

# Neonates Exposed to Opioids in Vermont

## Vermont Uniform Hospital Discharge Data Set

### Background

Vermont has the second highest rate of admissions to state-funded substance abuse treatment programs in the U.S. This unprecedented access to care in Vermont reflects a culture of treating addiction as a chronic disease. In recent years, access to medication assisted therapy (MAT) to treat opioid dependence has increased dramatically. In 2003 buprenorphine was legalized to treat opioid dependence, in 2004 the first methadone clinic opened in Vermont, and in 2012 the State of Vermont initiated the Care Alliance for Opioid Addiction, a statewide partnership of clinicians and treatment centers to provide MAT to Vermonters.

### Treating Pregnant Women

Pregnant women are a critical population of adults dependent on opioids. The American College of Obstetricians and Gynecologists recommends that all pregnant women with opioid dependence be in active treatment, including the use of MAT. Since 2002, Vermont hospitals have gone through rigorous quality improvement in treating opioid dependent pregnant women and their infants, such as the Improving Care for Opioid-exposed Newborns (ICON) project at the University of Vermont and the University of Vermont Medical Center.

### Infants Exposed to Opioids

In Vermont, the vast majority of opioid exposed infants are delivered to women who are in treatment.<sup>1</sup> Once a pregnant woman is identified as opioid dependent, her infant is diagnosed as “exposed to opioids” and assigned a diagnosis code for neonatal abstinence syndrome (NAS). Opioid-exposed infants may be monitored for four days in the hospital. Many of these infants never show symptoms of NAS. While some do have signs and symptoms of NAS, only a small proportion of those need to be treated with methadone or morphine.<sup>2</sup>

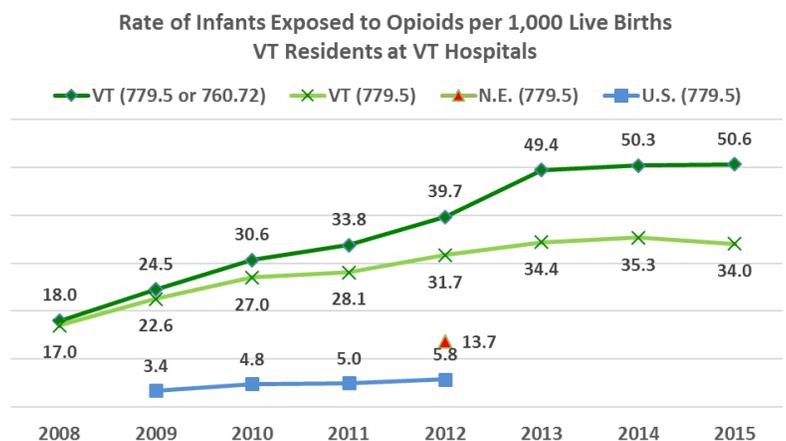
### Trend Over Time

The rate of newborns diagnosed as exposed to opioids in Vermont has increased statistically significantly from 2008 to 2015, although there has been little change since 2013. This increase may be partially explained by increases in provider awareness and access to treatment.

### Vermont Compared to the U.S.

According to the Kid’s Inpatient Database (a national sample of hospital discharges), the U.S. average rate of NAS increased from 3.4 infants per 1,000 hospital deliveries in 2009 to 5.8 infants per 1,000 hospital deliveries in 2012.<sup>3,4</sup> The U.S.

rate is calculated using only one of two potential diagnosis codes for neonatal exposure to opioids. When using the same single diagnosis code, in 2012 the Vermont NAS rate was five times higher than the national average. In contrast, Vermont’s rate of overdose due to opioids and overall opioid misuse rates are both similar to the U.S. average.<sup>5</sup> The



Data Source: Vermont Uniform Hospital Discharge Data Set, excluding transfers from other facilities.

<sup>1</sup> Vermont Medicaid Claims data analysis and Vermont Vital Records data analysis show that, in 2010, four out of five infants with ICD-9 codes for 779.5 or 760.72 were born to women in treatment.

<sup>2</sup> Johnston A. Children born to opioid-dependent parents. Vermont Joint Legislative Child Protection Oversight Committee, October 20, 2015.

<sup>3</sup> Patrick S, Schumacher R, Benneyworth B, Krans E, McAllister J, Davis M. Neonatal Abstinence Syndrome and Associated Health Care Expenditures. *JAMA*. 2012;307(18):1934-1940.

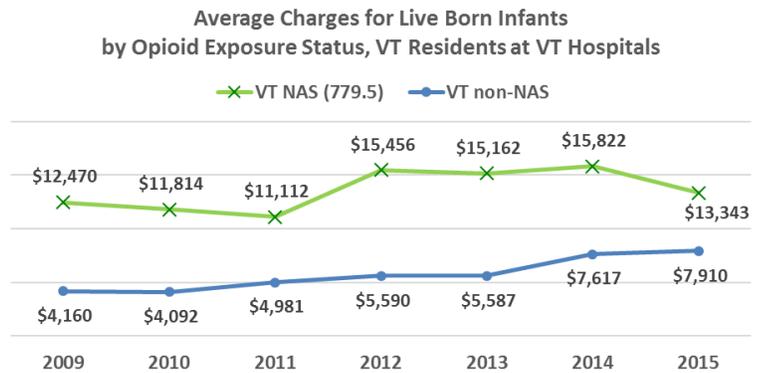
<sup>4</sup> Patrick SW, Davis MM, Lehman CU, Cooper WO. Increasing incidence and geographic distribution of neonatal abstinence syndrome: United States 2009 to 2012. *Journal of Perinatology* (2015) 35, 650–655.

<sup>5</sup> Data source: CDC/NCHS, National Vital Statistics System.

difference in NAS rates may be due, at least in part, to the comprehensive way Vermont treats opioid dependent pregnant women, provider education and awareness, and access to care (both treatment initiation and funding for treatment). In addition, the Vermont practice of coding all opioid exposed infants with one of two NAS diagnosis codes may not be the practice in other regions, where infants might only be diagnosed as NAS if they display symptoms that require medical treatment.

### Cost Over Time

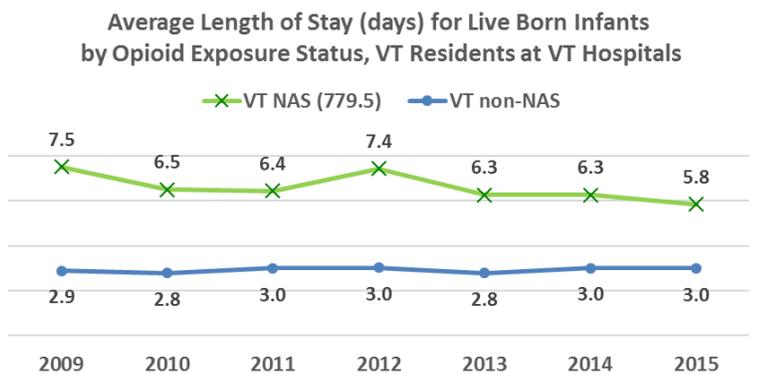
Though hospital charges do not directly indicate costs or payments, they do serve as an appropriate surrogate measure. Average Vermont hospital charges for NAS infants have fluctuated since 2009 (from a low of \$11,112 in 2011 to a high of \$15,822 in 2014, decreasing to \$13,343 in 2015 per infant), while non-NAS charges have increased steadily and almost doubled in the same time period. It is important to recognize that while Vermont’s rate of NAS diagnosis is higher than the U.S. rate, Vermont’s average charges per infant are much lower: the average U.S. hospital charges for an infant diagnosed with NAS was \$53,400 in 2009, increasing to \$66,700 in 2012.<sup>2,3</sup> As previously stated, only a small proportion of the infants diagnosed as NAS in Vermont need medical treatment.



Data Source: Vermont Uniform Hospital Discharge Data Set, excluding transfers from other facilities. Charges have been adjusted to the 2012 U.S. dollar.

### Length of Stay

The average length of stay (LOS) for Vermont NAS newborns has decreased since 2009, although the change is not statistically significant. In 2012, the average length of stay for an infant diagnosed with NAS in U.S. hospitals was 16.5 days<sup>2</sup> compared to 7.4 days in Vermont. The Vermont average LOS for an infant not diagnosed with NAS is 3.0 days, comparable to the national average.<sup>2</sup>



Data Source: Vermont Uniform Hospital Discharge Data Set, excluding transfers from other

### Conclusion

While the Vermont rates of opioid misuse and overdose are similar to the U.S. average, the rate of infants born exposed to opioids is much higher. However, for 2012, the average length of stay for NAS infants is 36% of the U.S. average and the average cost of care per infant is 23% of the U.S. average. Given these findings, it is possible that the difference between the Vermont rate and the U.S. rate of infants born exposed to opioids is due to differences in awareness, treatment models and hospital coding. Changes in the Vermont rate over time can be partially explained by an increase in provider awareness and increased access to treatment in Vermont over that same time period.

### Analysis Methodology

Data analysis was performed on the Vermont Uniform Hospital Discharge Data Set (VUHDDS). Analyses were limited to discharges of live born (diagnosis code of V3) Vermont residents at Vermont hospitals, excluding transfers from other facilities. Data were limited to Vermont hospitals because data for 2010-2015 are not yet available from all bordering states. Unless otherwise stated, opioid exposed infants were identified by any mention of either ICD-9 CM diagnosis code 779.5 or ICD-10-CM diagnosis code P96.1. Cases of iatrogenic NAS (ICD-9 CM 772.1x, 779.7, 777.5x, 777.6, 770.7 or ICD-10-CM P91.2x, P78.0x, P52x, P77x, P27x) were excluded from the NAS rate, but included in the non-NAS rate. Charges were adjusted to the 2012 U.S. dollar.