Use of the Overdose Detection Mapping Application Program (ODMAP)
to Study Opioid Overdoses in Oklahoma and 9 Oklahoma Counties

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Disclaimer

Abstract

The United States is dealing with an opioid crisis. The Overdose Detection Mapping Application (ODMAP) is a free program that assists public safety and public health officials to track suspected overdoses. The near real–time aspect of ODMAP sets it apart from other overdose surveillance efforts. ODMAP allows public health professional to make close to real time decisions on opioid overdoses. The purpose of this study was to use the ODMAP to describe the extent of the opioid overdose problem in the 9 Oklahoma Counties compared to the state of Oklahoma. ODMAP allows public health professional to make close to real time decisions on opioid overdoses. Over 700 overdoses in Oklahoma occurred between January 2018 and August 2019, 39 of which occurred in the 9 Oklahoma Counties. In the State of Oklahoma, naloxone was administered to only 6% of those experiencing an overdose (34 of 539, excludes 'use unknown') and to only 8.7% of those experiencing an overdose in the 9 Oklahoma Counties (2 of 23, excludes 'use unknown'). While use of ODMAP in the state and in the PSU is limited, the ODMAP system highlights the limited use of Naloxone to prevent fatalities, which could be the focus of future intervention efforts, combined with encouraging more use of ODMAP by first responders.

Background

The United States is dealing with an opioid crisis. There have been more than 630,000 deaths from an overdose between 1999 and 2016, and we currently see overdose deaths of 115 Americans every day (Beeson, 2018). Oklahoma is facing a similar opioid crisis. Of the more than 3,500 unintentional poisoning deaths in Oklahoma from 2010-2014, 74% involved at least one prescription drug (Oklahoma State Department of Health, 2016). Opioids are the most common class of drug involved in overdose deaths in Oklahoma and were involved in 85% of prescription drug-related overdose deaths (Oklahoma State Department of Health, 2016). As of April 22, 2020, the drug overdose death rate is 18.4 per 1000, 000 for Oklahoma (CDC, 2020).

With help from the Oklahoma State Department of Health's Ms. Claire Nguyen, MS, we obtained state-specific data about poisoning related deaths in Oklahoma. Unintentional poisoning deaths include fatalities caused from multiple forms of poisoning, and a subset of these include unintentional opioid overdose fatalities. From 2007 to 2017, prescription drugs were the number one cause of unintentional poisoning deaths in Oklahoma (Oklahoma State Department of Health, 2016). Oklahomans aged 45-54 had the highest unintentional poisoning death rates (just over 45 per 100,000), and males had higher death rates than females in all age groups. For American Indians (AIs) in Oklahoma, the unintentional poisoning death rate is the highest for those aged 45-54 (approximately 60 per 100,000) and AIs had higher rates than White and Black races for all age groups except age 55-64. For unintentional opioid overdose death rates in Oklahoma, the age group with the highest rate among American Indians was 45-54 (22 per 100,000), however, this rate was slightly lower than the White rate (approximately 23 per 100,000) for the same age group (Oklahoma State Department of Health, 2016).

The High Intensity Drug Trafficking Areas (HIDTA's) Overdose Detection Mapping Application (ODMAP) is a free program that assists public safety and public health officials to track suspected overdoses. The near real–time aspect of ODMAP sets it apart from other overdose surveillance efforts (Washington/Baltimore HIDTA, 2019). This program was first developed by Washington/Baltimore HIDTA in 2017. The ODMAP tool gives law enforcement agencies a powerful and unprecedented real-time information about overdose occurrences and trends that allows authorities a more effective opioid response to overdoses (Beeson, 2018). For example, public safety and public health officials use this information to identify and respond to overdose spikes, investigate drug dealers, educate the public, and develop long-term strategies to reduce overdoses in local communities (A. Woodrow, personal communication, March 9, 2020).

The implementation of ODMAP in Oklahoma began in May 2018 by the Oklahoma Bureau of Narcotics, the agency responsible for implementing the program. The ODMAP data is used to identify overdose spikes and clusters (concentrations of overdose events in a confined geographic area), and pinpoint areas where an immediate public safety and health response is needed (Washington/Baltimore HIDTA, 2019). The program uses first responder's information and a record management system, along with a mapping tool to track the overdose occurrences and locations. Historical data were entered by the State Medical Examiner into ODMAP for all reported fatal overdoses retroactively from January 1, 2017.

According to the Oklahoma Bureau of Narcotics, the goals for Oklahoma's implementation of ODMAP include: 1) Track overdoses across jurisdictions and identify hot spots; 2) Respond to overdose spikes; 3) Target/investigate drug dealers; and 4) Educate the public (A. Woodrow, personal communication, [March 9, 2020]). Current statistics about the use of ODMAP in Oklahoma include:

- 48 of 77 counties (63%) have at least one emergency service using ODMAP

- 27 of 77 sheriffs (35%) are registered for ODMAP

- None of the sheriffs or emergency services within the 9 Oklahoma Counties are currently using ODMAP

- 1,400 overdoses have been entered into ODMAP for Oklahoma into the system (1,308, or 93% fatal). This includes historical data from the Medical examiner and emergency service agencies.

- In 2019 alone, the emergency service agencies that are registered with ODMAP have entered 221 overdoses into the system (157, or 71% fatal)

The use of Naloxone is one part of a wide strategy in the State of Oklahoma's Plan to combat the opioid epidemic. When administered promptly, naloxone is a safe and effective drug that can reverse an opioid overdose (Jiang, 2013). The purpose of this study is to use the ODMAP to describe the extent of the opioid overdose problem in the 9 Oklahoma Counties, compared to the State of Oklahoma overall.

Methods

The ODMAP provides near real-time suspected overdose surveillance data. To participate, an agency must sign a data sharing agreement. This program has two levels of access. Level one is used mainly for data entry usually by first responders, while level two gives access to national maps and to view data and analytical functions, typically used by public safety and public health officials so prompt actions can be taken to mitigate the situation. Level two users also have access to the ODMAP dashboard. The dashboard user has the ability to display filters such as States, Counties, and date range, and multiple suspected drugs. The information

about the suspected overdoses is entered by the first responders or level one users. Level two access allows for viewing of cluster or spikes in overdoses in specific locations.

The first steps for this project was to register to use ODMAP. To gain access to level one, I had to complete the ODMAP Request Form, sign the Participation Agreement (this will be in the first email you receive upon completing a request form), and complete the registration steps outlined in the second email. The second email asks the applicant to include an agency code, and to identify employee(s) who will be responsible for entering suspected overdoses into ODMAP. Access to level one must be granted before you can request level two access.

After gaining access as a level one user, I made a request to the agency assigned administrator to grant access to ODMAP as a level two user. The two dashboards allows decision-makers to view and analyze all data submitted to ODMAP system from first responders that have level one access, using filters to narrow a search. The following filters were used for this project:

- Retained the suspected overdose filter.

- Selected a state (Oklahoma)

- Selected a county (the first run was all 77 counties; the second run included nine counties, the Pawnee Service Unit resides within these 9 Oklahoma Counties where my office resides and include the following counties: Kay, Noble, Payne, Pawnee, Osage, Craig, Ottawa, and Mayes, Delaware (Map 1)

- Selected an incident date range (the date range selected was January 1, 2018- August. 31 2019

- Selected a time range (the time of day selected was 'all')

- Selected a fatal range (this project choose both fatal and non-fatal)

- Naloxone administered (the all choice was chosen for the project)

- One run was made using all drugs and the second run was made using opioid specific

  drugs. Examples below:

  - Opioids (e.g., heroin, fentanyl, methadone, oxycodone, prescription drugs,

    suboxone, and other).

  - Stimulants (e.g., cocaine, crack, methamphetamine).

  - Depressants (e.g., alcohol, benzodiazepine, over the counter Benadryl).

  - Hallucinogens (e.g., lysergic acid diethylamide, 3-4

    methylenedioxymethamphetamine, phenylcyclohexyl piperidine).

After completion of this paper it was submitted and approved by the Oklahoma City Area

Indian Health Service Institutional Review Board.

Map 1. Map of the 9 Oklahoma Counties within the Pawnee Service Unit.
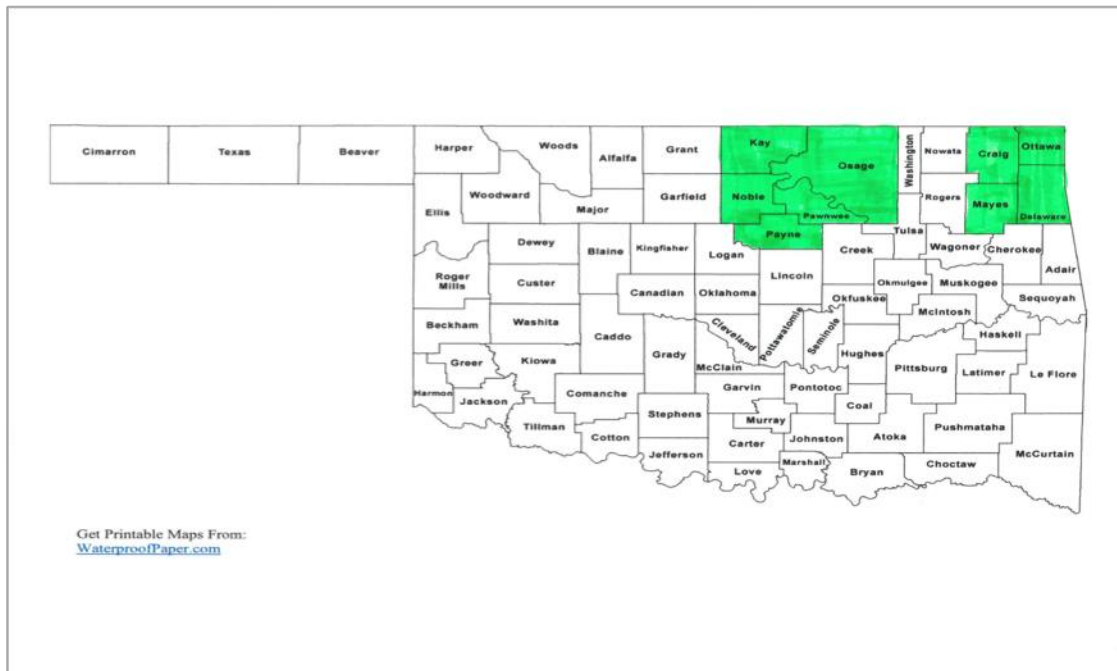
Results

From January 1, 2018 to August 31, 2019, there were a total of 714 overdoses in the State of Oklahoma according to the ODMAP system (Table 1). The majority, 83% (n=591), involved fatal overdoses, and 17% (n=123) were non-fatal. When considering the proportion of fatalities by Naloxone use, 98% and 82% of fatalities occurred where use was unknown (n=175) or no naloxone was used (n=505). Naloxone was administered to only 6% of those experiencing an overdose (34 of 539, excludes 'use unknown').

Table 1-All Drug Overdoses by Naloxone Use and Outcome, and Proportion of Fatalities in the State of Oklahoma (n=714), Jan 2018 to Aug 2019.

Naloxone Use	*Outcome Fatal (n=591)* *n (%)*	*Outcome Non-Fatal (n=123)* *n (%)*	*Proportion of Fatalities*
Use Unknown (n=175)	171 (28.9%)	4 (3%)	98%
No Naloxone (n=505)	412 (69.7%)	93 (76%)	82%
Multiple Doses (n=8)	2 (0.3%)	6 (5%)	25%
Single dose (n=26)	6 (1.0)%	20 (16%)	23%
Total Naloxone Use (n=34)	**8 (23.5%)**	**26 (75.5%)**	**6%**

During the same time period, the 9 Oklahoma Counties had a 39 overdoses according to the ODMAP system (Table 2). The vast majority, 97% (n=38), involved fatal overdoses, and 2.6% (n=1) were non-fatal. When considering the proportion of fatalities by Naloxone use, 100% and 95% of fatalities occurred where use was unknown (n=16) or no naloxone as used (n=21)." Naloxone was administered to only 8.7% of those experiencing an overdose (2 of 23, excludes 'use unknown').

Table 2-All Drug Overdoses by Naloxone Use and Outcome, and Proportion of Fatalities in the 9 Oklahoma Counties (n=39), Jan 2018 to Aug 2019.

Naloxone Use	*Outcome Fatal (n=38)* *n (%)*	*Outcome Non-Fatal (n=1)* *n (%)*	*Proportion of Fatalities*
Use Unknown (n=16)	16 (42.0%)	0 (--)	100%
No Naloxone (n=21)	20 (52.6%)	1 (100%)	95%
Multiple Doses (n=1)	1 (2.6%)	0 (--)	100%
Single dose (n=1)	1 (2.6)%	0 (--)	100%
Total Naloxone Use (n=2)	**2 (100%)**	**0 (--)**	**9%**

For opioid-specific drugs, the State of Oklahoma had 379 overdoses according to the ODMAP system (Table 3-Opioid Overdoses OK). The majority, 82.6% (n=313), involved fatal overdoses, and 17% (n=66) were non-fatal. When considering the proportion of fatalities by Naloxone use, 98% and 82% of fatalities occurred where use was unknown (n=104) or no naloxone as used (n=253). Naloxone was administered to only 8% of those experiencing an opioid overdose (22 of 275, excludes 'use unknown').

Table 3-Opioid Overdoses OK (n=379), Jan 2018 to Aug 2019.

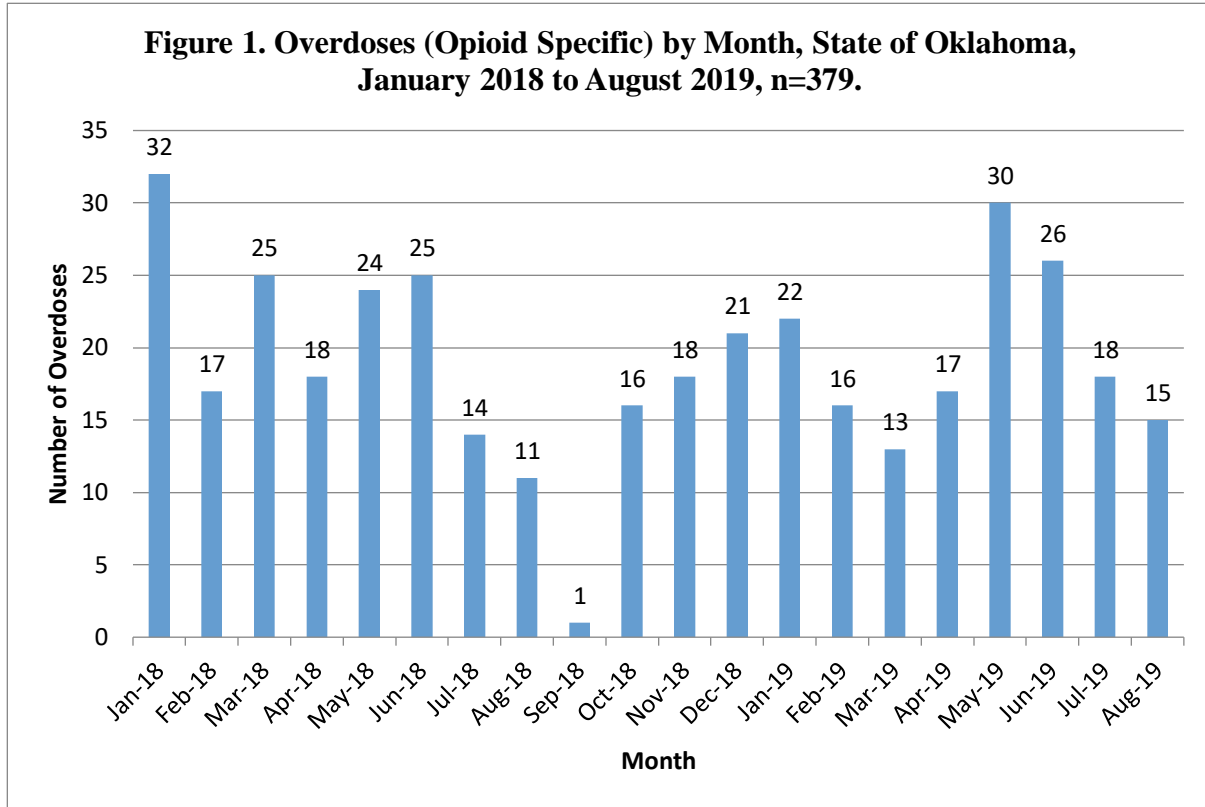| *Naloxone Use*	*Outcome Fatal (n=313)* *n (%)*	*Outcome Non-Fatal (n=66)* *n (%)*	*Proportion of Fatalities*
Use Unknown (n=104)	102 (32.6%)	2 (3.0%)	98%
No Naloxone (n=253)	208 (66.5%)	45(68.2%)	82%
Multiple Doses (n=5)	1 (0.32%)	4 (6.1%)	20%
Single dose (n=17)	2 (0.6)%	15 (22.7%)	12%
Total Naloxone Use (n=22)	3 (14%)	19 (86%)	8%

The 9 Oklahoma Counties had a 24 opioid-specific overdoses according to the ODMAP system (Table 4-Opioid Overdoses PSU). The vast majority, 96% (n=23), involved fatal overdoses, and 4% (n=1) were non-fatal. When considering the proportion of fatalities by Naloxone use, 100% and 89% of fatalities occurred where use was unknown (n=14) or no

naloxone as used (n=9). Naloxone was administered to only 10% of those experiencing an
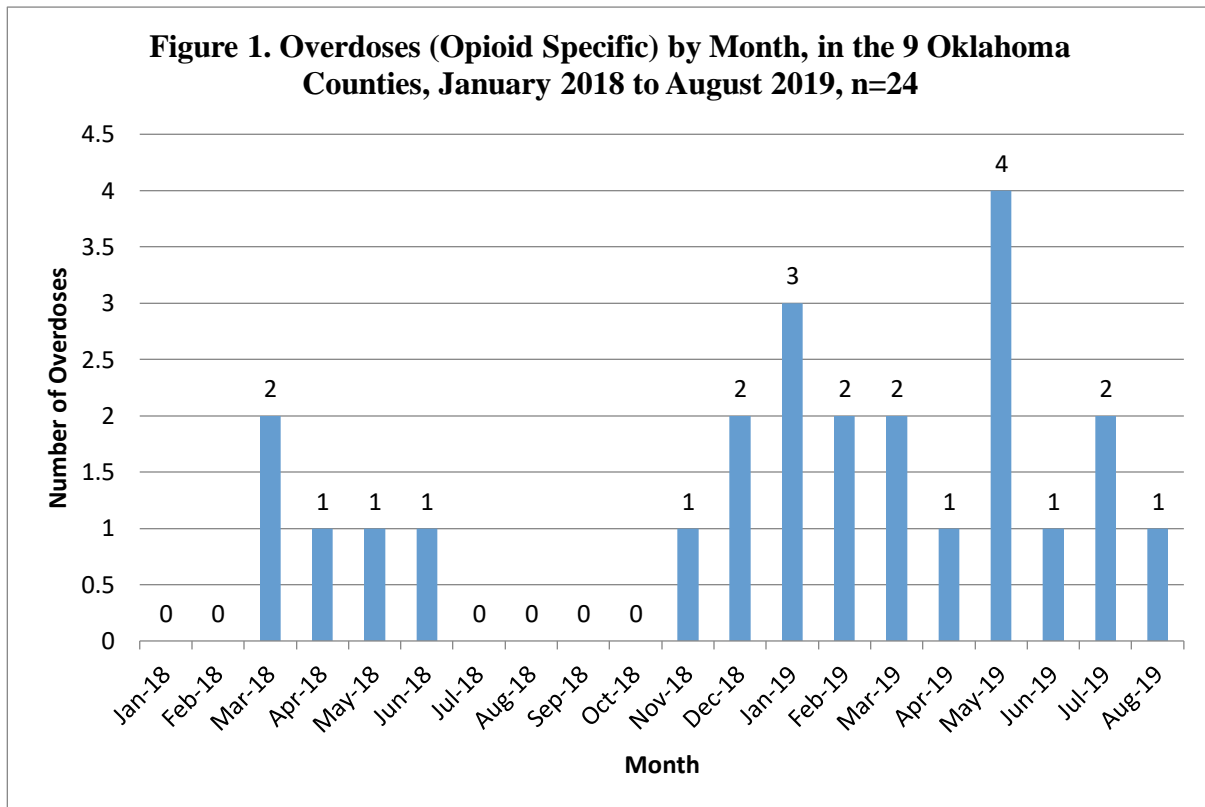
opioid overdose (1 of 10, excludes 'use unknown').

Table 4-Opioid Overdoses in the 9 Oklahoma Counties (n=24), Jan 2018 to Aug 2019.

Naloxone Use	*Outcome Fatal (n=23)* *n (%)*	*Outcome Non-Fatal (n=1)* *n (%)*	*Proportion of Fatalities*
Use Unknown (n=14)	14 (60.9%)	0 (--)	100%
No Naloxone (n=9)	8 (34.8%)	1 (100%)	89%
Multiple Doses (n=1)	1 (4.4%))	0 (--)	100%
Single dose (n=0)	0 (--)	0 (--)	0%
Total Naloxone Use (n=1)	1 (100%)	0 (--)	10%

Opioid-specific overdoses by month are shown for the State of Oklahoma in Figure 1.

The months of January 2018 and May 2019 had the highest number of overdoses, at 32 and 30,

respectively. The State of Oklahoma averaged approximately 19 overdoses per month for this

20-month time period. The range in overdoses by month between January 2018 and May 2019

was 1 (Sept 2018) to 32 (January 2018). Figure 2 shows opioid-specific overdoses for the 9

Oklahoma Counties by month. The months of May 2019 and January 2019 had the highest

number of overdoses, at 4 and 3 respectively. The 9 Oklahoma Counties averaged

approximately 1 overdose per month for this 20-month time period. The range in overdoses by

month between January 2018 and May 2019 was 1(Sept 2018) to 4 (January 2018)

Figure 1. Overdoses (Opioid Specific) by Month, State of Oklahoma, January 2018 to August 2019, n=379.

Source: ODMAP

Figure 1. Overdoses (Opioid Specific) by Month, in the 9 Oklahoma Counties, January 2018 to August 2019, n=24

Source: ODMAP

Discussion

The purpose of this study was to use the Overdose Detection Mapping Application Program (ODMAP) to report the extent of the opioid overdose problem in the 9 Oklahoma Counties.

The PSU had 5.5% of the overall overdoses in the state but contains 8.4% of the State population (United States Census, 2020). Both the state of OK and PSU, naloxone use was relatively low (at 6% and 8.7% respectively) for all overdoses, and for opioid overdoses (8% and 10%).

Results from this descriptive study reveal that: 1) the majority of overdose and opioid overdose fatalities occurred when Naloxone was not given; and 2) Naloxone use is unknown for roughly a third of fatal overdoses in the State of Oklahoma and for 42% of fatal overdoses in the PSU. The vast majority of overdoses are entered in ODMAP by the Medical Examiner's office, which does not know if naloxone was used or not. In addition, the non-fatal overdoses are entered by first responders. These provide a partial explanation of why naloxone use is either unknown or not given in the majority of overdoses resulting in a fatality. Increasing the use of ODMAP by first responders will help identify when non-fatal overdoses with the use of naloxone has occurred. Increasing the amount of data entered into the ODMAP system, by more first responders, will help to provide a clearer picture of the problem of opioid overdose fatalities, and Naloxone use to prevent them in Oklahoma.

Angie Woodrow, researcher for the Oklahoma State Bureau of Narcotics, is working to gain approval from the State legislature and agency stakeholders that would require all first responder to enter overdoses into ODMAP. If this proposal is approved, it would allow the

Oklahoma Emergency Medical Services Information (OKEMSIS) database to automatically feed into ODMAP. This would give ODMAP more data entries from level one users, including from State and tribal level one first responders.

The application of the ODMAP in PSU Tribal Communities could provide more complete data from first responders and more complete data to track overdoses across jurisdictions, identify hot spots, respond to overdose spikes, target/investigate drug dealers, and educate the public. Unfortunately, none of the sheriffs or emergency services in the 9 Oklahoma Counties are currently using ODMAP.   As a result, future research to identify barriers to the use of ODMAP could be conducted.

Use of ODMAP could also let tribal stakeholders (e.g., Tribal and non-tribal EMS, fire, police, injury prevention specialist, Indian Health Service staff) know if/how their local opioid prevention programs are effective. Until there is broader use of ODMAP, at a minimum, Tribal leadership and stakeholders can work to improve access to naloxone, by making it more readily available. Limited availability of naloxone might be contributing to the lower rates of use as identified in this project, both across the state and in the PSU.

ODMAP data systems have limitations, such as the inability to filter by race, age, and gender. Many of these items are not available due to privacy concerns. However, use of the system allowed for this preliminary picture of overdose surveillance at the local level.

ODMAP is a tool that gives a real-time description of the opioid overdose problem in the 9 Oklahoma Counties. Increased use of ODMAP would allow stakeholders in the PSU to identify the need to educate the public, develop long-term strategies to reduce overdoses, and monitor the effectiveness of the prevention strategies in local and tribal communities, including the use of naloxone to prevent fatalities.

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