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# Practices and concerns related to naloxone use among emergency medical service providers in a rural state: A mixed-method examination

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#### ABSTRACT

The rate of opioid misuse and overdose continues to increase in rural areas of the U.S. In response, access to naloxone hydrochloride ("naloxone"), an opioid antagonist used to reverse opioid overdose, has increased among both first responders and laypeople. While plenty of research has examined naloxone use among laypeople, little remains known about practices and concerns related to naloxone among emergency medical services (EMS) providers. This is particularly true among those serving rural areas that are disproportionately affected by opioid overdoses and the underutilization of naloxone. Accordingly, a mixed-method approach consisting of a quantitative Internet survey (N = 854) and qualitative focus groups (N = 20) was utilized to examine practices and concerns related to naloxone among EMS providers in a rural state. Participants represented a range of EMS licensure levels and years of experience. Findings from the focus groups can be summarized under two major themes: 1) variance in naloxone use and 2) concerns about naloxone use. In addition, meaningful information on practices of and concerns related to naloxone use, including rates of naloxone administration, knowledge about naloxone use/overdose, confidence in administering naloxone and providing follow-up care, and perceptions of rural impact, were obtained from rural EMS. Information obtained from this study can help inform policy and prevention efforts specific to EMS providers serving rural areas, including providing further evidence for permitting all EMS providers, regardless of licensure level, to administer naloxone and ensuring that education about naloxone use is effectively disseminated to these providers.

# 1. Introduction

The U.S. Drug Enforcement Administration (2016) described opioids (i.e., heroin and prescription pain relievers) as the most significant drug-related threat to the U.S. In 2016, 11.8 million Americans aged 12+ misused opioids (Substance Abuse and Mental Health Services Administration [SAMSHA, 2017]). Rates are increasing, as opioid misuse in 2016 was higher than all years between 2002 and 2012 (SAMSHA, 2017) and the overdose rate nearly tripled between 1999 and 2015 (Rudd et al., 2016). The opioid epidemic has been in rural areas for quite some time (Havens et al., 2007a; Havens et al., 2007b), with the overdose mortality rate rising 159% between 1999 and 2004 in rural counties compared to 54% in metropolitan counties (Paulozzi and Xi, 2008). This rate remains 45-50% higher in rural than urban communities in recent years (Centers for Disease Control and Prevention, 2017; Faul et al., 2015). While many laws/policies currently address prescription drug misuse (e.g., prescription drug monitoring programs [PDMP; Patrick et al., 2016]), future research is needed to expand knowledge on the effects of policy and prevention

efforts targeting opioid overdose deaths, particularly among rural populations.

One strategy is increasing access to naloxone hydrochloride ("naloxone"), an opioid antagonist administered to reverse an opioid overdose (Boyer, 2012). There is a strong interest in access to naloxone among family (Strang et al., 2008) and peers of drug users (Sherman et al., 2009), and prevention programs that train and distribute naloxone to bystanders have been successfully implemented across the U.S. (e.g., Piper et al., 2007; Tobin et al., 2009). While plenty of research has examined naloxone use among laypeople (e.g., Heavey et al., 2018; Kim et al., 2009; Wheeler et al., 2015), less research has examined naloxone use among emergency medical service (EMS) providers

The National Highway Traffic Safety Administration (NHTSA, 2007) defines four levels of EMS by increasing levels of training: emergency medical responder (EMR) and emergency medical technician (EMT)—defined as basic life support (BLS)—, advanced emergency medical technician (AEMT)—defined as intermediate life support (ILS)—, and paramedic—defined as advanced life support (ALS). While

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paramedics have routinely administered naloxone to reverse opioid-related overdose for decades (Strang et al., 2006), a national systematic legal review of the U.S. identified wide variation in levels of EMS personnel authorized to administer naloxone, dosing protocols, and routes of administration in recent years (Davis et al., 2014). For example, ALS personnel have always been authorized to administer naloxone in Wyoming, while ILS and BLS personnel received these authorizations in 2015 and 2018, respectively (Wyoming Department of Health [WDOH], 2018).

BLS providers, who are more common in rural areas that face major challenges related to longer response times, personnel shortages, and inadequate advanced training opportunities (Gonzalez et al., 2009; U.S. Congress, Office of Technology Assessment, 1989), are only now receiving authorizations to administer naloxone in order to provide earlier delivery times and serve remote areas (Belz et al., 2006; Davis et al., 2014). Research has demonstrated that the odds of naloxone administration and opioid overdose were 23% and 45% higher, respectively, in rural areas (Faul et al., 2015); however, BLS personnel have much lower rates of naloxone administration than ILS or ALS personnel (Faul et al., 2015). While these rates are likely to change as EMS scope of practice models extend naloxone authorization to BLS, at this time, little research that has examined the nuances of naloxone in rural areas. To our knowledge, only one study has examined attitudes towards naloxone specifically among rural EMS providers, finding that an EMT training program improved competency and concern about opioid overdose and increased support for expanding naloxone to people atrisk for overdose (Zhang et al., 2018). Thus, there remains a need to further examine current practices and attitudes towards naloxone among rural EMS personnel, particularly as changes to EMS scope of practice models are on the horizon.

Accordingly, the study aimed to examine practices and concerns related to naloxone among EMS providers in a rural state. Given the exploratory nature of the study and acknowledging the complexity of naloxone use among EMS providers even within a single state, a mixedmethod approach (i.e., combining qualitative and quantitative methods) was chosen to converge information (Creswell, 2014). Specifically, we aimed to obtain a comprehensive understanding of different experiences with and concerns about naloxone and the contexts that account for these differences, with the aim that qualitative data would provide clarification and elaboration of quantitative data. Information from this study will help inform healthcare administrators/ policymakers about practices related to and concerns about naloxone among rural EMS providers, as well as provide policy and prevention directions in an area in need of strengthening and augmentation given the growing number of potentially preventable overdose deaths across the country.

#### 2. Method

# 2.1. Quantitative questionnaire

The Office of EMS of the WDOH provided e-mails of the 3690 EMS registered in Wyoming. One-hundred sixty-four e-mails bounced back; thus, N=3526 (95.6%) were ultimately recruited for a study examining naloxone. A sample of 854 EMS responded, including BLS (n=464), ILS (n=191), and ALS (n=193). The national EMS scope-of-practice model in effect at the time of this study authorized both ILS and ALS personnel to administer naloxone (NHTSA, 2007); accordingly, these groups were combined for descriptive analyses. After providing informed consent, participants completed an Internet survey developed by the researchers and approved by the University of Wyoming IRB assessing demographics and various aspects of naloxone use, including administration (e.g., "Have you ever administered naloxone to a patient?", [yes or no]), training and policies (e.g., "Did you receive naloxone-specific training?" [yes or no]), knowledge (e.g., "Which of the following are signs of an opioid overdose?", [blood-shot eyes, pin point

pupils, etc.]), rural impact (i.e., "How strongly do you agree that the rural setting of your community impacts your naloxone use?" [0 = strongly disagree to 4 = strongly agree]), and confidence (e.g., "How confident are you that you can administer naloxone in the case of an overdose?" [0 = not at all confident to 4 = very confident]; see Appendix A). Uses of naloxone for the knowledge question were obtained from SAMSHA (2016). The survey was open from August 1 to August 15, 2017 with two reminder e-mails and participant's names were entered into a drawing for a \$299 I-Pad. All descriptive data were analyzed using SPSS Version 23.

#### 2.2. Qualitative focus groups

In order to further clarify and elaborate upon the quantitative data, two focus groups, with 9 and 11 participants each (N = 20), were conducted. Participants were recruited from a state-wide EMS conference to participate in one of two afternoon focus groups at the conference. Questions primarily assessed use of naloxone (e.g., "have you used naloxone?") and naloxone training/policies (e.g., "what kind of training did you receive about administering naloxone?"; see Appendix B). Two researchers obtained informed consent, discussed confidentiality, and explained the format of the group before participants engaged in a semi-structured, audio-recorded discussion about naloxone for 90 min. The University of Wyoming IRB approved the study and participants were compensated \$25 cash. The same researchers analyzed the focus group data following standard guidelines for thematic analysis (see Braun and Clarke, 2006). After transcribing both focus groups, the researchers moved from narrow units of analysis (e.g., significant responses), on to broader units (e.g., themes), then on to detailed descriptions for each question. The researchers coded themes for each question independently then collectively resolved the codes (Strauss and Corbin, 1990). From a master code list, the coders selected representative responses from participants based on how well they informed each theme.

#### 3. Results

### 3.1. Quantitative questionnaire

Participants were EMRs (13.2%), EMTs (41.1%), AEMTs (22.4%), and paramedics (22.6%) between the ages of 18 and 81 (M=41.96, SD=12.31) years with a range of EMS experience: less than a year (9.5%), 1–5 years (22.9%), and 5 or more years (67.6%). Participants reported their race/ethnicity as non-Hispanic White (93.4%), Hispanic White (1.5%), Black/African American (0.5%), American Indian/Alaskan Native (0.4%), Native Hawaiian/Pacific Islander (0.1%), multiracial (2.8%), and other (1.3%).

Ninety-six percent of ILS/ALS (AEMTs and paramedics) had received naloxone-specific training and 91.9% reported that their agency had a protocol (see Table 1). Despite not being authorized to administer naloxone, 27.7% of BLS (EMRs and EMTs) also endorsed receiving training and 38.5% identified an agency-specific protocol. A majority of ILS/ALS had administered naloxone themselves (80.2%) and/or witnessed an opioid reversal (84.0%), with 63.3% administering naloxone in the past 18 months and 49.2% administering more than one dose during a response (see Table 1). Among BLS, 29.1% had witnessed an opioid reversal. While 96.3% of ILS/ALS and 76.7% of BLS were able to identify the correct use of naloxone (i.e., to reverse an opioid overdose), almost 1 in 4 (22.5%) ILS/ALS and over 1 in 4 (27.5%) BLS also incorrectly identified at least one use, with reversing a cocaine overdose being most common (see Table 1).

Greater than 94% of ILS/ALS reported that they were somewhat or very confident in their ability to recognize opioid overdose risk factors, manage an opioid overdose, administer naloxone, and perform basic life support/follow-up care after an opioid overdose (see Table 1). Again, despite not being authorized to administer naloxone, greater

**Table 1**Characteristics of naloxone use among emergency medical services providers in Wyoming.

	Percentage	
	BLS (n = 464)	ILS/ALS (n = 384)
Ever administered naloxone (Q1)	-	80.2
Administered naloxone in the past 18 months (Q2)	_	63.3
Administered more than one dose during a response (Q3)	_	49.2
Witnessed an opioid reversal (Q4)	29.1	84.0
Received naloxone-specific training (Q5)	27.7	95.8
Reported agency has naloxone protocol (Q6)	38.5	91.1
Able to identify correct use of naloxone (Q7)	76.7	96.3
Incorrectly identified at least one use of naloxone (Q7)	27.5	22.5
Reversing a cocaine overdose	18.5	20.4
Reversing an amphetamine overdose	9.5	19.1
Helping someone to get off drugs	1.6	1.8
Perceive that rurality impacts naloxone use (Q8)	52.1	56.8
Confident in managing an opioid overdose (Q9A)	52.8	94.8
Confident in recognizing overdose risk factors (Q9B)	66.4	94.5
Confident in administering naloxone (Q9C)	53.7	96.4
Confident in performing follow-up care (Q9D)	84.7	99.0

*Note*: See Appendix A for full question items. Confidence = percentage of participants who endorsed "somewhat confident" or "very confident". Rural impact = percentage of participants who endorsed "agree" or "strongly agree". BLS (basic life support; n = 464) = emergency medical responders and emergency medical technicians. ILS/ALS (intermediate life support/advanced life support; n = 384) = advanced emergency medical technicians and paramedics. The study was conducted among EMS providers in the state of Wyoming in 2017.

than 50% of BLS also identified being somewhat or very confident in these abilities, which included administering naloxone. Slightly over half of both BLS (52.1%) and ILS/ALS (56.8%) perceived that the rurality of Wyoming impacted naloxone use (see Table 1). We further explored this finding and found that perceptions of rural impact were most common among AEMTs (62.8%), followed by EMTs (56.5%), paramedics (50.7%), and EMRs (38.4%). In addition, 58.3% of those who *did* serve rural counties and 49.0% of those who *did not* serve rural counties perceived an impact. Finally, AEMTs were most likely (89.6%) and paramedics were least likely to provide care in a rural county (75.4%).

#### 3.2. Qualitative focus groups

Focus group participants included 13 men (65%) with a range of experience (i.e., 6 months to 30 years). Participants were paramedics (55%), EMTs (35%), and "other" (10%; i.e., firefighter, emergency room nurse). Findings were summarized under two major themes: 1) variance in naloxone use and 2) concerns about naloxone use. These themes are discussed below and include representative quotes collectively decided upon by the researchers.

#### 3.2.1. Theme 1: variance in naloxone use

Participants identified naloxone administration to a variety of patients in different situations/contexts. The most common scenario involved non-medical opioid overdose by known/recreational drug users referred to as "repeat patients" by participants. While this situation can be identified by drug paraphernalia at the scene, "wrecked veins," and/or witness statements, serving a rural area makes the likelihood of EMS encountering the same patients more likely. For these known opioid users, EMS personnel described titration (i.e., "...we give just enough [naloxone] to get the effect, to get them breathing on their own.") as common, particularly when longer transports to the hospital from more rural areas were involved. Another common situation involved accidental overdose of prescription opioids by geriatric or pediatric populations. One participant described this situation as "elderly patients that

have incorrectly taken medication after a change in the dose or timing of their prescription." For an accidental opioid overdose among geriatric and pediatric populations, participants reported that the drug could be administered safely depending on patient size and mobility and titration was less necessary.

In addition, there were differing opinions between participants when asked about how the rural nature of Wyoming impacts their actual use of naloxone. EMS providers in remote areas with longer transport times and less law enforcement backup reported titrating naloxone more often. As one participant stated, "longer transport times mean that we often titrate and give lower doses to make the patient less combative, making the situation safer for everyone." Participants from rural areas also described lack of access to law enforcement in the case of a combative patient. As one participant described, "if we give them too much of this, we will send them into withdrawals. They'll throw up, they'll seize, they'll fight. They are really mad at you for taking away their high. ... It becomes a patient rodeo—they come out mad." In contrast, EMS who identified serving more populated areas of the state had less to say about the impact of rurality.

#### 3.2.2. Theme 2: concerns about naloxone use

Participants expressed a number of concerns related to the increased utilization of naloxone that can be directly tied to the rural communities in which they serve. Some related the increase in naloxone use to the overall rise in opioid misuse across the nation and were subsequently critical of how little is being done to address the underlying opioid epidemic, particularly in their own communities with less access to resources for substance use prevention and treatment. As one participant stated, "are we reacting or dealing with the root causes [of the increased naloxone use]?". While many expressed concerns related to overprescribing opioid medications and patient expectations for complete pain relief, others also highlighted positive changes to prescribing practices to curb some of these concerns (e.g., PDMP). Further, many identified a lack of access to treatment and harm reduction strategies (e.g., needle exchanges) for opioid use disorders in rural areas as a root cause of the epidemic subsequently impacting their increased utilization of naloxone.

Participants also expressed concern over allowing public access to naloxone before state-level BLS personnel. "All Emergency Medical Service personnel should be able to give [naloxone] before it's available overthe-counter," was stated by one participant. It should be noted that while naloxone is a prescription medication, pharmacists in Wyoming have been permitted to dispense naloxone kits since 2017 (Emergency Administration of Opiate Antagonist Act, 2017). Participants also expressed frustration about naloxone standards of care in Wyoming, with one referring to the state as "20 years behind" the rest of the country in terms of prevention and intervention efforts. However, participants recognized that the Office of EMS had been working tirelessly to permit BLS to administer naloxone, which was approved within a year after this study was completed.

Finally, participants noted that increased demand for naloxone could result in decreased availability and increased cost. One participant stated that their rural organization was already encountering backorders on naloxone. Specifically, they stated that "three or four years ago [they] were paying about \$300 for 10 boxes [of naloxone]. Now it's almost \$600... it has almost doubled." Participants explained that, while some of these costs are absorbed through insurance reimbursements, for patients who are self-paying, "[they'll] never see that money back." Despite these concerns, participants generally agreed that naloxone should be made available to the public, as "it will probably save some lives, especially in rural areas." They also strongly emphasized the need for increased access to education about naloxone for the whole community.

#### 4. Discussion

This study aimed to identify practices and concerns related to naloxone use among EMS providers in a rural state via mixed-method examination. While the current methodology does not enable us to comment on changes in the rate of naloxone administration over time, the quantitative data suggests that a vast majority of EMS authorized to administer naloxone in Wyoming had done so at some point during their career. The state's naloxone-specific trainings resulted in a high level of confidence in administering naloxone and providing follow-up care in these situations. Despite not being authorized to administer naloxone nor traditionally receiving naloxone-specific training, over half of BLS surveyed also identified confidence in overdose situations. including administering naloxone. However, a striking 1 in 4 participants incorrectly identified at least one use of naloxone (e.g., reversing a cocaine overdose). Accordingly, there may be gaps in training and future training protocols and/or refresher courses should focus on further training providers to recognize situations in which naloxone is warranted and how this may differ by patient/situation (e.g., repeat patients vs. geriatric/pediatric accidental overdose, long transport times). This is particularly true as state-wide scope of practice models change, allowing more BLS personnel to administer naloxone.

Surprisingly, the quantitative data revealed that only half of EMS personnel perceived that the rural nature of their served community impacts how they use naloxone, despite participating frequently alluding to this in the focus groups and existing research identifying a number of disparities and barriers related to naloxone in rural areas (Faul et al., 2015). One may expect that the EMS in this sample would perceive similar impacts specific to rural areas (e.g., longer transport times, underutilization of naloxone) and the state of Wyoming itself (e.g., lack of Good Samaritan overdose immunity laws [National Conference of State Legislatures, 2017]). However, those who themselves served rural areas were in fact more likely to identify the rural nature of their served community as an impact, with AEMTs being both the most likely to both serve rural areas and perceive an impact. In addition, given that EMRs and EMTs were not authorized to administer naloxone, and paramedics were least likely to serve rural areas, these groups may have been less likely to perceive an impact of rurality on naloxone use. Accordingly, findings suggest the perceived impact of rurality on naloxone use may vary by community served and licensure level, even within the state level. It is also likely that only a single question without participant-provided examples of ways in which rurality may impact one's use of naloxone limited our ability to comprehensively assess this variable.

Overall, these quantitative findings shed light on practices and concerns related to naloxone use among EMS authorized to administer naloxone in one rural state. EMS surveillance data have indicated that, despite EMS personnel being uniquely positioned to treat opioid overdose in rural settings, the growth of overdose has outpaced the ability of EMS providers to provide naloxone (Alexander et al., 2004). Accordingly, this study provides further support for permitting BLS personnel to administer naloxone, specifically given the percentage of BLS that feel confident in managing an opioid overdose despite not receiving training in this area. However, even among those trained to administer naloxone, there may be gaps in knowledge about naloxone use (e.g., uses of naloxone) in rural areas that are already disproportionally affected by the opioid crisis and underutilization of naloxone. Overall, it is recommended that policymakers and educators consider the rural nature of communities served when passing legislation and ultimately training BLS personnel on naloxone use.

The qualitative focus groups further support these findings by revealing two primary themes related to naloxone use among rural EMS personnel. The first revealed that the use of naloxone is highly variable even within in a single state, as each encounter of an opioid overdose involves its own nuances (e.g., type of patient) that ultimately impacts the use of naloxone. Accordingly, training EMS in how to administer

naloxone should involve a variety of different patients, situations, and contexts to capture the variability in naloxone use they will likely encounter. In addition, due to safety concerns, titrating multiple doses of naloxone during a transport to the nearest medical facility is particularly common in rural communities with more BLS providers (Patterson et al., 2007). These longer transport times increase the risk for aspiration, hypoxia, hypercarbia, and mortality (Cummins et al., 1986; Elling and Politis, 1983; Jesudian et al., 1985). Thus, in rural communities, where BLS providers may be the only first responders available, access to thorough education about when and how to best administer naloxone during longer transports is crucial.

The second theme revealed that, despite known benefits, EMS personnel in a rural state have concerns about increased naloxone use. Consistent with existing research from the medical community (Green et al., 2013; Heavey et al., 2018; Tobin et al., 2005), many EMS personnel had concerns about how expanding access to naloxone might result in increased and riskier drug use and ultimately not address the underlying causes of the opioid epidemic disproportionally impacting rural areas. However, this is in contrast with recommendations by a number of professional organizations who advocate for expanded use of naloxone among bystanders (American Association of Poison Control Centers, 2014). In addition, naloxone has no abuse potential and medical complications from its use are uncommon (Burris et al., 2001). Thus, naloxone-specific trainings should aim to inform EMS personnel on the objective, positive impacts of extending naloxone access to both BLS personnel and laypeople (e.g., changes in opioid use/overdose, cost, and availability). In addition, states advocating for BLS personnel to administer naloxone and increased access to naloxone among laypeople should rely on the perspectives and testimonies of those with first-hand experience with naloxone (e.g., ILS and ALS) in policy pro-

The current study is preliminary and exploratory. Response rate was relatively low and participants were limited to a volunteer sample of EMS in a single, rural state who cannot necessarily generalize to all personnel in the state or other states. Accordingly, a more thorough assessment of naloxone-related variables among EMS in both Wyoming and other geographic regions is warranted. In addition, the researchers did not assess participant' gender in the quantitative survey, preventing an examination of gender differences. In the qualitative focus groups, the researchers also did not collect basic demographic information along with each participant quote. Further, we recognize that nurses and firefighters may have fundamentally different training/perspectives than EMS and the focus groups should have been limited to EMS only. Finally, the quantitative results in this study are limited in that the researchers developed the question rather than utilize already developed overdose knowledge, confidence, and attitudes scales (Green et al., 2008; Wagner et al., 2016; Williams et al., 2013).

Nonetheless, this study is only one of two to examine practices and concerns related to naloxone use among rural EMS, which has important prevention and policy implications. Specifically, the disproportionate impact of opioid overdose in rural communities highlights a need to strengthen prevention efforts. Once such way is to strengthen and tailor naloxone-specific training among BLS providers to reflect the nuances faced in rural communities. While previous research has emphasized the benefits of permitting BLS personnel to administer naloxone and developing universal guidance on naloxone administration (Faul et al., 2015), the current study provides additional information on areas in which this education/training is needed (e.g., identifying situations in which naloxone is warranted, titration vs. full reversal protocols) specifically among rural BLS.

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None of the authors have any conflicts of interest to disclose.

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#### Appendix A

Questions used in quantitative survey:

#### Administration

- 1. Have you ever administered naloxone to a patient?
- 2. Do you recall administering naloxone to any of your patients in the past 18 months?
- 3. Do you recall giving more than one dose of Naloxone in one response?
- 4. Have you witnessed an opioid reversal after you or someone else administered naloxone?

### **Training and Policies**

- 5. Did you receive any training on naloxone during your education/training to become an EMS or after you started your position?
- 6. Does your current agency have any protocol or standard operating procedures when it comes to administering naloxone?

#### Knowledge

7. Naloxone (naloxone hydrochloride) is used for (CHECK ALL THAT APPLY): reversing heroin overdose; reversing cocaine overdose; reversing amphetamine overdose (e.g. 'Speed', 'Ice'); reversing the effects of OxyContin overdose; helping someone to get off drugs; other (please specify)

#### **Rural Impact**

8. How strongly do you agree that the rural setting of your served community impacts your use and administration of Naloxone? (0 = strongly disagree, 4 = strongly agree)

#### Confidence

#### 9. How confident are you that...

Not at All Confident

Not Very Confident

Somewhat Confident

Very Confident

- A. You have enough information about how to manage an opioid overdose
- B. You can recognize the symptoms of an opioid drug overdose
- C. You can recognize the risk factors that increase the possibility of an overdose
- D. You can administer naloxone in the case of an overdose
- E. You can perform basic life support and follow-up care after administering naloxone

### Appendix B

Questions used in qualitative focus groups:

#### Tell us About Naloxone

In what situations do you administer naloxone?

What are the primary symptoms/impressions that warrant naloxone administration?

What other information do you use to decide to administer naloxone?

How do you know if naloxone "worked"?

# **Using Naloxone**

Have you used naloxone?

Have you ever run out of naloxone?

Do you have any hesitation about using naloxone?

Have you seen an increase in naloxone use?

Do you think being in a rural context impacts your naloxone use?

#### **Naloxone Training**

What kind of training did you receive about administering naloxone?

Did you receive a special training or just general information during training/education?

Does you agency and/or medical director have protocols for administering naloxone?

## Changes to Naloxone Administration

What do you think about the recent changes to who can administer naloxone?

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