2023

Improving Minnesota's Access to Opioid Use Disorder Treatment and Naloxone

Annasha Doane-Ramkhalawon

Improving Minnesota's Access to Opioid Use Disorder Treatment and Naloxone

By: Annasha Doane-Ramkhalawon, PA-S

Augsburg University

Master Advisor:
Eric Van Hecke, MPAS, PA-C, CAQ-EM, DMSC candidate

Paper Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Science in Physician Assistant Studies Augsburg University

Abstract

Background: In 2020, Minnesota recorded 4,920 admissions with associated opioid use for adults 18 years of age and older.[1] 2021 put Minnesota's Opioid-related overdose mortality number at 1,017 individuals.[2] Methadone and Buprenorphine as MOUD is the first line treatment for Opioid Use Disorder and long-time management as the standard of care.[3] Naloxone is the drug of choice for opioid reversal and overdose prevention.[3]

Purpose: This study aims to investigate the barriers that OUD feel when attempting to receive treatment for OUD and access Naloxone. The indication is the number of OUD-related admissions and OUD-related overdose fatalities. In addition, the goal is to discover limitations to care and find solutions that can be met in Minnesota communities.

Methods: A comprehensive literature review was conducted with UpToDate, Jstor, Augsburg University's Lindell Library, Google Scholar, National Institutes of Health (NIH), Center for Disease Control (CDC), Science Direct, Health Affairs, Addiction Science and Clinical Practice, Substance Abuse and Mental Health Services Administration (SAMHSA), Food and Drug Association (FDA), and more. The Inclusion data ranged from the year 1992 to 2022 published in 2017 or thereafter.

Conclusions: Minnesota the expansion of the ECHO project can lead to an increased OUD treatment with the use of online technology, the increased clinical offices offering initiation of Buprenorphine a MOUD, and treatment of comorbid conditions. Buprenorphine training programs and intensive facility guidance can optimize treatment for OUD patients.

Keywords: Opioid Use Disorder, Buprenorphine, Minnesota, Naloxone, Hub and Spoke, ECHO project

Question

What barriers prevent OUD treatment and access to Naloxone in the United States? What are the Minnesota solutions for these barriers?

P: Adults with Opioid Use Disorder in the United States
I: Need for more individuals in Minnesota to get treatment for Opioid Use Disorder.
C: Race, cost of care, location, treatment type. Comparing models of treatment from Canada and other United States to Minnesota.
O: Solutions for adults with Opioid Use Disorder to get the treatment they need in Minnesota and improve access to Naloxone.

Introduction

Opioid Use Disorder is defined by the American Psychiatric Association in the DSM-5 as “opioid use leading to clinically significant impairment or distress" manifested in at least two forms of DSM-5 symptoms listed.[4] Opioids include prescription and street drugs such as Oxycodone, Hydrocodone, Heroine, Morphine, Codeine, and Fentanyl.[5] UpToDate lists Methadone and Buprenorphine as the pharmacotherapy first-line treatment for Opioid Use Disorder and long-time management as the standard of care.[3] Naltrexone is also an option for patients who have recovered from the withdrawal of an opioid after discontinuation. [3]

Naloxone is the rescue drug of choice for reversing the effects of opioids and providing anyone with an opioid reversal for emergencies as the standard of care. [3] Although buprenorphine is available for prescription now with providers who have the Drug Enforcement Administration (DEA) registration without a DATA waiver requirement provider training is inadequate.[6] This study aims to investigate the barriers to Opioid Use Disorder treatment in the United States and Naloxone access to find specific solutions in the state of Minnesota. The indication is a large number of the population in the United States with OUD and opioid overdose-related deaths. Trends in OUD

treatment and overdose deaths were seen from 1992 to 2022. In the past costs, location, number of providers with DATA waivers, and restrictions on prescriber patient numbers for distribution of medication have decreased access to care for individuals with OUD.

Background

In 2021, 80,411 overdose deaths were reported nationally by the CDC.[7] CDC data from 1992-2019 included fatal overdoses related to opioids in the United States outpaced the admission numbers for opioid treatment leading to a need for improvement in access to OUD treatment.[8] Drug overdoses for OUD can co-occur with other substances.[9] As of 2020 the CDC reports 2.7 million people in the United States 12 years and older with Opioid Use Disorder. [10] OUD comorbidities include polysubstance use, hepatitis C viral (HCV) infection, Human Immunodeficiency virus (HIV), and other chronic diseases.[11]

Data from the State Unintentional Drug Overdose Reporting System reports Minnesota's Opioid-related overdose number of deaths 1,017 in 2021.[2] From these deaths 30.2% were synthetic Fentanyl related.[2] Males were shown to be at higher risk (69.4 %) than females (30.6%).[2] Additionally between the ages 25 and 34 were the most at risk for fatal opioid overdoses at 26%.[2] White individuals (58.1%) and Non-Hispanic Blacks (20.4%) had the highest death rates followed by Non-Hispanic American Indian/ Alaska Native (10.1%). [2] In 2020, Minnesota recorded 4,920 admissions with opioids reported for 18 years and older. [1]

Methods

A comprehensive literature review was conducted using the Journal of Substance Abuse Treatment, Jstor, Augsburg University's Lindell Library, Google Scholar, National Institutes of Health (NIH), Center for Disease Control (CDC), World Health

Organization (WHO), Drug Enforcement Administration (DEA), Science Direct, Health Affairs, Addiction Science and Clinical Practice, Substance Abuse and Mental Health Services Administration (SAMHSA), Food and Drug Association (FDA), UpToDate, American Journal of Public Health, Department of Human Services, Journal of Rural Health, and American Journal of Psychiatry.

The search terms included "who is not getting opioid treatment", "Opioid Use Disorder treatment", "Opioid use disorder treatment in Minnesota", "Access to opioid use disorder treatment", "Racial differences in opioid treatment", "Opioid treatment in Europe", "Opioid treatment models", "Barriers to opioid use disorder treatment", "Access to Medicaid and opioid Use Disorder", "Access to Naloxone", "Chronic pain and Opioid Use Disorder".

Inclusion criteria were materials published in 2017 to 2023. The Inclusion data range from the year 1992 to 2022 published in 2017or thereafter. Exclusion criteria were studies that were systematic reviews, meta-analyses, and published before 2017. The research conducted was to investigate the cost of care for OUD, location of OUD treatment facilities, medical models, harm reduction strategies, and education programs as possible solutions for barriers to OUD treatment in Minnesota.

Goals For Treatment

A study done by Hallvik et al. demonstrated the importance of Medication treatment for OUD as a long-term continuation for Medicaid users in Oregon from 2014-2015. [12]The study found an increase in suicide and overdose after abruptly stopping medications for Opioid Use Disorder (MOUD) leading to overdoses from a cessation or reduction in treatment. [12]

Larochelle et al. found similar results in their study from 2012-2014 in a Massachusetts where post-non-fatal overdoses used Methadone or Buprenorphine to treat decreasing risk in mortality for those participants.[13] From these two studies the discontinuation of MOUD has shown to lead to an increase in mortality and thus remaining on the treatment beneficial long term for OUD patients.

Cost and Medicaid Coverage

After access to care is established an increased reduction in costs of care is necessary to obtain treatment for OUD individuals. In the past cost and insurance coverage have been a barrier to Opioid Use Disorder treatment. Andrew et al. show an increase in Medicaid coverage from 26% to 38% leads to an increase in Substance Use Disorder (SUD) treatment and a decrease in those without insurance in 46 of the united states.[14] Medicaid coverage for Naloxone in 50 states and the District of Columbia from 2011 to 2017 in both metro and nonmetro areas with coverage distributed more Naloxone than states who did not adopt the Medicaid changes for drug treatment.

Long term stay outpatient treatment centers versus office outpatient treatment in some patients is determined by financial means. In Hartung et al. an Oregon Medicaid patient study reports that treatment for MOUD can be maintained in both residential facilities and outpatient treatment after 12 months.[17] Palombi et al. studied a rural community collaboration from 2015-2018 in north and east Minnesota locations.[18] The communities held meetings for OUD awareness and made connections leading to acceptance of Opioid Crisis Grant and Federal grants for increased Naloxone access in those communities and continued education for OUD.[16,18] Department Of Health And

Human Services has increased coverage for drug benefit programs that aid with OUD treatment.[19]

The Medicare increase in coverage have made a difference in OUD treatment and Naloxone access but there are still gaps in payments and financial burden with care. Hodgkin et al. explored how drug office-based opioid treatment can be covered in the meantime for insured and uninsured patients as they struggle with funds in the office based opioid treatment (OBOT) locations. [20] Grants or Medicare bundles have been considered as an option for coverage. When accepted Substance Abuse and Mental Health Services Administration Opioid Response grant can cover some costs for OBOT and the uninsured.[16, 21] More research and lobbying for the expansion of OUD program coverage from state and federal funding is still needed to close these gaps.

Urban Vs Rural

There is a need for more provider offices around the opioid treatment programs (OTPs). Tofighi et al. performed a qualitative study that reported the need for more access to OBOT care which can encompass Buprenorphine medication, HIV, and HCV treatment along with mental health services in rural areas.[22] Kiang et al. United States study found significantly longer driving times to OUD treatment providers to be problematic in rural areas if local facilities were not accepting new patients compared to urban areas.[23] Transportation and distance to treatment has proven to be a barrier to OUD patients.

Swann et al. studied a collaboration among five united states in rural areas on increasing access to care and forming networks for OUD treatment.[24] The study found benefits in forming alliances with outside state governments and opioid treatment

programs resulting an increase in methadone availability especially benefiting rural areas throughout all states participating.[24] The states were able to connect to keep the collaborations going forward to benefit the communities it has reached.

Models For Care

Waitlist times and availability for new patients with OUD to receive treatment is a barrier to care. The state of Vermont's “Hub and Spoke” project remains a study that has sparked a model for changing the way OUD treatment is approached in rural and urban areas. [25] The Medicaid-supported program used "Hubs" as OTPs and OBOTs as “Spokes” that surround Hubs at varying locations.[25] The idea is to use the “Hubs” as the treatment for more acute withdrawal or severe cases and OBOT as the maintenance or initiation of lower-risk patients for MOUD.

In 2016 Rawson et al. evaluated the Vermont program and confirms the benefits of the Hub and Spoke model. [26] Benefits included reduction in waitlist times, a decrease in opioid use, decrease needle use, and polysubstance use.[26] Even with the model in place there is still a need for more Hub and Spoke organizations to cover more territory not being reached as distance remains and barrier to care.

Like the Hub and Spoke model in Vermont, a similar idea can establish a connection to care and MOUD prescribers who support rural areas with the Minnesota Extension for Community Healthcare Outcomes (ECHO) program.[38] In 2014 ,Minnesota Morrison County's Accountable Communities for Health (ACH) was implemented with St. Gabriel's Hospital and FMC to reduce OUD-related ED visits and OUD overdoses in their local community.[27]As a result the community significantly increased the treatment

of OUD.[27] These strides have led to an increase in funding and their existing program to become an "ECHO" or "Hub" for other facilities to learn from.[27]

In this instance the "Hub" provides training from the specialized medicine teams to other prescribers “in rural, underserved areas, and primary care” (Spokes).[28] Based on Solmeyer et al., 2021 the ECHO program demonstrates an increase in OUD treatment with the first line medications. The ECHO has shown to be effective in rural and urban Minnesota communities and can be a solution for the lack of education and training for providers to start MOUD implementation with online communication as “telemedicine”.[27]

From the ECHO project stemmed the "Buprenorphine Bootcamp" an extension as in-person workshops for Buprenorphine education for prescribers.[29] The results of the in-person bootcamp training program were improvement in buprenorphine prescribing and long-term maintenance follow-ups at 18 months compared to control providers. [29] Another approach to Buprenorphine prescribing is an intensive tailored education program and strategy implementation. At low prescribing facilities for MOUD, it has been shown to increase Buprenorphine distribution at Veterans Health Administration facilities. [30]

Hagedorn et al. saw improvement in a 12 months study (2019 to 2020) statically significant increase in the MOUD to OUD at 12% from before and after the program was implemented.[30, 31] It translates then that the expansion of these combined novel models to all communities in Minnesota will increase access and reduce wait times for treatment of OUD in Minnesota communities.

Harm Reduction Strategies

In Denver, Colorado the qualitative study by Wagner et al. recruited individuals who have overdosed or witnessed an overdose.[15] This study found participants easily receive Naloxone at established programs but it is not as attainable for those who don't particiapte.[15] 2021 CDC data of the OUD overdose deaths was 58.4% of opioid overdose deaths had bystanders present at the time of death in 2021.[2] Naloxone public health vending machine (PHVMs) for adults who don't access the current treatment programs was an idea that emerged.[15] This idea can be implemented to allow quick access of the rescue drug for those who use opioids or are bystanders witnessing a overdose.

In March of 2023, the FDA approved the use of Naloxone as a nasal spray over the counter in "drug stores, convenience stores, grocery stores, and gas stations as well as online".[32] The goal is easily attainable medication for sale for opioid overdose reversal. Costs and company choices were predicted barriers to purchasers. [32]

To test the access of Naloxone after the approval Olives et al. interviewed urban and rural Minnesota pharmacies around the metro area.[33]The study found even with the changes made for the drug to be legally more attainable the pharmacies themselves did not all have Naloxone.[33] Those who did not sell claimed they were not aware of the changes, did not want to sell, and/or they don't feel necessary.[33] Pharmacies who carried the drug were more readily found in urban areas compared to rural areas and in larger company chains.[33] Specifically in Minnesota Pharmacies awareness of distribution policies and chain versus other pharmacies can determine where OUD individuals or community members can obtain naloxone.

Regardless of the changes being made if a strategy is implemented and the drug companies and stores don't want to sell Naloxone, it defeats the purpose. Awareness,

education, company willingness, and the costs for the product were issues raised. Medicaid increased coverage and state or federal funding for Naloxone over the counter can be a future solution if new policies are pushed to reduce the prevalence of OUD overdoses.

With the idea of reducing OUD overdose rates, looking to Canada at their harm reduction a cohort study done by Kennedy et al. describe a novel approach to safe drug injection locations with trained staff for Substance Use Disorder (SUD).[34] The goal is the reduction in mortality for those who use inject drugs and reducing the spread of diseases such as HIV and HCV known comorbidities of needle sharing.[11] The locations in Canada recruited 800 people who inject drugs (PWID) monitored over 10.5 years.[34] The report found that those PWID at the structured facilities had a lower risk of mortality than those who did not. Kennedy et al. demonstrate that safe drug consumption sites are a harm reduction model that can be adopted in the United States to reduce mortality and the spread of diseases.

Closer to home Le et al. in a level III trauma center emergency department (ED) in the Appalachians in the United States show reduced number of ED visits in a 12 month period for OUD with the increase in initiation of Buprenorphine for ED patients. [35]

American Indian Tribe-Specific Solutions

With American Indian overdose rates of 10.1% of opioid overdoses in Minnesota during the year 2021, further research into American Indian treatment is warranted. An opioid cascade of care model in 2018 has shown to be effective with OUD awareness and treatment in the anonymous tribe of Minnesota compared to reported data of all adults in Minnesota being treated for OUD. [36] The cascade consists of five stages for the at-risk

population of OUD persons, first assessing the issue and ultimately leading to long-term maintenance with MOUD. [36]

The tribe participants (41%) remained on treatment with no relapse for 180 days at compared to all Minnesota participants (12%). [36] The tribe found success in the opioid cascade model among American Indian communities, a population shown to be affected by OUD. The cascade model can be a solution to increasing OUD treatment in American Native communities.

Medication for Opioid Use Disorder and Chronic Pain Management

Opioid Use Disorder stems from obtaining opioids from health care providers or alternatively the synthesized drugs purchased on the streets. Research to prevent OUD was identified by Hale et al. with two studies to determine the efficacy of Buprenorphine for pain for chronic pain management.[37] The two double-blind 12-week studies were structured with one group receiving the drug and another group receiving the placebo.[37] The study found a statistically significant reduction in pain for the 12 weeks for those who used the dissolvable Buprenorphine compared to the placebo group validating the drug as a long-term pain management option.[37]

Not only can Buprenorphine be applied to chronic pain but also peri-operative pain. Lee et al. also demonstrated the benefits of this in a single patient case study with spine misalignment as a result of a fall.[38] During the case study the patient was able to successfully transition from Methadone and Oxycodone to higher dose of buprenorphine/naloxone without withdrawal symptoms to control her post operative back pain.[38] If patients with or patients predicted to have long-term chronic pain receive

Buprenorphine as the pain medication the negative side effects from opioids (non-MOUD) can be eliminated.

Results

There is a need to lower OUD fatal deaths in Minnesota, especially in the white male population who the highest rates at 58.1% of total opioid deaths in 2021.[2] There is a need for increased access to medication for Opioid Use Disorder treatment. As of March 2023, there is an increase in provider authority with the elimination of the DATA waiver for Buprenorphine in clinical settings. [6] For those who have OUD studies have shown discounting MOUD increases the risk of mortality.[13]

From the literature analyzed cost of care, insurance coverage in the form of Medicaid, distance to OUD treatment, and facilities in rural areas have been determined as barriers to Opioid Use Disorder care. The first-line treatment is in the form of Methadone, Buprenorphine, or Naltrexone as medication treatment along with treatment for comorbidities and psychological care. Cost and insurance coverage, apprehension of companies who sell and distribute Naloxone, non-chain pharmacies, and lack of education on the new policies are barriers to Naloxone access. Naloxone vending machines were a proposed method to reduce OUD overdoses and the bystander effect. [15]

Research has identified the Vermont " Hub and Spoke" and the Minnesota "ECHO project" as models of care to increase the education of Spoke providers from drug addiction specialists (Hubs) to initiate MOUD in rural and urban communities shortening waitlists for OUD treatment. [25,28] If providers are not comfortable with OUD and are not sure how to start and maintain care for OUD users they can enter the Buprenorphine bootcamp. The program has shown benefits and should remain in place

for providers who need further OUD and MOUD training in Minnesota.[29] Intensive training and monitoring of providers who can prescribe buprenorphine at large facilities will benefit OUD patients as more providers become comfortable and available for care.[30]

For a Minnesota American Indian tribe, the “opioid cascade of care model " is an effective method for Opioid Use Disorder treatment and can be adopted by other willing tribes. [36] Canada's harm reduction model for professionally supervised injection sites has been shown to reduce the mortality risk for PWID.[34] Buprenorphine and the Buprenorphine/Naloxone combination were studied as a replacement for other chronic pain management drugs and found to be an effective replacement for previous used opioids. [37, 38]

Discussion

Medicare policy changes have shown an increase in OUD treatment and Naloxone access but it does not help the uninsured or the cost of over-the-counter Naloxone. [14,15] For cost and Medicaid coverage for MOUD treatment, Naloxone access, and clinal setting reimbursements grants from the state level, federal level, or Medicare bundles have been considered to help pay all staff adequately in treatment centers.[20] Substance Abuse and Mental Health Services Administration Opioid Response for example can offset the cost at facilities that take uninsured patients.

For those users who cannot afford outpatient longer-stay treatment at facilities but can afford office-based treatment MOUD can be effective. [17] Location does seem to be a factor for OUD treatment as the driving distance of rural treatment centers is greater than

urban locations. The absence of transportation or the absence in means to afford transportation can become problematic.[24]

Solutions to limited availability in local care facilities or lack of transportation can be addressed by increasing office-based opioid treatment programs by replicating Extension for Community Healthcare Outcomes (ECHO) programs throughout Minnesota.[27] With an expanded reach the need for more training programs for those who can prescribe Buprenorphine with the DEA license is also necessary.

The Canadian study on supervised injection facilities is another idea to consider for the future.[34] The harm reduction model has not reached the United States and there may be legal barriers to facility implementation at this time. More research is needed for the public and policymakers to push for the Canadian model.

Naloxone access for patients who use opioids or bystanders is an issue that needs to be addressed. Not all Minnesota pharmacies currently carry Naloxone.[33] If the Naloxone companies don't want to make the drug available over the counter or the pharmacies don't want to sell them one could argue that the FDA approval is insufficient and Naloxone vending machine may be a novel solution. [15]

Easy access Naloxone can reduce the bystander effect. It is concerning that 58.4% of the 2021 OUD overdose deaths in Minnesota had potential bystanders. The events of death are not reported by the CDC data, but it is evident there is a need for open access to Naloxone. OUD begins with Opioids use. Clinically opioids can be used for perioperative pain, treatment for chronic pain, or bought off the street by drug dealers. To prevent the disorder from occurring it can be cut off at the source by prescribing Buprenorphine or Buprenorphine/ Naloxone as an alternative pain reduction option.[37, 38]

Research Proposal

Opioid Use Disorder remains a large public health concern in the United States. Despite advances in Medicaid insurance coverage and increased in office-based opioid treatment there remains a need to expand access to MOUD and Naloxone in Minnesota. The first objective of this study is to determine what are the barriers to OUD treatment and how accessible can Naloxone be to the public. The second objective is finding solutions to the barriers to care in Minnesota. A retrospective study using quantitative data from TEDS and the CDC and qualitative data from participant interviews will be used. The population of this study is adult individuals with OUD throughout the years 1992 to 2022.

The primary variables examined will be the cost of care, Medicaid coverage, rural vs urban treatment programs and MOUD in medical offices, and models to improve OUD treatment availability and outcomes in the United States. Also, comparing the Canadian care model to the United States model for OUD treatment. As this is a retrospective study, there are no anticipated risks for participants. We expect to see an increase in OUD treatment and Naloxone access with an increase in Medicaid coverage. Barriers to care are expected to be the cost of MOUD and Naloxone, distance to care facilities, lack of availability for care, and lack of provider education. Identifying these barriers will allow for more research leading to an increase in OUD treatment and Naloxone availability.

Conclusion

OUD can be fatal with an overdose of opioid drugs. With the proposed solutions presented in the literature there are possibilities to reduce the prevalence of the disorder,

related mortality, and comorbid diseases. Specifically in Minnesota, the expansion of the ECHO project can lead to an increase in OUD treatment with the use of online technology, the increased clinical offices offering initiation of Buprenorphine as MOUD, and treatment of comorbid conditions. Additional funding can be achieved through state, federal, and Substance Abuse and Mental Health Services Administration grants to offset the costs of opioid treatment programs.

Bootcamp training programs for Buprenorphine prescribers or intensive facility adjustments will allow more providers to learn how to start maintenance therapy for OUD and follow up with long-term care. The cascade model for OUD treatment can be broadly implemented among American Native tribes in Minnesota to increase retention and long-term maintenance.

Clinically, Buprenorphine or Buprenorphine/ Naloxone can be further studied for severe pain levels and chronic pain to replace current addictive opioids in the future. Further studies are needed to determine the impact of the recent DATA waiver elimination for MOUD and FDA approval of over-the-counter Naloxone will have on Minnesota communities.

Limitations

The literature reviewed is limited to data provided by collected databases with whom we do not know the errors and biases. The study does not include those who were left out of those databases or whose ICD code implementation was placed incorrectly by facilities. The states' data that is left out of national and USA cumulative data. OUD and Naloxone statistics that are unreported and diagnosed by healthcare facilities. Qualitative data collected was patient-reported and subject to human error.

References

1. *Treatment Episode Data Set (TEDS) 2020 (Revised) Admissions to and Discharges from Publicly Funded Substance Use Treatment Facilities*. https://www.samhsa.gov/data/sites/default/files/reports/rpt38665/2020_TEDS%20Annual%20Report-508%20compliant_1182023_FINAL.pdf
2. SUDORS Dashboard: Fatal Overdose Data | Drug Overdose | CDC Injury Center. www.cdc.gov. Published July 28, 2022. https://www.cdc.gov/drugoverdose/fatal/dashboard/
3. Strain, MD E. Opioid use disorder: Treatment overview. UpToDate. Published July 12, 2023. Accessed August 4, 2023. https://www-uptodate-com.ezproxy.augsburg.edu/contents/opioid-use-disorder-treatment-overview/print?search=opioid%20use%20disorder&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=
4. American Psychiatric Association. *DSM-5 TM*.; 2013. https://repository.poltekkes-kaltim.ac.id/657/1/Diagnostic%20and%20statistical%20manual%20of%20mental%20disorders%20_%20DSM-5%20(%20PDFDrive.com%20).pdf
5. Dydyk AM, Jain NK, Gupta M. Opioid Use Disorder. PubMed. Published June 21, 2022. https://www.ncbi.nlm.nih.gov/books/NBK553166/
6. *Title: Use of Existing DEA-Form 222s (U.S. Official Order Forms -Schedules I & II) after Removal of X-Waiver*. Accessed August 5, 2023. https://www.deadiversion.usdoj.gov/GDP/(DEA-DC-069)(EO-DEA265)_Existing_DEA_222_Use_QA.pdf
7. Jones AA, Shearer RD, Segel JE, et al. Opioid and stimulant attributed treatment admissions and fatal overdoses: using national surveillance data to examine the intersection of race, sex, and polysubstance use, 1992-2020. *Drug and alcohol dependence*. 2023;249. doi:10.1016/j.drugalcdep.2023.10994
8. Jones AA, Shearer RD, Segel JE, et al. Opioid and stimulant attributed treatment admissions and fatal overdoses: using national surveillance data to examine the intersection of race, sex, and polysubstance use, 1992-2020. *Drug and alcohol dependence*. 2023;249. doi:10.1016/j.drugalcdep.2023.10994
9. DeLaquil, M. (2019). *Differences in rates of drug overdose deaths by race*. https://www.health.state.mn.us/communities/opioids/documents/raceratedisparity2019prelimfin al.pdf
10. Disease of the Week - Opioid Use Disorder. Centers for Disease Control and Prevention. Published August 30, 2022. Accessed August 10, 2023. https://www.cdc.gov/drugoverdose/featured-topics/opioid-use-disorder/
11. Fine DR, Yu L, Triant VA, Baggett TP, Metlay JP. Baseline factors associated with mortality in patients who engaged in buprenorphine treatment for opioid use disorder: a cohort study. *Journal of general internal medicine*. 2020;35(8):2375-2382. doi:10.1007/s11606-020-05779-1
12. Hallvik S, Johnston K, Gedes J, Leichtling G, Korthuis PT, Hartung D. Patient outcomes following opioid dose reduction among patients with chronic opioid therapy. *Health services research*. 2020;55(S1):105-106. doi:10.1111/1475-6773.13480

13. Larochelle MR, Bernson D, Land T, et al. Medication for Opioid Use Disorder After Nonfatal Opioid Overdose and Association With Mortality: A Cohort Study. *Ann Intern Med*. 2018;169(3):137-145. doi:10.7326/M17-3107
14. Andrews CM, Pollack HA, Abraham AJ, et al. Medicaid coverage in substance use disorder treatment after the affordable care act. *Journal of substance abuse treatment*. 2019;102:1-7. doi:10.1016/j.jsat.2019.04.002
15. Wagner NM, Kempe A, Barnard JG, et al. Qualitative exploration of public health vending machines in young adults who misuse opioids: A promising strategy to increase naloxone access in a high risk underserved population. *Drug Alcohol Depend Rep*. 2022;5:100094. doi:10.1016/j.dadr.2022.100094
16. Cheng Y, Freeman PR, Slade E, Sohn M, Talbert JC, Delcher C. Medicaid expansion and access to naloxone in metropolitan and nonmetropolitan areas. *The Journal of Rural Health*. 2022;39(2):347-354. doi:https://doi.org/10.1111/jrh.12719
17. Hartung DM, Markwardt S, Johnston K, et al. Association between treatment setting and outcomes among oregon medicaid patients with opioid use disorder: a retrospective cohort study. *Addict Sci Clin Pract*. 2022;17(1):45. Published 2022 Aug 19. doi:10.1186/s13722-022-00318-1
18. Palombi L, Olivarez M, Bennett L, Hawthorne AN. Community forums to address the opioid crisis: an effective grassroots approach to rural community engagement. *Substance abuse: research and treatment*. 2019;13. doi:10.1177/1178221819827595
19. "Department Of Health And Human Services: Centers For Medicare & Medicaid Services: Rules and Regulations: Medicare Program; Contract Year 2019 Policy and Technical Changes to the Medicare Advantage, Medicare Cost Plan, Medicare Fee-for-Service, the Medicare Prescription Drug Benefit Programs, and the PACE Program: [FR DOC # 2018-07179]," . 2018;Vol. 83, No.73:16440.
20. Hodgkin D, Horgan C, Bart G. Financial sustainability of payment models for office-based opioid treatment in outpatient clinics. *Addiction science & clinical practice*. 2021;16(1). doi:10.1186/s13722-021-00253-7
21. *Department of Health and Human Services Substance Abuse and Mental Health Services Administration FY 2022 State Opioid Response Grants (Short Title: SOR) (Modified Announcement) Notice of Funding Opportunity (NOFO) No. TI-22-005*. https://www.samhsa.gov/sites/default/files/grants/pdf/fy-22-sor-nofo.pdf
22. Tofighi B, Lekas H-M, Williams SZ, Martino D, Blau C, Lewis CF. Rural and small metro area naloxone-dispensing pharmacists' attitudes, experiences, and support for a frontline public health pharmacy role to increase naloxone uptake in new york state, 2019. *Journal of substance abuse treatment*. 2021;129. doi:10.1016/j.jsat.2021.108372
23. Kiang MV, Barnett ML, Wakeman SE, Humphreys K, Tsai AC. Robustness of estimated access to opioid use disorder treatment providers in rural vs. urban areas of the united states. *Drug and alcohol dependence*. 2021;228. doi:10.1016/j.drugalcdep.2021.109081
24. Swann WL, DiNardi M, Schreiber TL. Association between interorganizational collaboration in opioid response and treatment capacity for opioid use disorder in counties of five states: a cross-sectional study. *Substance abuse: research and treatment*. 2022;16. doi:10.1177/11782218221111949
25. Brooklyn JR, Sigmon SC. Vermont Hub-and-Spoke Model of Care for Opioid Use Disorder: Development, Implementation, and Impact. *J Addict Med*. 2017;11(4):286-292. doi:10.1097/ADM.0000000000000310

26. Rawson, Ph.D. RA. Vermont Hub-and-Spoke Model of Care for Opioid Use Disorders: An Evaluation. *Vermont Center on Behavior and Health Department of Psychiatry University of Vermont Burlington, Vermont 05401*. Published online December 2017. Accessed August 7, 2023.https://www.healthvermont.gov/sites/default/files/documents/pdf/ADAP_Hub_and_Spoke_Evaluation_2017_1.pdf
27. Au-Yeung C, Blewett LA, Lange K. Addressing the rural opioid addiction and overdose crisis through cross-sector collaboration: little falls, minnesota. *American journal of public health*. 2019;109(2):260-262. doi:10.2105/AJPH.2018.304789
28. Solmeyer, A. R., Berger, A. T., Barton, S. L., Nguyen, B., Kotasek, K., Alaradi, M., & Merrick, W. (2021). *Evaluation of ECHO programs in Minnesota: Impact of project ECHO on opioid use disorder treatment*. Minnesota Management and Budget. https://www.lrl.mn.gov/docs/2021/mandated/210878.pdf
29. Solmeyer, A. R., Berger, A. T., Barton, S. L., Nguyen, B., & Merrick, W. (2022). Evaluation of a Buprenorphine Boot Camp training program for healthcare providers in Minnesota. Minnesota Management and Budget. https://mn.gov/mmb/impact-evaluation/projects/evaluation-bootcamp-programs/
30. Hagedorn H, Kenny M, Gordon AJ, et al. Advancing pharmacological treatments for opioid use disorder (ADaPT-OUD): protocol for testing a novel strategy to improve implementation of medication-assisted treatment for veterans with opioid use disorders in low-performing facilities. *Addict Sci Clin Pract*. 2018;13(1):25. Published 2018 Dec 13. doi:10.1186/s13722-018-0127-z
31. Hagedorn HJ, Gustavson AM, Ackland PE, et al. Advancing Pharmacological Treatments for Opioid Use Disorder (ADaPT-OUD): an Implementation Trial in Eight Veterans Health Administration Facilities. *J Gen Intern Med*. 2022;37(14):3594-3602. doi:10.1007/s11606-021-07274-7
32. Commissioner O of the. FDA Approves First Over-the-Counter Naloxone Nasal Spray. FDA. Published March 29, 2023. https://www.fda.gov/news-events/press-announcements/fda-approves-first-over-counter-naloxone-nasal-spray#:~:text=Today%2C%20the%20U.S.%20Food%20and
33. Olives T, Willhite LA, Lee SC, et al. Point-of-sale Naloxone: Novel Community-based Research to Identify Naloxone Availability. The Western Journal of Emergency Medicine. 2020 Aug;21(5):1188-1194. DOI: 10.5811/westjem.7.2020.47252. PMID: 32970574; PMCID: PMC7514389.
34. Kennedy MC, Hayashi K, Milloy MJ, Wood E, Kerr T. Supervised injection facility use and all-cause mortality among people who inject drugs in Vancouver, Canada: A cohort study. *PLoS Med*. 2019;16(11):e1002964. Published 2019 Nov 26. doi:10.1371/journal.pmed.1002964
35. Le T, Cordial P, Sankoe M, et al. Healthcare use after buprenorphine prescription in a community emergency department: a cohort study. *The western journal of emergency medicine*. 2021;22(6):1270-1275. doi:10.5811/westjem.2021.6.51306
36. Boyd T, Stipek J, Kraft A, et al. Quantifying opioid use disorder cascade of care outcomes in an american indian tribal nation in minnesota. *Drug and alcohol dependence*. 2021;222. doi:10.1016/j.drugalcdep.2021.108661

37. Hale M, Gimbel J, Rauck R. Buprenorphine buccal film for chronic pain management. *Pain Management*. Published online May 12, 2020. doi:https://doi.org/10.2217/pmt-2020-0013
38. Lee DS, Hann JE, Klaire SS, Nikoo M, Negraeff MD, Rezazadeh-Azar P. Rapid Induction of Buprenorphine/Naloxone for Chronic Pain Using a Microdosing Regimen: A Case Report. *A A Pract*. 2020;14(2):44-47. doi:10.1213/XAA.0000000000001138

AUGSBURG
UNIVERSITY

Augsburg University Institutional Repository Deposit Agreement

By depositing this Content ("Content") in the Augsburg University Institutional Repository known as Idun, I agree that I am solely responsible for any consequences of uploading this Content to Idun and making it publicly available, and I represent and warrant that:

- I am *either* the sole creator or the owner of the copyrights in the Content; or, without obtaining another's permission, I have the right to deposit the Content in an archive such as Idun.
- To the extent that any portions of the Content are not my own creation, they are used with the copyright holder's expressed permission or as permitted by law. Additionally, the Content does not infringe the copyrights or other intellectual property rights of another, nor does the Content violate any laws or another's right of privacy or publicity.
- The Content contains no restricted, private, confidential, or otherwise protected data or information that should not be publicly shared.

I understand that Augsburg University will do its best to provide perpetual access to my Content. To support these efforts, I grant the Board of Regents of Augsburg University, through its library, the following non-exclusive, perpetual, royalty free, worldwide rights and licenses:

- To access, reproduce, distribute and publicly display the Content, in whole or in part, to secure, preserve and make it publicly available
- To make derivative works based upon the Content in order to migrate to other media or formats, or to preserve its public access.

These terms do not transfer ownership of the copyright(s) in the Content. These terms only grant to Augsburg University the limited license outlined above.

Initial one:

AD I agree and I wish this Content to be Open Access.

___ I agree, but I wish to restrict access of this Content to the Augsburg University network.

Work (s) to be deposited

Title: Improving Minnesota's Access to Opioid Use Disorder Treatment and Naloxone

Author(s) of Work(s): Annasha Doane-Ramkhalawan

Depositor's Name (Please Print): Annasha Doane-Ramkhalawan

Author's Signature: Annasha Doane-Ramkhalawan Date: 08/11/2023

If the Deposit Agreement is executed by the Author's Representative, the Representative shall separately execute the Following representation.

I represent that I am authorized by the Author to execute this Deposit Agreement on the behalf of the Author.

Author's Representative Signature: _____ Date: _____