarily commit a loved one to treatment for opioid addiction when they pose a danger to themselves or others
- Expand treatment in substance abuse facilities, correctional facilities, and emergency rooms.

Data-driven policy and program change

As described above, new programs are being created for individuals who are incarcerated, pregnant and post-partum women and those diagnosed with mental health problems.

Recognizing that not all populations are seeing an equal decline in opioid overdoses the Department of Public Health (DPH) is taking action. For example, in 2017 while the opioid-related overdose death rate declined for the population as a whole, it rose by [44%](#) for black males. This data led the DPH to develop a community-based public awareness campaign to reach black males.

As a result of visualizing and breaking down the data geographically, DPH is using opioid-related overdose death data to identify high need areas for licensed treatment facilities. Treatment will use the latest insights on effective practices, incorporate recovery coaches into treatment programs, and leverage the insight, compassion, and credibility of people who have experienced and recovered from addiction themselves.

Massachusetts has made significant strides in increasing the number of medical professionals who are aware of and are prepared to treat opioid use disorder. DPH has worked with nearby medical, dental, and nursing schools to incorporate a set of core competencies into their curriculum aimed at properly training students and professionals on prevention and management of prescription drug misuse. This novel method has been documented in peer reviewed journals and has already been copied in Philadelphia. Over 8,500 individuals have already been trained, and each year the number grows.

Promising initial results

The efforts of this interdisciplinary approach seem to be working. In 2017, Massachusetts saw a [4% decrease](#) in the number of opioid-related overdoses compared to 2016. Data for 2018 to date are preliminary, but the [trend appears](#) to be continuing. The rate of prescribing has decreased based on the new tracking of prescriptions, with opioid prescriptions down [30 %](#) in the state since 2016. Prescribers must now check a database for a patient's other prescriptions to reduce "doctor shopping" and to see if the patient has concurrent prescriptions for gabapentin and benzodiazepines, which can cause dangerous interaction. The system also provides prescribers quarterly notification of how their history compares to others in the field.

Lessons learned

Key to the success was continued executive sponsorship and the interdisciplinary nature of the approach. The data-first approach meant that the approaches could be based on facts not opinions. The following lessons are applicable to other jurisdictions seeking to learn from the experience in Massachusetts.

- **Executive leadership matters.** Solving the opioid problem was the #1 health priority for Governor Baker, who repeatedly declared that the situation was a crisis. He paid close attention and continually asked questions and sought insights. His Secretary of Health and Human Services and his Commissioner of Public Health maintained a high degree of focus on the issue with numerous public presentations and consistent attention to the issue.
- **Legislation requiring a public report creates urgency.** The fact that the legislation spelled out questions to be answered about the opioid crisis, and gave the state one year to answer those questions and produce a public report, created a sense of urgency that enabled state agencies to overcome previous barriers to the sharing of data. And the fact that the legislation took on data sharing and required breaking down silos forced the hands of agencies not used to sharing their data. As Department of Public Health Commissioner Monica Bharel noted, "The statute was the first step." She pointed out how necessary this step was because prior to it she was unable to compare person-level data even across the various offices and bureaus within her department that held birth and death records, prescription drug data and substance abuse treatment data – all for important statutory privacy reasons.
- **Build a team with diverse skills.** The data work for Chapter 55 required legal, data, technology, and analytic skills that were found in the Department of Public Health, the Center for Health Information and Analysis, the Executive Office of Technology Services and Security, along with data, legal and privacy experts from across the many agencies that shared data with DPH. No one agency had all of the necessary skills or resources, nor sufficient manpower for the task, so collaboration was key.
- **Leverage pro bono contributions.** Chapter 55 did not provide funding specifically for the analytic work – so instead it called forth creativity. Massachusetts is lucky to have many high caliber local academic institutions and private companies willing to contribute data scientists to the effort. State employees coordinated and assembled the Chapter 55 dataset on site at state premises, and conducted all key analysis. Private sector and academic resources were invited to participate as partners through a public "Notice of Opportunity" to contribute pro

bono analytics support services. The work was completed in a secure environment with de-identified data only temporarily linked for analysis purposes. Their donated work allowed them access to data they would otherwise not be able to have, and gave them the opportunity to create their own papers for publication in academic journals. In this way donated services benefited both the state's efforts to solve data problems, and the desire for published work of those who donated the services.

- **Generate early wins.** The first report, which leveraged insight from 10 data sets found surprising insights into the opioid crisis and demonstrated the value of data sharing. This accelerated participation by other agencies making it easier to get to 29 organizations contributing data by the time of the second report. The success of both has resulted in the legislation authorizing the DPH to continue to maintain a Public Health Database to monitor “urgent issues as they arise” at the discretion of the Commissioner. This is a win for permanently embedding data-powered decision making.
- **Create standard data sharing and use agreements.** At the start of the Chapter 55 process, there were 78 different types of data sharing agreements in use in departments across the state and the average time to reach agreement to share data between two agencies was 133 days. Inspired by the work of the Chapter 55 data team, a working group of executives across departments together developed a standard Data Use Licensing Agreement (DULA) that can be used and adapted for any agency in the state for sharing, protecting, and securing data. Establishing this infrastructure for sharing data will likely have benefit for years to come in ways not even yet imagined as agencies and departments open up new avenues of data collaboration.
- **Lawyers, technologists, and data people need to work together to solve privacy challenges.** Forging an innovative way to protect privacy while doing individual-level data matching took patience in working across disciplines with countless multi-hour meetings to hammer out all the details. As DPH data leader Dr. Tom Land said, “There’s a way around every issue, and people had the patience to sit down and work it out. We didn’t get to zero risk, but we minimized risk and created better protections than anything else we could find.” At the best moments, the privacy protection and data access issues were dealt with in tandem, while the moments of challenge and difficulty were when the privacy protection or data access teams were working independently and sometimes at cross purposes. In one instance a privacy lawyer was making recommendations about how the code would be written for data privacy, rather than working in a spirit of collaboration where lawyers focus on statute and policy and empower the data scientists to create code in compliance with agreed policy. For best results, lawyers focused on data privacy protections should work together with the data team from the start as joint problem solvers focused on common results.
- **Access to insurance facilitates access to treatment.** Massachusetts expanded access to Medicaid under the Affordable Care Act, and already had a high rate of health insurance coverage. This means more Massachusetts residents who need treatment [have the insurance](#) to pay for it. There is still a need for more treatment capacity, but compared to other states, Massachusetts leads in the ability of individuals to pay for treatment with insurance.

Summary

The opioid crisis in Massachusetts created an opportunity for data innovation that paved the way for permanent cross-departmental sharing of information and new ways of using data to drive policy.

The innovative method of temporary linkage of person-level data allowed deeper analytic insight while preserving the highest levels of data privacy. Other states would do well to emulate this model.

Case Five: State of Utah

Summary

Utah had the [third highest](#) opioid pain reliever death rate per 100,000 residents in the US in 2014. The state has now begun to turn the tide, as the number of heroin-related overdose deaths in Utah has also [decreased](#) in 2017 for the first time in six years. The approach in Utah has been data-driven and has been a collaborative effort spread across a variety of departments and branches of government. This combination of data use and cooperation is a model of success other jurisdictions should examine.

Background

The opioid problem in Utah couldn't be ignored once opioid overdoses surpassed deaths caused by firearms, falls, motor vehicle crashes. While in much of the rest of the nation the crisis is defined by street drugs, or a mix of prescription and street drugs, the problem in Utah is primarily one of prescription drug abuse. There are numerous theories surrounding the high rate of opioid prescription use, and addiction, in Utah – some believe that the state's nearly two thirds Mormon population who eschew coffee and alcohol are "opiate naïve" and more susceptible than others to misuse and addiction. Others posit that residents of this state are trusting of authority, and are trusting of those who prescribe them opiates. Regardless of the reason, prescription opioids are widely used in Utah, and in 2014 nearly one third of adults in the state were prescribed an opiate.

The opioid crisis led the legislature to declare drug overdoses a public health emergency. The Governor signed the bill into law in March of 2016. The measure asked that all of state government find ways to address the crisis. Now, the many efforts begun in 2016 are beginning to bear fruit.

In noting how collaborative the effort has been across state government, David Stringfellow, Chief Economist, Office of the State Auditor said, "As much as government can do an "all hands-on deck" effort, that's what's happened here. The extent of the crisis created a sense of urgency and drove cooperation among agencies that aren't always in alignment. We are trying to bend the curve on what could be an exponential explosion in fatalities due to misuse of opioids."

Early insight from innovative research

The data-driven approach to fighting the opioid crisis began a decade earlier, with the state's response in 2004 to a spike in deaths caused by methadone. The medical examiner noticed a sharp and surprising rise in deaths caused by methadone. In an attempt to understand the root cause, the state medical examiner sought and received legislative funding to conduct a next of kin study to ask family members about the deceased to try to identify causes for the deaths.

The results of that study were then used to target interventions to address methadone deaths.

When opioid overdoses spiked, a new next of kin study was commissioned to understand the causes and behavior patterns of those who died of opioid overdoses. In response, starting in 2008, the

state issued clinical guidelines for prescribing opioids, and launched a media campaign “use only as directed,” focused on safe storage, use and disposal of prescription opioids.

Data quantity and quality allows Utah greater insight than many other states

Data availability and quality in Utah is higher than in many states, as it has a comprehensive overdose data set, daily updates from the disease surveillance system, and a sophisticated prescription drug monitoring database.

- The depth of data on drugs deaths is more comprehensive in Utah than in most states. Utah was one of the first states to adopt the [National Violent Death Reporting System](#), which was begun in 2002. This system captures suicide, homicide and undetermined deaths drawing data from death certificates, medical examiner reports, law enforcement reports, and toxicology reports into a single source. Utah was one of the first states to collect data on all unintentional drug overdose deaths and to join it in this single combined database. This allowed a comprehensive look at the drug overdose data not just at a point in time, but historically and allowed analysis of the type of drug, prescription or illicit. Data collection on opioid overdoses will be improved in the coming years with a recent grant from the CDC to establish near real-time monitoring and reporting and will allow for data sharing across the state.
- The Utah Department of Health receives daily updates from the statewide disease surveillance system in hospitals. Monitoring for the chief complaint of individuals admitted to the emergency department, the daily updates allow the state to monitor overdoses treated by hospitals. The data are mapped, looking for hotspots of activity so that responses can be put in place. This data is used for internal analysis but is not shared publicly for privacy reasons.
- The state has overhauled its Prescription Drug Monitoring Program site, which already provides connectivity to surrounding states so that a prescriber can see a patient’s history of opioid prescriptions in other locations. One unique aspect of the PDMP is the cross-agency collaboration that has been created. The PDMP is the responsibility of the state’s Department of Commerce and its Professional Licensing Division. The Utah Department of Public Health (DPH) funded a liaison staff person to be embedded at the PDMP to extend functionality beyond the traditional law enforcement use, and extend use for public health purposes as well. This led to the development of a patient dashboard, where when a provider searches a patient, they will immediately see flags for certain indicators – such as a patient that has a prescription for over 90 MME (morphine milligram equivalent) of an opioid, or a patient with simultaneous opioid and benzodiazepine prescriptions. The prescriber dashboard will show how many prescriptions they have written over 90 MME and how many of their patients are doctor shopping and if they have contributed to an overlapping of benzodiazepine and opioid prescriptions. Prescribers can also see both how often they are checking the database, and how their activity compares to others in their specialty and the state as a whole. A new dashboard will show aggregated prescriber data by county so that the 13 local public health departments can look at aberrations in the data. That system will also include a trigger to send an email when there is an aberration in the

data so that the county can mount a response. County health departments already have response plans in place that would just need to be activated.

Utah Coalition for Opioid Overdose Prevention (UCO-OP)

The Utah Coalition for Opioid Overdose Prevention (UCO-OP) is an example of the degree of cross-disciplinary collaboration that has been the hallmark of Utah's approach to battling opioids. This coalition began in 2009 as an organization focused solely on prescription opioids and has since broadened its focus to all opioids negatively affecting Utah. It is a multi-disciplinary collaboration with more than 60 experts in the fields of substance abuse prevention and treatment, law enforcement, environmental quality, healthcare, and public health.

Coalition meetings are chaired by Lieutenant Governor Spencer Cox and the executive committee has leaders from across state govt departments. For the first time this year, the coalition will be taking a vote to prioritize ideas for next steps. That will provide new and deeper stakeholder support as the key executives in government responsible for execution will be receiving and voting on the coalition's recommendations.

Furthering inter-governmental cooperation, the Utah Department of Public Safety has established partnerships with federal, state, and local agencies to create the Drug Monitoring Initiative. The initiative is currently focused on developing an early warning capability for emerging drug threats within the state of Utah.

Learning from overdose deaths

A state-level Opioid Overdose Fatality Review Committee was recently [formed](#) to promote cooperation and coordination among agencies involved in opioid misuse, abuse and overdose prevention, treatment and surveillance. The committee will specifically identify points of contact between people who die of opioid overdoses and state healthcare, social services, criminal justice, and other systems in hopes of finding points when intervention could change the course of their life and prevent the fatal overdose. The first area of focus for the committee is the overlap between opioid and gabapentin overdose deaths. Additional areas of focus are hotspots and individuals released from incarceration, released from substance abuse treatment facilities and individuals getting prescriptions for opioids based on post-operative care. Future efforts will also look at special populations such as veterans.

Opioid action from the Utah State Auditor

In one very specific response to the 2016 call to action, the Utah State Auditor examined prescription drug data from the [\\$2.4 billion](#) Medicaid program that provides health care services to low income and disabled individuals in the state. Noting that [83%](#) of prescription drug deaths were opioid-related, the Auditor chose to examine claims for drug benefits and to look for patterns that might indicate misuse of the drugs.

A [performance audit](#) completed in August 2016 pointed out that there were suspicious prescriptions paid for by Medicaid that may have contributed to the problem of misuse, abuse and or overdose and death. The audit found that some government funds paid for prescriptions written by deceased

prescribers, one of whom had been dead for as long as six months when the prescription was dispensed. The audit also found that prescriptions were obtained in the names of deceased Medicaid program recipients. While the total number of suspicious prescriptions found in the audit was not large, it indicated systemic issues with the data and processes used by the state Department of Health which administers Medicaid. A follow up management letter from the Auditor in 2018 noted that despite some progress that there remained prescriptions paid for deceased Medicaid program participants, and that prescriptions were paid for prescribers who were deceased. Further data improvements are being made to close this gap.

The Utah Opioid Task Force, a law enforcement effort that takes a collaborative and community-outreach approach

One example of the degree to which the opioid response in Utah is multi-agency is the diversity of participants in the Utah Opioid Task Force, organized in 2017 by Utah Attorney General Sean Reyes to combat the opioid epidemic via law enforcement and prosecution. The task force is made up of members of law enforcement, community activists and the medical community and government participation spans the legislature, the executive branch and local representatives of the federal government. The task force is co-chaired by Senator Mike Lee, DEA District Agent in Charge Brian Besser, and Attorney General Reyes.

The Utah Attorney General has been aggressive in pursuing manufacturers and distributors of prescription opioids both individually and joining with other state attorneys general. He has also sought to enlist healthcare and pharmacy benefit management companies to implement programs to mitigate prescription opioid abuse.

The Task Force held a summit in the fall of 2018 reaching 9,000 youth and parents. Students who attended the summit were encouraged to download two apps that can provide them with resources to combat an overdose or to seek support in avoiding drugs. The [SafeUT App](#) is a smartphone app for teens that enables them to text and receive real-time crisis intervention and to allows them to provide confidential tips about others. While not exclusively focused on opioids, the app connects teens to crisis counseling, suicide prevention, and referral services for challenges such as substance use, bullying, relationship problems, mental health, or suicide related issues. The [FENDMovement App](#), a rewards-based learning platform that promotes knowledge as a tool against drugs. FEND (Full Energy No Drugs) is now in five states and combines music, technology and gamification to grow the anti-opioid movement among youth.

Data-driven and evidence-based responses

The Utah Department of Human Services has provided grants to local communities to implement evidence-based prevention activities, has provided resources to train and equip first responders with naloxone, and this year has opened three new Medication Assisted Treatment programs.

Lessons learned

The key lesson from Utah is the power of collaboration and the degree to which crisis can be a springboard to focused energy and innovation. Regarding the degree of collaboration, Anna Fondario, Program Manager, in the Utah Violence and Injury Prevention Program, noted:

“It’s surprising how collaborative we can all be when you invite others to the table. There have been a few instances where everyone has their own agenda and will do what they’re going to do no matter what. But it’s surprising and impressive how many want to be part of the solution and put aside their own agenda to be part of the common agenda. A lot of that comes from the momentum of existing progress, and the leadership from the Lieutenant Governor. He’s created an environment where it is seen as a state issue instead of a public health or mental health or education issue, so that we all have part to play and a clear role in determining how to address it.”

Additional lessons and insights from Utah include:

- **Be specific and narrow in scope for data analysis projects.** When collecting data, the state does not over-reach or try to be overly ambitious. For example, the state has linked data systems together for the Prescription Drug Monitoring Program, overdose deaths, the state’s cancer registry, and its all-payer claims database. In identifying data sets to link, notes Fondario, “It’s one thing to link it all but you’ve got to be able to clearly answer, “what are you going to do with it?” and have a purpose in mind, otherwise you lose credibility and waste time.”
- **Be open to unique and new partnerships.** The prevalence of HIV and hepatitis increase with shared needles, and the CDC has put three counties in the state of Utah on its list of the [5%](#) of counties most at risk. With transmission of these diseases on the rise in Utah, a new partnership has been formed between those in state government battling opioids and those fighting HIV and hepatitis, linking the infectious disease and violence prevention communities within the public health arena with a vulnerability assessment that will help identify the areas most likely to see highest risk.
- **Have patience in forging data alliances.** Noting the importance of data privacy protections, the agencies interested in sharing data came together to create data use agreements that would be sensitive to needs of data privacy for individual-level data and for aggregate data where it could be used to identify individual cases. As Fondario noted, forging data use agreements requires patience because “It is a long process, not something that happens in months, it’s years.”

In summary, Utah has done a remarkable job of addressing the opioid crisis by studying the problem, getting to root causes, staying abreast of emerging trends and patterns, and taking a cross-disciplinary approach to addressing the problem.

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