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Olivia Croft

University of Lynchburg, crofto847@lynchburg.edu

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Rural Appalachia and the Opioid Epidemic: Overcoming Current Barriers with New Solutions

Olivia Croft

Senior Honors Project

Submitted in fulfillment of the graduation requirements

of the Westover Honors College

University of Lynchburg

Kristin Shargots, DNP, RN, CNE

Laura Kicklighter, PhD

Amanda Pribble, MSN, RN, FNP-C

Abstract

The opioid epidemic has damaged the lives of many Americans since the early 2000's. As America continues to look for ways to fight the opioid epidemic and save this country, the idea of providing the rescue drug, naloxone, to the general public has been discussed and implemented in some areas. An overdose from opioids causes a person to have respiratory depression and eventually stop breathing. Without intervention, this quickly leads to death. Although the opioid epidemic is nationwide, some of the most significantly affected populations are the rural communities tucked away in the Appalachian Mountains. In rural areas of America, it can take too long for first responders to arrive and intervene before an overdose becomes fatal. The goal of this project is to analyze the current barriers and provide new solutions for reducing deaths caused by opioid overdoses in rural Appalachia. The U.S. strived to help stop the opioid epidemic, but it must keep evolving and changing its tactics as the epidemic continues. There are many barriers that prevent new approaches to the epidemic from being effectively implemented.

Introduction

According to the Center for Disease Control and Prevention (2022), 187 people die everyday from an opioid-related overdose and in 2020, 75% of all drug overdoses involved opioids. When someone overdoses on opioids, this causes respiratory depression and eventually death from hypoxia if left untreated. Rural Appalachian communities, such as Kentucky, West Virginia, Tennessee, North Carolina, and Virginia, have become an epicenter of this epidemic. Appalachian communities are the populations of people that live in and around the Appalachian Mountains, which stretch from the top of Georgia through Maine. Emergency medical services in this area have much longer response times leading to longer periods of apnea by patients which can cause severe health problems and death. Schalkoff et al. (2020), meta analysis shows that although overdose death rates increased nationally more than 60% from the 90's to the 2000's and were at a rate of 7.1 per 100,000 in 2004, rural Appalachian rates were often much higher than the national trend. Also, rural Appalachia is vastly underserved by opioid agonist treatment centers resulting in lack of access by the community (Hyder et al., 2021). Treatment deserts are areas that do not have access to proper healthcare and, therefore, suffer health disparities. Nuamann et al. (2019) found that in a rural North Carolina community where more than 100 kits per 100,000 people were distributed, the overdose rate went down by 14%. Although access to naloxone helped the population in North Carolina, there are still problems related to naloxone access, education, and legality issues. This thesis will first analyze the current barriers and then synthesize new recommendations for reducing deaths caused by opioid overdoses in rural Appalachia. Using a harm reduction framework will have long term benefits for disadvantaged populations living in rural Appalachia during the opioid epidemic.

Methodology

A literature review as the basis to study and understand where the barriers remain in the battle against the opioid epidemic in rural Appalachia. This literature review focused on identifying what has been implemented so far, what has worked and what has not, the barriers that remain, trends in the epidemic over time, and the urgency of this topic. Sources were located through the databases PubMed and CINAHL, two of the leading medical and nursing databases. Search terms such as “naloxone,” “rural Appalachia,” “methadone,” and “opioid epidemic” were used. Most sources older than 7 years were eliminated and most sources are less than 3 years old.

A harm reduction framework is used to analyze the literature evidence and derive meaning from this literature. A harm reduction approach is effective in fighting the opioid epidemic because it focuses on keeping the target population safe (Vearrier, 2018). The elements of harm reduction framework include being non-judgmental, empowering patients to take part in their treatment, improving quality of life, and patient safety (Vearrier, 2018). By applying the harm reduction framework to this research one can synthesize that abstinence from use is often not the best way to overcome addiction and more effective treatment options are available.

Literature Review

History of the Opioid Epidemic and the Effects on the Rural Appalachian Community

The opioid epidemic has a history that begins in the early 2000’s and has plagued the nation ever since, especially those living in rural Appalachian communities. The disproportionate effect that the opioid epidemic has had on rural Appalachian communities has been outlined in research by Schalkoff et al (2020). The goal of this research was to examine trends in how rural Appalachia was affected by the opioid epidemic over the past 10 years and it clearly ties together how many factors came together to create an opioid epidemic epicenter in rural Appalachia

(Schalkoff et al., 2020). This research is limited by the fact that its study concluded in 2017 and more recent research needs to be collected. Schalkoff et al. (2020) describes ways that the opioid epidemic began in the early 2000s when the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO) pushed to add pain as a fifth vital sign, which emphasized the need for more stringent pain control. Also in the early 2000's, pharmaceutical companies were creating and advertising new prescription opioids that they claimed to be safer and less addictive than prior opioids (Schalkoff et al., 2020). The combination of these events resulted in pain being taken more seriously and being treated with opioids, rather than using non-pharmaceutical or non-opioid treatment routes to reduce pain. Other routes to reduce pain include distraction techniques and the use of nonsteroidal anti-inflammatory medications, to name a couple. Also, Kenan et al. (2012) studied the rates at which opioids were prescribed from 2000-2010. They pulled information from Vector One: National and the Automation of Reports and Consolidated Orders System which document prescriptions written by providers and distributed to pharmacies. They found that between 2000 and 2010, the number of opioid prescriptions per 100 people increased by 35.2% and the amount of oxycodone and hydrocodone per prescription both increased by around 69% (Kenan et al., 2012). Limitations to this study also include the fact that it only addresses opioid prescription rates until 2010 and more research should be done to address how these rates have changed in more recent years. Schalkoff et al. (2020) also highlights that the Appalachian community has a history of substance abuse involving moonshine and marijuana use and those at highest risk for abuse of any substance were white males, ages 25-45, with low formal education levels and low-income employment. These findings come together to show how rural Appalachia's long-standing history of substance abuse

and the introduction of new opioid medications that were heavily prescribed have made rural Appalachia an epicenter of the opioid epidemic.

Another important element that merits recognition is that opioid-use disorder can affect anyone. This disorder can and does affect people from all backgrounds and all levels of society, even those who cannot make decisions for themselves. One of these populations is pregnant women. This is undoubtedly a very crucial population because opiate abuse not only affects the mother, but the unborn child as well. Erwin et al. conducted a study in 2017 in eastern Tennessee focusing on how the opioid epidemic affected pregnant women and infants that were born with Neonatal Abstinence Syndrome (NAS). These researchers pulled their information from summaries from the Tennessee Surveillance System for Neonatal Abstinence Syndrome and the Tennessee Department of Health. The sample size for this study was 1198 infants from 16 different counties in eastern Tennessee. Erwin et al. (2017) found that almost 30 infants out of 1,000 live births suffered from NAS. This syndrome occurs when infants are born and suffer withdrawal due to exposure to opioids while in the womb. Ultimately, these babies are addicted to opioids at birth and therefore have to be detoxed in a neonatal intensive care unit. Mothers with infants suffering with NAS had fewer prenatal visits, which could speak to access to this care and affordability in the U.S. At the time of birth, infants with NAS were twice as likely to have an abnormal health condition and were more likely to have a low birth weight (Erwin et al., 2017). This data shows that opioid addiction is already hurting the next generation in the United States. This study illuminates how opioid-use disorder truly affects everyone, even those that cannot make decisions for themselves. This research is limited by the fact not all NAS infants are reported and not all 16 counties are considered part of Appalachia (Erwin et al., 2017). Another effect of the epidemic is that even if a person does make it out alive, they will likely have long

term consequences, such as being infected with Human Immunodeficiency Virus (HIV) or Hepatitis C (Moorman et al., 2018). The purpose of this study was to analyze the infection of rural Appalachia with HIV and Hepatitis C and understand how it was occurring (Moorman et al., 2018). Moorman et al. (2018) found that both HIV and Hepatitis C can be contracted through the use of shared needles to inject substances. Both have life-long negative health consequences and cause many comorbidities. They also found that the people of Appalachia are more likely to contract HIV compared to other populations in the United States (Moorman et al., 2018).

Limitations to this study include that there is limited data on this population and further research should be done to manage and prevent these illnesses (Moorman et al., 2018). This research shows that even if a resident of rural Appalachia does not die because of an overdose, they may have to live with lifelong consequences of an HIV infection. Despite all the negative effects the opioid epidemic has had on rural Appalachia, there have been beneficial resources implemented to help lower the amount of opioid overdose fatalities.

Naloxone Treatment and its Efficiency

One beneficial resource that was implemented was the distribution of naloxone to the public under certain circumstances. Naloxone is a drug that can be given through the nose, muscle, or veins in order to reverse an opioid overdose (Holman et al., 2019). It works by attaching itself to the receptors in the brain that the opioid is attached to and reversing the effects of the overdose. This, in turn, improves breathing and diminishes apnea, which is what causes death in overdose (Holman et al., 2019). In some states, naloxone has been distributed to the public in hopes of improving survival rates from opioid overdoses by having rapid bystander intervention. Naumann et al. (2019) studied one such program in North Carolina to see the effects it had on preventing fatal opioid overdose rates. This study researched county-level

counts on naloxone kits distributed from 2013-2016 and mortality data from those years as well. Naumann et al., (2019) found that in a community where more than 100 kits per 100,000 people were distributed, the overdose rate went down by 14% (Naumann et al., 2019). This study also found that roughly \$3,000 was saved from every death avoided (Naumann et al., 2019). This study is limited because many rural North Carolina counties were not included and the origin of naloxone cannot always be traced back to the distribution program in this study (Naumann et al., 2019). In Cabell County, West Virginia, Allen et al. (2019) conducted a study to find out how well naloxone was actually being distributed and the effect of this distribution. Allen et al. (2019) looked at the correlation between people who use opioid and whether they have access to take-home naloxone. The sample population consisted of 371 participants and data was collected anonymously via audio computer assisted self-interview (ACASI) (Allen et al., 2019). Survey subjects were recruited at either the county health department or in areas where this population was known to congregate. The survey population reported that less than half, 48.2%, received take-home naloxone (THN). However, 10.5% of survey respondents reported more than five recent overdoses and 71% reported witnessing a non-fatal overdose (Allen et al., 2019). This study shows that naloxone distribution is still not reaching the population effectively based on the fact that less than half of respondents in this study had received naloxone. This study is limited due to only assessing naloxone distribution of individuals who use opioids and does not speak to the distribution of naloxone to the population as a whole in West Virginia (Allen et al., 2019). Otachi et al. (2020) conducted a similar study in Appalachian Kentucky. Otachi et al's study found that only 21.4% of the study population had access to THN (Otachi et al., 2020). The study population included 324 participants that were recruited using respondent-driven sampling techniques (Otachi et al., 2020). Unfortunately, this study is limited because it only

included three counties in Kentucky, so it is not a good representation of the general population (Otachi et al., 2020). From the research in West Virginia and Kentucky, it is shown that naloxone is still not accessible to most of the community that needs it. In both rural communities that were studied, only between 20-50% of respondents had access to naloxone. These studies have found that widespread naloxone distribution is not being properly executed, but they do not highlight the barriers to this execution.

Finding and understanding the barriers to public naloxone distribution will help synthesize new solutions to overcoming these barriers. Rudisill et al. (2021) conducted a study in West Virginia to learn and understand more about facilitators and barriers of naloxone distribution. Rudisill et al. (2021) found the barriers to widespread naloxone distribution to be the cost of naloxone and laws surrounding naloxone distribution. One of the greatest problems found in this study was that naloxone can only be distributed with a prescription from a physician (Rudisill et al., 2021). However, naloxone has minimal adverse effects and, for the most part, is safe for the public to administer (Medscape, n.d.). There are also laws in West Virginia surrounding the need for training of laypersons in order for distribution to occur (Rudisill et al., 2021). The greatest limit to this study is that the barriers were self-reported by stakeholders and therefore may be biased (Rudisill et al., 2021). To improve naloxone distribution and overcome these barriers, Krawczyk et al. (2020) also recommend naloxone education during opioid agonist treatment and better naloxone distribution to the community. In rural Appalachia, naloxone training programs fall short because of the lack of accessibility to care and mandated training, causing the areas that need the most help to be left without assistance. Also, naloxone distribution programs are not the only resource that is often inaccessible to rural Appalachian communities.

Opioid Agonists Treatment Centers and Lack Thereof

Another beneficial resource that has been implemented to help fight the opioid epidemic are opioid agonist treatment centers. In these treatment centers, patients go to the clinic and receive methadone or buprenorphine which helps reduce withdrawal symptoms, ultimately helping reduce relapse. Often, the effects of these medications only last for 24 hours, so patients may need to go to an opioid treatment center every day (LaNeve, 2022)

Krawczyk et al. (2020) conducted a study in publicly-funded outpatient opioid agonist treatment clinics in Maryland to determine the effectiveness of using methadone and buprenorphine to reduce opioid use and improve treatment retention. Krawczyk et al. (2020) study had 48,000 participants which were linked with death records in order to determine fatal overdose rates and trend the data. Patients who were treated with opioid agonist medications, such as methadone and buprenorphine had a significantly lower chance of overdose after completing treatment (Krawczyk et al., 2020). Patients treated with opioid agonist medications were 80% less likely to overdose than the population who had non-medication treatment which focus on behavioral and detoxification alone (Krawczyk et al., 2020). This study is limited because treatment data was only categorized as “medication treatment” and “non-medication treatment” and was not broken down into more subcategories to be studied. Havens et al. (2021) conducted similar research in Kentucky by studying how access to opioid agonist treatment centers, specifically methadone, affected the opioid use. Havens et al. (2021) followed 507 participants and their use of non-prescription opioids following opioid agonist treatment. Access to methadone maintenance, residential, and outpatient treatment within the past year all decreased the likelihood of using opioids (Havens et al., 2021). Havens et al, (2021) reports that this study may be limited by attrition bias. These studies illustrate that access to opioid use

treatment centers has a positive impact on reducing relapse rates, however, it is important to keep in mind that multiple relapses are very common in recreational drug users and persistence of treatment is key to lifelong abstinence. Although Krawczyk et al. (2020) and Havens et al. (2021) showed how beneficial the use of opioid agonists are to reducing the risk of relapse, there still remains a major accessibility problem in many rural communities. This literature has highlighted how opioid agonist treatment is effective in reducing the rates of opioid overdose, but further research shows that barriers still remain in rural Appalachia that prevent these communities from taking advantage of this beneficial resource.

Beneficial resources are not effective if the community is not able to access them. This is the case for these opioid agonist treatment centers in rural Appalachia. Hyder et al. (2021) conducted a research study in Ohio to determine how accessible opioid agonist treatment centers were to the public. Their research was conducted in Franklin County, Ohio which has a population of 1.3 million. This study collected overdose data from EMS and analyzed this with the location of opioid agonist treatment centers. They discovered that many counties in Ohio were opioid treatment deserts (Hyder et al., 2021). The “deserts” in healthcare refers to areas lacking necessary resources. Hyder et al. (2021) found that even within the capital city of Columbus, Ohio using public transportation took longer than 30 minutes to get to a treatment clinic. This study is limited by the fact that they used data from only one EMS agency. This study speaks to barriers to accessibility, because in order to access a treatment center within 30 minutes, one has to have the money to pay for the public transportation and public transportation has to be available. Furthermore, Iloglu et al. (2021) also found that in Ohio only 10% of both large rural and small rural communities combined had access to an opioid treatment program within 15 minutes and that over one-third of people needing treatment in the state were not

covered by the clinics available with decreasing coverage in rural areas. Iloglu et al. (2021) conducted a cross-sectional geospatial analysis of areas with at least one opioid-overdose death stratified by Rural-Urban Commuting Area codes. This information reinforces the problem of a health disparity happening in rural communities regarding access to opioid treatment. Iloglu et al. (2021) recommends more widespread availability of methadone/buprenorphine treatment and naloxone distribution by allowing local pharmacies and federally qualified health centers, which are often located in underprivileged communities, to be allowed to administer opioid agonist treatment and distribute naloxone. This study is limited because it likely overestimates the coverage of methadone treatment centers and not all centers are accepting new patients (Iloglu et al., 2021). This research highlights how rural Appalachia is a treatment desert for opioid agonist treatment centers which has been another cause for rural Appalachia to become an epicenter of the opioid epidemic.

The Harm Reduction Framework

This research has been analyzed using a harm reduction framework. This framework has four elements that focus on keeping the target population safe (Vearrier, 2018). These four elements include being non-judgemental, empowering patients to take part in their treatment, improving the patient's quality of life, and patient safety (Vearrier, 2018). Although the harm reduction framework is slowly being introduced in the U.S. currently, it has been in effect in other countries much longer. Michels & Stöver (2012) discuss how interventions such as methadone treatment centers, needle-exchange programs, and drug consumption rooms were introduced in Germany in 2000. Germany has found that these programs were more beneficial in treating opioid-use disorder and reducing relapses (Michels & Stöver, 2012). This study is limited by the fact that it was published in 2012 and may not have the most up-to-date

information. Despite this research that shows the benefits of using the harm reduction framework to address the opioid epidemic, there are downsides to this framework as well. Allen et al. (2019) found in their West Virginia based research that participants who received naloxone were also more likely to have overdosed more than 5 times in the last 6 months. The harm reduction framework focuses on protecting this population from death and disease until they can conquer long-term sobriety. Unfortunately, relapses are common and are to be expected when working with this population. According to the American Addiction Center (2022), between 40% and 60% of people in recovery end up relapsing. Ultimately, relapse is to be expected and effective interventions need to be implemented to keep this patient population alive and safe in relapse and in recovery. This research works with a harm reduction framework because it focuses more on improving the outcomes of patients through meeting them where they are, rather than forcing abstinence on them. The literature evidence, along with the recommendations in this thesis, are focused on patient safety and better patient outcomes in the long-term, rather than quick fixes.

The opioid epidemic and its disproportionate negative impact on rural Appalachia was created by the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO) emphasizing the need for more stringent pain control (Schalkoff et al., 2020), opioid pain medications being prescribed more heavily (Kenan et al., 2012), and the long-standing history of substance abuse in rural Appalachia (Schalkoff et al. (2020). Beneficial resources have been implemented such as naloxone distribution to the public which was shown to reduce fatal opioid overdose rates (Naumann et al., 2019) and opioid treatment centers which reduce relapse rates in opioid users (Krawczyk et al., 2020). However, these resources have not been as effective as possible because there are still barriers that remain to their proper implementation. In order to

overcome these barriers, this thesis will use the four elements of the harm reduction framework to synthesize new solutions.

Discussion

From the literature, one can see how beneficial resources have been implemented in order to help stop fatal opioid overdoses caused by the opioid epidemic. However, barriers to the efficiency of public naloxone distribution and opioid agonist treatment centers have been highlighted. In order to overcome these barriers, this thesis will synthesize and explain new solutions that have been tailored to the needs of rural Appalachian communities through the use of the harm reduction framework.

Barriers to Naloxone Distribution and New Solutions

Naloxone distribution to the public is a beneficial resource that has been implemented in many states across the country. However, this distribution currently has barriers that reduce its efficiency. Barriers to widespread naloxone distribution include the requirement to take a class and/or have a prescription from a provider in order to receive naloxone. In Virginia, a program called “REVIVE” conducts classes and distributes naloxone to attendees at the end of the class (VDBHDS, 2022). One either has to attend an in-person class or an online class. Many people in rural Appalachia may not have a computer, access to internet connection, or the luxury of missing work to attend a class. According to the Appalachian Regional Commission (ARC) (2022) 17.1% of rural Appalachian households did not have access to any computer device, compared to 8.7% in urban areas. Also, only 73%-79% of households in Tennessee, West Virginia, Kentucky, and rural areas of Virginia and North Carolina had internet access, compared to the national average of 85% (ARC, 2022). Nationally, 12.7% of people live below the poverty line and in Appalachia that number is much higher at 17% (Schalkoff et al., 2021). Living below

the poverty line reduced the likelihood of this community to miss work and lose money in order to attend a class. Also, the need for a prescription to access naloxone is a barrier as well. In Virginia, standing orders have been created so that medical personnel other than providers can dispense naloxone. Barriers to naloxone distribution reduce the availability of the public to access this resource and, in turn, reduce fatal overdose rates.

Improved distribution of naloxone highlights all elements of the harm reduction framework. Increased access to naloxone alone is consistent with improving quality of life and patient safety by reducing the risk of a fatal opioid overdose. A pamphlet or educational materials that can be quickly reviewed and sent with the person who receives the naloxone empowers patients to take part in their treatment and shows non-judgement from healthcare personnel. Also, verbal education should be given along with a short demonstration and return demonstration with a manikin. Having patients give a return demonstration also empowers them to take part in their care because it gives them more confidence and improves patient safety because they will be better trained if they need to administer the naloxone in the future. Also, policy change that creates standing orders for naloxone distribution needs to be put into place nation-wide to break down this barrier. Based on the literature evidence, this thesis recommends using pharmacies, mobile units, health departments, and clinics to distribute naloxone in order to have more widespread distribution to those in need of this life-saving medication. These recommendations can help overcome the barriers to naloxone access and decrease opioid-related deaths in rural Appalachia, but there are other barriers that need to be addressed as well.

Barriers to Opioid Agonist Therapy and New Solutions

Another intervention as part of the harm reduction approach to the opioid epidemic has been increasing the use of opioid agonist therapies. Opioid agonist treatment centers have been

opened in many of the Appalachian states, but they are often located too far from rural communities to effectively serve them. Hyder et al. (2021) discovered that many counties in rural Appalachia were opioid agonist treatment deserts, despite the fact that this treatment greatly reduces relapse rates. According to Krawczyk et al. (2020), patients that were treated using opioid agonists were 80% less likely to overdose than patients who had non-medication treatment such as behavioral treatment and detoxification. This leaves this community without any continuity of care after discharge and increases the risk for relapses. Iloglu et al (2020) recommends that opioid treatment be extended into federally qualified health centers, which serve underprivileged communities, to maximize accessibility. From this research, one can derive that overcoming the barrier of opioid agonist treatment inaccessibility will help rural Appalachia reduce relapse rates.

A solution to this barrier would be to create a mobile clinic that can be dispatched into these rural Appalachian communities. In southwest Virginia, there is a mobile clinic known as “The Health Wagon” that also seeks to provide healthcare to rural communities that have barriers to accessibility. The Health Wagon was formed to provide healthcare in many forms to the people of southwest Virginia (The Health Wagon, 2023). The Health Wagon reports that they have served almost 11,000 patients and have provided free care valuing over 5 million dollars to impoverished communities in rural Appalachia (2023). The success of this organization proves that this kind of approach can be successful and beneficial in providing much needed healthcare, using mobile units, to rural Appalachian communities. Similar to The Health Wagon, there would be multiple mobile units to serve a county with one base location. This base would house administrative offices, logistics, hold supplies, and staff would report there each day before leaving in the mobile unit. Rural Appalachian counties would be studied to identify the

communities that showed the greatest need for mobile units and the mobile unit would travel to an area that could be easily accessible to the people of that community. Having a mobile unit dispatched to patient's communities will improve their quality of life by reducing the burden of traveling long distances to an opioid agonist treatment center. Also, it will improve the quality of life and patient safety for individuals that could not travel to an opioid agonist treatment center and otherwise would not have received treatment at all. This unit would have staffing based on the amount of patients that they are serving and staff would include a primary physician, nurses, counselors, and assistive personnel. Being that this mobile unit serves a special population, hiring patient and understanding staff would be of importance in order to create a non-judgemental and psychologically safe environment for the patients. The unit would be equipped with all the technology and supplies needed to serve these patients such as vital signs equipment, cardiac monitoring devices, AED's, medications, IV supplies, etc. Ideally, this unit would be able to provide opioid agonist treatment to rural communities and would be more accessible. The mobile units would also be able to provide take-home naloxone kits to patients and anyone else by request, provide verbal education, and educational materials. This type of program would greatly benefit the communities of rural Appalachia and reduce the health disparities in this area due to accessibility issues.

Although beneficial resources such as public naloxone distribution and opioid agonist treatment centers have been introduced to help fight the opioid epidemic, it's been proven that they are less effective in rural Appalachia due to the special circumstances that surround this community. These special circumstances include higher rates of poverty (Schalkoff et al. 2021), fewer households with internet access (ARC, 2022), and experiencing treatment deserts due to rural commute times (Hyder et al., 2021). These disadvantages can be addressed through the

implementation of a mobile unit that can provide opioid agonist treatment to communities in need and distribute naloxone as well. Also, implementing more efficient naloxone education that is more accessible to these communities will help overcome these barriers. Finally, nation-wide policy change that creates a standing order for naloxone distribution will also improve the ability for naloxone to be distributed. These new solutions align with the harm reduction framework by showing non-judgement, empowering patients to be involved in their care, improving patient safety and improving quality of life. By implementing these new solutions to the current barriers that are hindering rural Appalachia, hopefully improvement will be seen and this community will be positively impacted.

Limitations

Limitations to this research include the fact that there are many layers to the opioid epidemic and it is impossible to address them all in one research project. This research could have gone many different directions and addressed many different topics. This thesis only addressed two barriers that have negatively impacted rural Appalachia, but there are still many more that should be addressed. Also, this thesis has only provided a few solutions to these barriers, but many more could be synthesized to continue to overcome these barriers. Further research could be done into how pharmaceutical companies played a greater role in the start of the opioid epidemic in rural Appalachia and could hold those companies accountable. Future research should look further into how EMS response times may affect overdose death rates in urban versus rural areas as this adds another layer to the disparity that rural communities face accessing substance abuse treatment. There also could be further research into how countries outside the U.S. are handling substance use epidemics, what has been successful, and how successful strategies can be applied here. After these interventions are implemented, there should

be follow up studies to track how effective they have been and if they are benefiting or harming the communities long-term. Lastly, more research should be done to determine the impact of applying a harm reduction framework to substance abuse management or if it has had a negative influence.

Conclusion

According to the CDC (2022), in 2020 75% of all drug overdoses involved opioids and everyday 187 people die from an opioid-related overdose. Rural Appalachia has been disproportionately affected by the opioid epidemic based on the fact that they often have much higher rates of opioid overdoses than the national average (Schalkoff et al., 2020). Beneficial interventions, such as public naloxone distribution and opioid agonist treatment centers have been implemented, but have been less effective in rural Appalachia and have created barriers.

This thesis has researched and discussed the barriers related to naloxone distribution and opioid agonist treatment centers. Opioid agonist treatment deserts are present all across rural Appalachia (Hyder et al., 2021). Also, naloxone distribution has not been widespread throughout rural Appalachia (Otachi et al., 2021), despite its reduction in fatal opioid overdose deaths (Naumann et al., 2019). Appalachian communities are still vastly underserved in relation to naloxone distribution and opioid agonist treatment centers. Due to the geographical and socioeconomic makeup of these areas, this population has special circumstances that require new solutions. These needs can be better met through the new solutions to break barriers and combat the opioid epidemic to reduce opioid-related death in rural Appalachia.

New solutions including a mobile unit for opioid agonist treatment and naloxone distribution would help overcome these barriers in rural Appalachia. A mobile unit would travel into communities that showed a need for opioid agonist treatment. Along with providing opioid

agonist treatment, these units would be able to give brief, yet effective, naloxone education and distribute naloxone to the public. Also, nation-wide policy change to create standing orders for naloxone could help overcome these barriers. These new solutions promote patient safety, non-judgement, improve quality of life, and empower patients to take part in their treatment.

These new solutions must be implemented in rural Appalachia or this community will continue to be disproportionately affected by the opioid epidemic and will continue to be an epicenter. Yearly, thousands of deaths are attributed to the opioid epidemic and this will not change if new solutions are not taken seriously. The communities of rural Appalachia have been allowed to slip through the cracks for far too long.

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