Neonatal Abstinence Syndrome in Tennessee: Past, Present, and Future Directions

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It’s my weekly volunteer shift at East Tennessee Children’s Hospital (ETCH) and another newborn was just admitted to the 3rd floor Neonatal Intensive Care Unit (NICU). In active drug withdrawal because he was exposed to his mother’s prescription opioid addiction in utero, the child’s first hours of life are marked by uncontrollable tremors, difficulty with the first feed, and the signature, piercing cry of Neonatal Abstinence Syndrome (NAS). In an attempt to reduce symptoms and stabilize their newest patient, the medical staff admit the infant to a special unit at ETCH built in response to a sweeping epidemic of NAS in Tennessee. In a private room designed to minimize light and sound that may lead to increased withdrawal symptoms, the nurses start the hours-old infant on a high dose of morphine to curb the initial withdrawal symptoms. Twenty-one days later and free of daily morphine doses, the baby is discharged and funneled into a constantly changing legislative system to determine where he will be placed. I wish I could say that this encounter was uniquely my own and that the patient was the first and only one in his situation, but that is far from the truth. While this infant was hospitalized, racking up a 50,000-dollar medical bill, ETCH received twenty more NAS patients. In conjunction with the US opioid crisis, NAS has reached epidemic levels in Tennessee and is ravaging communities across the state, especially in East Tennessee.

 While the opioid epidemic has far-reaching effects nationally and even globally, Tennessee has been especially impacted. For nearly ten years, Tennessee’s mothers, babies, and communities have been gripped by the one of the highest rates of opioid addiction and NAS in the country. Acting out of both necessity and hope, Tennessee has led the way in many aspects of addressing the opioid and NAS crisis, from pioneering a comprehensive inpatient NAS treatment protocol to enacting multi-dimensional recovery programs for affected moms. However, as the epidemic continues to rage in all three regions of the state, there is still much work to be done in understanding the causes and outcomes of the crisis while finding new ways to respond to and mitigate its effects. The following piece will explore the literature surrounding the opioid epidemic and NAS in Tennessee by providing history and background, analyzing some root causes of the epidemic, highlighting several key interventions that have already been implemented, and offering recommendations for future NAS/opioid abuse reduction in Tennessee. In particular, I will argue for improved medical education through a structural competency approach.

**Background**

 The following section will be used to provide context and history surrounding the opioid epidemic and NAS in Tennessee. First, I will provide a brief history of opioids in the United States. Second, I will define NAS and link both the opioid epidemic and NAS to current statistical data illustrating the scope of the issue. Finally, I will address an important caveat in ethical discourse about addiction and the opioid epidemic: the disparate ways in which the prescription opioid epidemic has been portrayed and responded to in comparison to the War on Drugs, particularly as it pertains to race in America.

**Opioid Epidemic**

Opium is a substance derived from poppy seeds that acts as a narcotic analgesic, and is the base ingredient for a variety of drugs. Chinese immigrants coming to the United States to work on the railroad system were the first to introduce opium to American society (Jones and Fielder, 2015). In 1827, Merck was the first pharmaceutical company to put morphine, an opiate substance still common today, on the market as a pain reliever commonly used by upper-middle-class White women with minor physical ailments (Jones and Fielder, 2016). In 1906, the American Medical Association approved the use of heroin, first manufactured by Bayer, as a morphine substitute (Jones and Fielder, 2015). The Harrison Act of 1914 made heroin illegal in the United States, but did not stop several waves of its recreational use (Jones and Fielder, 2016). In 1996, OxyContin hit the market as a controlled-release prescription opiate used to treat moderate to severe pain in patients with chronic discomfort from surgeries or terminal cancers (Leukefeld et al., 2005). In a very lucrative market, OxyContin was heavily advertised to primary care physicians for treatment of chronic pain, and its addictive qualities were withheld from physician and patient education, resulting in a recent lawsuit against Purdue (Leukefield et al., 2005). In addition to OxyContin, other prescription opiates available today include Codeine, Methadone, Percocet, Hydrocodone, and several others (Leukefeld et al., 2005).

While the addictive nature of prescription opioids is well known today, that has not stopped the drugs from being widely prescribed and abused. Currently, there are 2.5 million Americans dependent on heroin or prescription opioids, and between 2000 and 2014, there was a 200% increase in the number opioid overdoses (Grossman et al., 2017 & Ko et al., 2017). In 2015, Tennessee saw 1,451 opioid overdose deaths and that number continues to rise (Warren, 2017). Tennessee in particular has a notably high opioid prescribing rate of 1.4 prescriptions per resident, the second highest rate in the nation (Warren et al., 2015). This has led to soaring rate of NAS incidence in the state; the national average is 5.8 NAS cases per 1000 live births, while Tennessee weighs in at 11 cases per 1000 live births. In the Northeast region of Tennessee, the rate is more than four times higher at 49.1 cases per 1000 live births (Benchmarks, 2017). Additionally, there are a number of medically-assisted therapies designed to help curb opioid abuse such as Methadone and Buprenorphine. Methadone and Buprenorphine are designed to satisfy physiological opioid cravings while offering a much lower dose of the substance itself. However, even these drugs can cause both addiction and NAS and are often sold in street markets (Maxwell, 2011).

**Neonatal Abstinence Syndrome**

There are a number of social and health consequences of the prescription opioid epidemic, ranging from increased crime to disrupted family structure. NAS, infant drug withdrawal due to maternal opioid abuse, forms the topic of this work as it is one of the most salient effects of the opioid crisis. Clinically speaking, NAS is defined as a constellation of opioid withdrawal symptoms affecting the central and automatic nervous systems of opioid-exposed infants (Atwood et al., 2017). Symptoms, if they occur, typically present 24 to 96 hours post-delivery and affect anywhere from 49 to 94 percent of opioid-exposed infants (Atwood et al., 2017). Symptoms include increased muscle tone from central nervous system irritability, sweating from automatic nervous system dysfunction, gastro-intestinal issues that can result in poor feeding, difficulty breathing, seizures, and overall failure to thrive (Jones & Fielder, 2015).

 While NAS was first observed in the 1800s, there is still a great disparity in how hospitals and providers assess and treat affected infants. Perhaps the most popular diagnostic tool is the Finnegan NAS Scoring System (FNASS). Developed over forty years ago and modified several times since its creation, the tool contains 21 items/symptoms, with each assigned a specific point value. In many hospital settings, a newborn scoring over 8 points on the FNASS will be considered for NAS treatment (Grossman et al., 2017). While a tool like the Finnegan system can be helpful in standardizing care and improving communication among providers at different hospitals, it also possesses significant limitations. For example, because the items on the tool include a range of symptoms from increased muscle tone to sneezing, an infant’s score can become quite subjective and a healthy baby can easily score in the treatment range without an actual need for advanced care (Grossman et al., 2017). The Finnegan tool continues to be shortened and modified to accommodate for these concerns, but is gradually receiving less and less weight in treatment decisions for opioid-exposed infants. Instead, many physicians and NICUs are favoring holistic assessments of the mother/infant dyad through the infant’s basic ability to function with sleeping and feeding. Moreover, the infant’s ease in terms of being consoled is also a sign of good health and lack of withdrawal symptoms (Grossman et al., 2017).

 Not unlike NAS diagnosis, treatment methods also vary widely between patients and hospitals. When NAS treatment first became a key concern of the neonatology community, a pharmacological treatment regimen was developed that involves bringing NAS patients onto the NICU and placing them on a regular dose of an oral opioid to prevent withdrawal symptoms. Morphine is the most common choice for its short half-life and subsequent flexibility in dosage changes, but can also cause sedation. Methadone is a morphine alternative, but has a much longer half-life and thus the dosage has to remain more constant over time (McQueen & Murphy-Oikonen, 2016). Over an average period of 21-23 days, infants are gradually weaned from their oral opioid doses while being carefully monitored. The cost of pharmacological treatment easily reaches 50,000 dollars per case (França et al., 2016). These treatments amounted to a 1.5 billion dollar national price tag in 2012 alone (Ko et al., 2017). In Tennessee, 81% of NAS cases are covered by TennCare, putting considerable stress on the state budget (Patrick et al., 2015). For example, 13% of Medicaid spending on births goes towards NAS births that account for only 1.7% of live births in Tennessee (Patrick et al., 2015). Recently, due to both the cost and the potential for unnecessary medication, there has been a resurgence in the popularity of non-pharmacological treatment. Supportive, non-pharmacological treatment includes minimizing stimulation, cuddling/swaddling, and a slow progression to full feedings. Having mothers “room in” with their newborns has also been shown to reduce withdrawal symptoms and help to defray the need for and cost of pharmacological management (McQueen & Murphy-Oikonen, 2016).

**Key Caveat: Racially Privileged Portrayal of the Opioid Epidemic**

 In discussing the opioid epidemic and NAS, it is important to bring attention to a key concern that often appears in discourse surrounding the issues at hand: disparate, racially stratified representations of addiction, especially through media coverage. All too often, the dialogue surrounding the prescription opioid epidemic privileges and excuses the behavioral issues of Whites in ways not afforded to their non-White counterparts. For example, the prescription opioid epidemic currently holds center stage in national discussions about healthcare. President Trump has recently declared the issue a national emergency and there has been a significant amount of media coverage given to the prescription opioid crisis in the past 5-7 years. It appears that much of the sensationalized coverage of the prescription opioid epidemic is fueled by the shocking notion that the epidemic does not affect “crack heads” and other “criminals” who are targets of the War on Drugs, but rather the “soccer mom next door.” The typical profile of an individual featured in a media piece describing the everyday horrors of the opioid epidemic is White, middle class, and pictured as “not that different from everyone else” (McLean, 2017). There is also widespread fascination with the notion of abuse of prescribed medication that shifts blame away from individual patients and towards the physicians and systems that perpetuate this method of deceptive distribution.

 The characteristics of how the prescription opioid epidemic is discussed stand in stark contrast to the War on Drugs and its focus on the more typically “Black” opiate substance—heroin. While the active ingredient in heroin is chemically identical to that in OxyContin, the consequences for possessing and abusing heroin are significantly more severe. This illustrates a common trend of policing Black bodies while sparing Whites who have been “deceived” by their physicians and pharmaceutical companies (Kerrison, 2015). This double standard also carries over into racial divides in the prescribing of medically-assisted treatment therapies for opiate addiction; Whites typically receive buprenorphine, a more expensive and less-stigmatized version of the “Black” methadone, a cheaper alternative with strong negative cultural stigma (Hansen et al., 2016). There is also little to no literature about the racial epidemiology of NAS, suggesting that little care to examining important racial demographics has been given to such a “White” crisis.

For the purposes of this project, I will focus predominantly on prescription opioid abuse because it is the most salient form of opiate abuse in the state of Tennessee; however, this focus may serve to limit the analysis in a way that could perpetuate the negative consequences of White privilege if not carefully read. Even if the racial divide is not further discussed in this project, it is crucial to avoid creating double standards in legislation and access to treatment across different forms of opioid abuse. In my further examination of the issues at hand, let us commit to seeking solutions and frameworks for understanding the opioid epidemic that are just and inclusive of all people.

**Analyzing Origins of the Epidemic**

 The following section will consider some of the key contextual sources of the opioid epidemic and precipitating issues with NAS. In order to address the issue and mitigate the presence and effects of NAS in Tennessee, it is essential to retrace the roots of opiate addiction and begin to dismantle the issue from its base. While there are a myriad of factors that influence and fuel the opioid epidemic, physician behavior through overprescribing, the role of the pharmaceutical industry, and individual behavior/community risk factors will be the primary considerations in this section.

**Physician Behavior/Overprescribing**

There are a number of factors that play into the magnitude of the opioid epidemic and rise of NAS rates in Tennessee, but considering that the primary cause of the vast majority of NAS cases is prescription opiates, it is important to consider physician prescribing behaviors as a key element in the ongoing epidemic as well as a point for intervention and long term management of the issue. In response to an intense marketing attempt geared towards physicians by large pharmaceutical companies like Purdue Pharmaceuticals (first manufacturer of OxyContin), physician overprescribing continually fuels the opioid crisis. In 2012, there were 259 million opioid prescriptions written in the United States—more than one per adult citizen (Sinenberg et al., 2017). A large number of these prescriptions were written for surgery and cancer patients, but still more were written by emergency medicine physicians and primary care providers looking to control acute or chronic non-cancer pain (Sinenberg et al., 2017). As medicine becomes more and more of a competitive business, “doctor shopping” and patient satisfaction rating scores serve as driving forces for physicians to offer the strongest pain management they have, opioids, at the potential cost of the drugs ending up in the wrong hands (Sinenberg et al., 2017). Many of these decisions are left up to physician discretion and subjective assessment of a patient’s “trustworthiness” and/or their ability to properly handle prescription opioids. Overall, the number and rate of opioid prescriptions written by primary care physicians has risen over the past ten years, only recently leveling off due to more structural interventions and clearer guidelines (Warren, 2017).

**Pharmaceutical Industry**

 Physician prescribing behaviors are a key driver of the opioid epidemic, but underlying these overprescribing practices is a multi-billion dollar industry colloquially known as “Big Pharma.” Since 1995 when Purdue Pharmaceuticals’ OxyContin first hit the market as a controlled-release opioid analgesic, the prescription opiate industry has grown to bring in an excess of 13 billion dollars in profit each year (Schatman & Webster, 2015). From the beginning of the prescription opioid craze, large pharmaceutical companies have been deeply invested in the marketing and manufacturing of the drugs that lead to widespread addiction and NAS for Tennessee’s infants. The prescription opioid epidemic gained its roots in the late 1990s with Purdue hosted 20,000 “physician education” events where the company’s representatives presented the benefits of OxyContin for chronic pain management along with copious free samples, claiming that the risk of addiction was less than 1% and that the benefits far outweighed the risks (Dhalla et al., 2011). To further silence naysayers and secure OxyContin’s place in the pharmaceutical industry, Purdue provided funding incentives for the American Pain Society’s “Pain is the 5th Vital Sign” campaign and sent additional presenters to convince wary physicians of the distinct difference between OxyContin’s potential for clinically unimportant “physical dependence” and a personally driven potential for “addiction” (Kolodny et al., 2015). Unfortunately, most physicians who were convinced to liberally prescribe OxyContin were not aware that the studies that the sales representatives lauded were hardly empirically sound and were not strong enough to truly justify the assertion that benefits of prescription opiates outweighed the risks of addiction (Dhalla et al., 2011). With intense marketing, careful control of special interest groups, and silencing of concerns, large pharmaceutical companies like Purdue were extremely successful in instituting prescription opioids and all of their associated risks as key components of pain management in the United States.

 While Purdue and OxyContin took the market by storm and laid groundwork for today’s opioid epidemic in the late 1990s, the influence of Big Pharma on the prescription opioid epidemic and NAS is still salient. As evidence that OxyContin and other prescription opiates are far from non-addictive and safe for mass distribution has become increasingly clear, large pharmaceutical companies have faced significant pushback from physicians and citizens alike. The newest way to hold these companies accountable for the harm they have caused in the American society has been a series of lawsuits and other litigation as consequences for the clear misleading of physicians and patients that is now a raging NAS and opioid epidemic. While these lawsuits are empirically justified, many of them have failed to make significant impacts on the drug companies because of the ease of blaming addiction on personal behavior and choices (Haffajee & Mello, 2017). However, litigation has been successful when taken as class action lawsuits commenting on the ways in which opioid prescriptions based on false marketing have pulled from and therefore misused government insurance funds (Haffajee & Mello, 2017). In addition to placing financial sanctions on the large pharmaceutical companies that have supported the opioid epidemic, suggested interventions to reverse some of the negative effects of fiscally driven false marketing and exploitation include company-sponsored continuing education for physicians on appropriate use of opiate prescriptions and legal restrictions on marketing and distribution of free samples of Schedule II drugs that have the potential to be addictive in nature (Dhalla et al., 2011). These interventions remain important considerations as the market for medically assisted treatment (MAT) opioid drugs such as methadone and buprenorphine continues to grow.

**Individual Behavior**

 Physician behavior and the influence of the pharmaceutical industry have certainly had a major impact on the magnitude and burgeoning nature of the American opioid epidemic and NAS in Tennessee, but it is also important to note many of the “personal” choices and characteristics that draw individuals into the epidemic. NAS in an infant can and must be traced back to its origin—addiction. Like heroin, cocaine, and other addictive substances, prescription opiates alter the dopamine receptor pathways in the brain and create a physiological need for more and more of the drug to achieve the same effect, no matter whether it is pleasure or pain relief. Like many other diseases and medical conditions, tendencies towards addiction and addictive behaviors can be genetically inherited and passed from generation to generation in families (Deren, 1986)

In addition to genetic predisposition, many people who abuse prescription opioids and suffer from addiction are also heavily influenced by social and environmental factors. For example, research has shown that living in poverty with limited access to resources that characterizes the regions of Tennessee most affected by the opioid crisis is a significant risk factor for substance abuse. Tennessee’s rural counties suffer a particularly high rate of opioid abuse and NAS due to a myriad of these environmental factors including but not limited to high need for chronic pain management of injuries from heavy mining labor, limited recreational opportunities to distract residents from drug culture, and extremely high rates of poverty—exceeding 30% in many rural counties (Appalachian Regional Commission, 2011). A large proportion of residents in these areas are dependent on TennCare, Tennessee’s Medicaid program, for their healthcare and therefore also have relatively easy access to opioid prescriptions (Patrick et al., 2015). Finally, given that up to 86% of NAS births are the result of unplanned pregnancies, it can be gathered that physicians prescribing opioid pain relievers to women of childbearing age, in general, fail to emphasize the risks associated with pregnancy while using the medications (Ko et. al, 2017). Therefore, limited access to or use of birth control is also an important personal factor to consider in the perpetuation of opioid abuse and NAS in Tennessee. In the discourse surrounding the causes of the opioid epidemic and NAS, assigning personal responsibility to the individuals who consume and abuse prescription opioids is a popular position, but holds limited efficacy in long term mitigation of the issue in Tennessee.

**Tennessee’s Response**

Tennessee has seen a 10-fold increase in the number of NAS cases reported per year, compared to the national average of a 3-fold increase over the same ten-year time period (Warren, 2017). The severity of the NAS crisis in Tennessee has demanded a response from the state to the opioid epidemic and NAS as a consequence**.** In fact, many programs and protocols developed in Tennessee now serve as models for other physicians, hospitals, and communities across the nation as they begin to grapple with NAS in their own areas. The following section seeks to highlight several of Tennessee’s initiatives and programs formed in response to NAS. While not an exhaustive list, these programs have already shown preliminary evidence of effectiveness in supporting individuals and communities impacted by the opioid epidemic and NAS (Warren, 2017).

**Mothers and Infants Sober Together (MIST)**

In 2013, with the help of a $290,000 grant from BlueCross BlueShield of Tennessee, Dayspring Family Health Clinic in rural Jellico, TN began offering a comprehensive program for NAS moms called MIST-Mothers and Infants Sober Together. The program came in response to a burgeoning NAS population in Campbell County, home to Jellico and the three surrounding communities served by the Dayspring clinic. Campbell County records one of the highest rates of NAS in all of Tennessee’s 95 counties. Dr. Geogy Thomas, a family physician at Dayspring, knew that his opioid-affected patients and their infants needed additional supports and pioneered the 6-month program designed for pregnant and postpartum mothers struggling with addiction. With a goal of enrolling mothers while they are pregnant and seeing them through the delivery of their babies, MIST provides mothers with wrap-around services at the clinic location including counseling, case management, and education about caring for their newborns with the goal of getting mothers safely off of drugs and in a place where they can successfully parent their children. While MIST initially encountered some issues with patient intake due to the negative stigma of addiction treatment, especially in a small town where relationships in group therapy settings are easily enmeshed, the program has developed a strong reputation for non-judgmental support and is now popular (Henderson, 2015). While MIST has only been in place for a few years, it already demonstrates tremendous efficacy in improving outcomes and providing support for mothers delivering NAS infants. After the MIST program, 79% of mothers test negative in their drug tests and 60% of those testing positive do so because they are on a prescribed opioid medication (Henderson, 2015). While MIST itself primarily aids women and families in rural East Tennessee, it may serve as a model program for other states and clinics across the nation.

**Monitoring System**

Recognizing the ways in which the medical community can unintentionally allow the proliferation of prescription opioids and NAS through “doctor shopping” and drug diversion (meds prescribed for one patient used by another individual), Tennessee became the first state to implement a statewide opioid monitoring system that carefully tracks every Schedule II prescription written in the state (Patrick et al., 2016). Beginning in 2013, all providers were required to not only enter any opioid prescriptions they wrote in the system, but also to check that the patient had not first tried to procure the same prescription from other providers. In addition to tracking opioid prescriptions, the Tennessee Department of Health also requires that all cases of NAS be subsequently reported. The monitoring system has provided much more accurate data with which to assess the state of the issue in Tennessee and how to move forward. Fortunately, there has not been a statistically significant increase in the rate of NAS over the past two years, suggesting that while the rates are still extremely high, the epidemic may be reaching a plateau in its growth due to tracking measures (Patrick et al., 2016). Moving forward, the data provided by the monitoring system will be crucial in further measuring NAS in Tennessee as well as providing data and methods for reducing the issue in other regions. In fact, 22 states have already followed suit with a great deal of initial success. In a 2016 study, a nationwide analysis of opioid use and abuse in states that have monitoring systems showed that such programs are successful at reducing the number of opioid prescriptions by approximately 30% within the first six months of implementation (Bao et al., 2016). Programs like Tennessee’s that required entry of every opioid prescription instead of elective data entry were even more successful at reducing unnecessary opioid prescriptions compared to those with voluntary entry (Bao et al., 2016).

**Special Unit**

Also with a large grant from BlueCross BlueShield of Tennessee valued at 1 million dollars, East Tennessee Children’s Hospital in Knoxville TN, the epicenter of the opioid and NAS epidemic in the state, opened the nation’s first dedicated NAS Neonatal Intensive Care Unit in 2010. When the epidemic hit full force in East Tennessee, there was no protocol for treatment of NAS, so ETCH pioneered a treatment method that has been nationally recognized and followed. Knowing that NAS patients respond negatively to overstimulation of light and sound, ETCH carved out a special wing of the hospital with private rooms to decrease these stimuli. Additionally, medical staff developed a careful protocol for initially administering morphine and slowly weaning each patient before transitioning them into a home environment. ETCH also employs an army of volunteer “cuddlers” to swaddle and soothe infants whose parents often cannot stay with them, a program that has been implemented in many hospitals across the nation. The efforts of ETCH staff and the special unit have resulted in an overall decrease in average length of stay by 7 days while the unit has been open (Henderson, 2015). Not long after, Monroe Carrell Jr. Children’s Hospital at Vanderbilt also began to respond more specifically to NAS in Tennessee. In addition to adopting ETCH’s treatment protocol, Vanderbilt put together a multi-disciplinary team of physicians, nurses, social workers, and others to meet bi-weekly and discuss current NAS cases and coordinate appropriate care.

**Susannah’s House**

While East Tennessee Children’s Hospital possesses a special unit for NAS patients themselves, Susannah’s House is an example of a nearby wrap-around service center for new moms of NAS babies and other affected family members. Funded by a local Knoxville church, Susannah’s House provides recovery services in conjunction with childcare to attend to the specific needs of mothers experiencing opioid addiction. Like MIST, Susannah’s House seeks to dismantle much of the stigma that comes from receiving addiction treatment, especially as a mother or mother-to-be. Even after a mother is reunited with her child, Susannah’s House and other programs like it provide ongoing support for their patients and clients to prevent future relapse (Susannah’s House, 2018). Susannah’s House fills a gap left in the MIST program by following mothers and babies beyond the first six months of life.

**Legislation**

Faced with an incredibly high rate of NAS, Tennessee has enacted legislation that adds to a vibrant debate on the best way to legally handle NAS cases. In a study of Child Protective Services (CPS) data from across the country, prenatal substance exposure was a strong indicator of involvement with CPS during infancy. For example, in California, approximately 1 in 3 children who were medically diagnosed with prenatal substance exposure were placed in foster care during their first year of life. This exceeds the national average of foster care placement by 11 times that of other children with similar socio-demographic characteristics (Prindle et al., 2018). In Tennessee, 1.3% of infants will experience involvement with the Department of Children’s Services, but 13% of those who do are NAS patients (Warren, 2017). Mirroring the national data trend, the Knox County judge who handles most custody cases with substance-using mothers is often called “the busiest in the courthouse” with a constantly increasing caseload (Wadhwani, 2016). Much of this legislative involvement was initiated due to a national law passed in 2003 called the Keeping Children and Families Safe Act. This blanket bill made reporting and social service requirements more stringent for children exposed to substances in the home (Reuters, 2015). In Tennessee, there have been two drastically different legislative approaches to handling NAS in the past five years. First, Governor Bill Haslam signed the Safe Harbor Act in 2013 giving pregnant and postpartum mothers on opioids amnesty and initial rights to their child’s custody so long as they proved they were in appropriate treatment. The Safe Harbor legislation was turned over in 2014 and replaced with a “fetal assault” law that allows for arrest of mothers proven to be exposing their unborn babies to opioids. The law is set to expire in July 2018 and has not been renewed due to its failure to truly protect Tennessee’s NAS population. More than 100 women have been arrested under the fetal assault law and hundreds more have forgone prenatal care and/or received abortions to avoid legal consequences of their conditions (Wadhwani, 2016).

**Research**

Finally, while Tennessee has implemented several excellent support systems and programs for NAS patients and families, overall mitigation of the opioid epidemic and NAS crisis in Tennessee will continue to depend on accurate data and robust research. The opioid monitoring system has begun to provide some accurate data sets, but there is a continual need for synthesis of existing data and gathering of additional data—especially as it pertains to the long-term effects of NAS on the neurological and social development of these patients. Several local and statewide entities have been active in the research side of NAS including East Tennessee State University’s Quillen College of Medicine, which has a dedicated research division for NAS and the opioid crisis in East Tennessee (Benchmarks, 2017). Additionally, there is a team of researchers at Vanderbilt University Medical Center who have shown longtime engagement with characterizing the scope of NAS in Tennessee as well as developing evidence-based treatments to give patients the best outcomes possible (Benchmarks, 2017). In particular, there is a pilot study in the beginning phases at Vanderbilt examining the relationship between health literacy and discharge readiness of mothers whose infants have been hospitalized for NAS. This study and others like it point to the importance of examining the social determinants of health in addition to clinical outcomes.

**Seeking Solutions**

 In view of the opioid epidemic and high incidence of NAS in Tennessee, I will argue that bolstering medical education through a structural competency framework may be the best long-term solution to positively influence all areas of the issue. Physicians play a direct role in two of the three elements that I have analyzed as key factors in fueling the opioid epidemic and NAS in Tennessee—overprescribing and the pharmaceutical industry—and may even have influence over the third, personal characteristics/behavior. Therefore, targeting physicians who have had a negative impact on flooding the market with prescription opioids yet possess the potential to influence patients, pharmaceutical companies, and communities alike represents a worthwhile investment.

 The American Medical Association has recognized the potential benefits of addressing the opioid crisis through medical education, and much progress has already been made in improving medical education to prevent the opioid overprescribing that has been seen in Tennessee and across the nation. Since the early 2000s when the opioid epidemic first began to grow, much of the discourse that fed the “pain is the 5th vital sign” heavy management era has been transformed into a new narrative focused on seeking alternative, more personalized treatments for patients with chronic pain that limit opioid prescriptions whenever possible (Kowarski, 2017). Additionally, the CDC has released guidelines for opioid prescribing that eliminate much of the uncertainty that previously lent itself to overprescribing by primary care and emergency medicine providers (National Pain Strategy Report, n.d.). Many US medical schools now offer courses in pain management that further clarify the role of the physician in prescribing appropriate amounts of controlled substances. Similar courses are also frequently offered in continuing education settings (AAMC, 2018; Sokol & Kunz, 2017). However, there is still much room to improve these measures as the opioid crisis continues to grip Tennessee. Medical education is already making an impact in clarifying appropriate opioid prescribing and therefore reducing overprescribing, but it can also make a community impact. Further improving medical education by incorporating structural competency principles may prepare our physicians to not only appropriately handle pain management and NAS treatment, but also to function as community partners in addressing the opioid epidemic and NAS outside the walls of the clinic.

 Structural competency is an approach to medical and pre-medical education that prepares current and future doctors to understand not only the biomedical issues facing their patients, but also the numerous social determinants of health that shape patient lives and health profiles more than medications and procedures ever will (Metzl & Hansen, 2014). Structural competency in medical education seeks to build student capacity in recognizing structure, using extra-clinical language to describe these structures, renaming “cultural” factors in structural terms, seeking structural interventions, and constantly maintaining structural humility. Similar to structural competency, cultural competency has been a popular topic in medical education for over ten years, focusing on reduction of stigma and provision of better patient care through cross-cultural understanding between patients and providers (Beach et al., 2005). However, structural competency goes beyond this more interpersonal approach and pushes its students to examine structural forces external to the patient’s individual cultural characteristics (i.e. linking food deserts due to residential segregation more so than poor “cultural” food choices to unhealthy patient eating habits). In the context of NAS and the opioid epidemic in Tennessee, structural competency in medical education could help physicians to recognize community systems and factors that might put patients at risk of opioid abuse and ultimately delivering NAS babies. If these patients do in fact need an opioid prescription, physicians could co-prescribe additional support such as counseling or preemptive birth control for women of childbearing age. Beyond the interpersonal competency lauded by the cultural competency movement, a structural competency approach to medical and continuing medical education for Tennessee’s physicians may also equip them to engage directly with the community itself.

 Structural competency framework in medical education for Tennessee’s physicians may be a key to equipping and sending physicians out to impact the community at large by training them to build community capacity. Even though one of structural competency’s five key elements is structural humility, or maintaining a realistic perspective on the limitations and efficacy of interventions, physicians trained in structural competency may truly be able to directly address some of the systems and structures that lead to opioid addiction and NAS in the first place. For example, many low-wage jobs in Tennessee from the coalmines of Appalachia to the factories of Middle Tennessee and the farms of West Tennessee, involve heavy manual labor. This type of work can absolutely lead to a higher rate of chronic pain and perceived need for prescription opioids for these communities. In fact, I believe these types of jobs and the pain they can cause are a principle driver of the opioid epidemic in many Tennessee counties. A physician trained in a structural competency approach may see a patient who works one of these jobs and respond by not only providing alternative treatment for the patient (i.e. massage therapy or virtual reality distraction, two pain management tactics currently being studied as opioid alternatives), but also go beyond the clinic and address the administration at the patient’s place of work. Trained in building community capacity, the physician may advocate alongside the local or national workers union to create upstream change in work environments that can reduce the bodily stress incurred in the work place and the amount of pain needing opioid management in the clinic. This cyclical reduction in opioid prescribing and the pain that necessitates it can lead to less opioids circulating, less drug diversion, and ultimately less NAS in Tennessee.

 Approaching mitigation of the opioid epidemic and NAS in Tennessee by incorporating structural competency framework into medical education may be one of the most sustainable and impactful solutions we have. In conjunction with ongoing interventions through prescription opioid monitoring, recovery support geared towards NAS moms like MIST and Susannah’s House, and special NICU units to treat the tiniest victims of the epidemic, structural competency medical education flips the narrative on a key element of the ongoing issue. Improved medical education, as it equips physicians to be community partners rather than overprescribers, represents our chance to build community capacity—to link a population of physicians who have a significant share of power in controlling the substances that wreak havoc on families, infants, and communities, with the patients that are most affected by the epidemic. Structural competency medical education taps into the strengths inherent in each community and builds capacity rather than barriers to healthcare like fetal assault legislation and removal of naloxone from Medicaid coverage. However, I also find it necessary to complicate the structural competency narrative in view of the racially privileged nature of the current response to the prescription opioid crisis. While structural solutions are important ways to address social issues like the opioid epidemic in sustainable ways, much of the opioid epidemic is driven by cultural values in Appalachia. Therefore, pure cultural competency may also maintain a strong place in the medical education world for proper mitigation of the opioid epidemic. Structural competency medical education does not come without its challenges from breaking down deep-seated bias within physicians and communities to procuring necessary funding for widespread implementation; structural competency medical education is not the only effective approach to mitigation of the opioid crisis and NAS in Tennessee. However, taking a careful look at the ways in which medical education can both hurt and heal the opioid crisis represents a beacon of hope for Tennessee and its people.

**Addendum: The Politics of the Opioid Epidemic**

Regardless of origins and strategies for addressing NAS and the opioid epidemic, the issue will always be rooted in a highly polarized political climate, and it is important to constantly consider the context of data and interventions. The political climate has a significant influence on how the opioid crisis is perceived and therefore handled in Tennessee and beyond. Since Purdue Pharmaceuticals became involved in the heavy marketing and profiting associated with promoting OxyContin, the opioid epidemic has become increasingly political from market regulations on drug companies to changing ideas of how to handle opioid abusers and dealers. The epidemic reached a steady “crisis” level during the Obama administration that has carried into the Trump presidency. However, even though the crisis wears on, there is much division in conservative and liberal perspectives on the causes, consequences, and way forward with prescription opioids and consequently NAS in Tennessee. The following section offers a brief check in on the current political action towards opioids and a framework for understanding the general conservative and liberal standpoints on the issue.

 In general, the liberal viewpoint on the opioid epidemic zeroes in on addiction as a disease and the importance of access to pain management medications for patients that need them. In line with this perspective, many democratic legislators favor funding rehabilitation programs over punitive measures for opioid abusers and access to healthcare for the poor, including pain medications where necessary. This is an important stance to take in view of the global disparities in access to appropriate pain management that often manifest among the marginalized in the United States (Fishman, 2007). While there are many more factors in management of the opioid epidemic other than executive leadership, looking at public sentiment towards the Obama administration as it concerns opioids can provide valuable insight into the politicized nature of managing the epidemic. The opioid epidemic has its chronological roots in the Clinton and Bush era, but it first gained national attention during the Obama administration. President Obama was quite vocal about the magnitude of the issue and the need to address it at a national level, but has since received much conservative criticism for allowing and even contributing to the burgeoning of the epidemic (Frydl, 2017). There are many factors involved in the growth of the epidemic beyond executive leadership, but critics often associate Obama’s Affordable Care Act and Medicaid expansion with increased access to prescription opioids in the poor, rural areas where the drugs have the strongest grip. During Obama’s presidency, the number of opioid prescriptions rose and reached a peak in 2012 (Frydl, 2017). There was also a 55% increase in the number of Medicaid drug fraud cases investigated in the four years following the Medicaid expansion (Editors, 2018). This level of criticism speaks to the truly volatile nature of the opioid crisis in the political realm.

 On the other hand, conservatives generally hold closely to the argument that opioid abuse is a matter of personal responsibility rather than a disease of addiction. They do not generally support significant federal regulation of prescription opioids but instead prefer for federal funds to be directed to local governments to address the crisis in their own backyards (Addressing Epidemic, n.d.). Many of the citizens who live in the regions most affected by the opioid epidemic also voted for Trump, who made addressing the opioid epidemic one of his campaign promises, to the tune of a majority in most of those regions. Some scholars who study the politics of opioids believe that this phenomenon is actually a symptom of several decades of economic decline, to which Trump made an excellent appeal in his 2016 campaign (Weekend Edition Saturday, 2016). In recent months, President Trump has made a series of very strong statements concerning the opioid epidemic, but has yet to give many concrete examples of how he will fund or execute his claims. In October of 2017, Trump declared the opioid crisis as a national emergency, which could have provided access to millions of dollars of additional funds, but no action has been taken with funding allocation since then (Levitz, 2017). Trump’s latest claim for addressing the opioid epidemic comes in the form of proposing the death penalty for dealers of opioids. While the proposal has garnered plenty of media attention, congress has yet to support the notion and many scholars are not hopeful that it could actually lower the burden of opiate overdose in America (Lopez, 2018).

**Conclusion**

 Tennessee is in the midst of the opioid epidemic with a constant stream of NAS cases affecting our state’s most vulnerable citizens. Fueled by physician behavior, the pharmaceutical industry, individual characteristics/environments, and several other factors, addressing the opioid epidemic and NAS in Tennessee will continue to demand a multidimensional approach and a team of physicians, policymakers, and community members alike. Tennessee has made major strides in the past 5-7 years by pioneering treatment and support for affected mothers and infants through the MIST program and Susannah’s House, ETCH special unit, and a prescription drug monitoring system. The state also continues to reevaluate legislation and research surrounding the issue to best suit the needs of both mothers and babies. While these interventions have shown a good degree of success so far, it is important to constantly consider new ways to engage in mitigating the NAS and opioid crisis in Tennessee—especially through a structural competency approach in medical education that can both reduce harmful physician behavior and promote community engagement and capacity-building. The scope of the opioid epidemic and NAS in Tennessee is vast, but the Tennessee Volunteer spirit stretches from Memphis to Johnson City and together we will continue to work towards full health for all of our states’ citizens.

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