

# 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 the past decade 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 Vermont initiated the Care Alliance for Opioid Addiction. The Care Alliance for Opioid Addiction is 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, at birth her infant is diagnosed as “exposed to opioids” with one of two diagnosis codes for neonatal abstinence syndrome (NAS). Opioid-exposed infants are 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 some need to be treated with methadone or morphine.\*

### Trend Over Time

The rate of infants born exposed to opioids is increasing in Vermont. The increase may be partially explained by an increase in provider awareness and increased access to treatment.

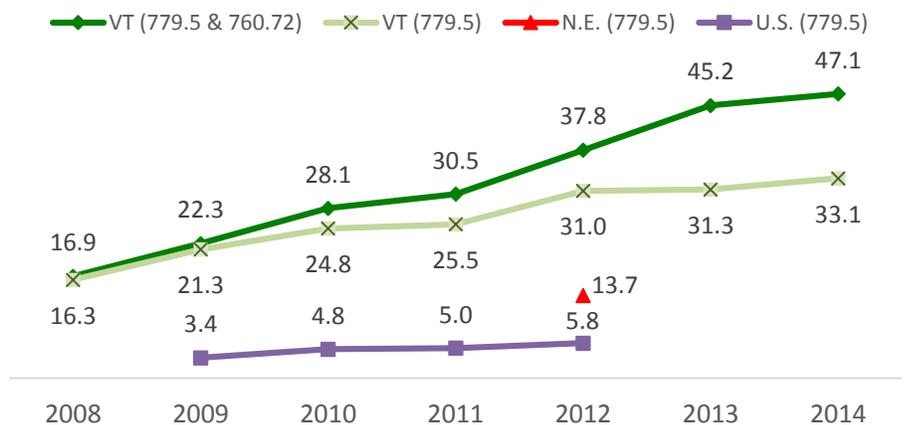
### Vermont Compared to the U.S.

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>2,3</sup> The U.S. rate is calculated slightly differently from the Vermont rate

(only one of two potential diagnosis codes for neonatal exposure to opioids is used). When using the same diagnosis code, the Vermont rate is five times higher than the national average in 2012. This stands out compared to Vermont’s rate of overdose due to opioids and overall opioid misuse rates, which are both similar to the U.S. average. The difference 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 coded if they display symptoms.

\* The proportion of infants treated is unknown. The information that not all NAS infants are treated is from informal conversations with providers at large area hospitals in Vermont and other states. Further analysis is needed to determine the exact proportion treated.

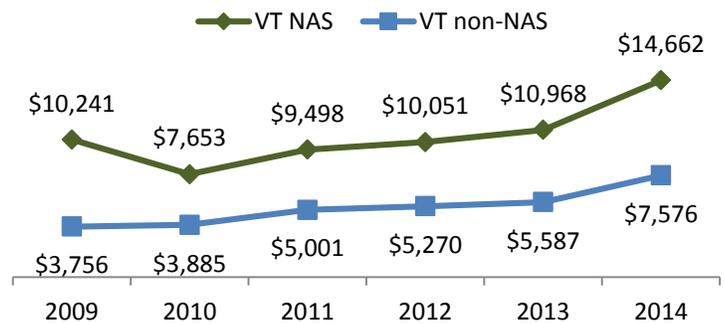
Delivery rate of infants exposed to opioids per 1,000 live births, Vermont residents at Vermont hospitals



## Cost Over Time

Though charges do not directly indicate costs or payments, they do serve as an appropriate surrogate measure. Vermont hospital charges for infants exposed to opioids have not statistically significantly increased in the last five years (\$10,241 in 2009 and \$14,662 in 2014 per infant), but have gone up 43%. Non-NAS costs have increased 102% in the same time period. In 2009, the average U.S. hospital charge for an infant diagnosed with NAS was \$53,400 increasing to \$66,700 in 2012.<sup>2,3</sup> It is important to recognize that while the rate of diagnosis is higher in Vermont, the average charge per infant is much lower. As previously stated, only some infants diagnosed in Vermont need treatment.

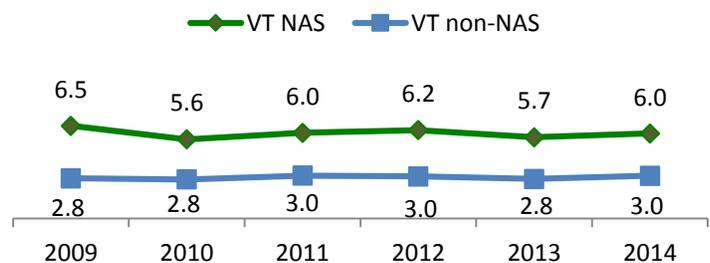
**Average charge for live born infants, by opioid exposure status, for Vermont residents at Vermont hospitals**



## Length of Stay

The average length of stay (LOS) for an infant exposed to opioids has not significantly changed in the last 5 years. 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 only 6.2 days in Vermont. The Vermont average LOS for an infant not diagnosed with NAS is 3.0 days, which is similar to the national average.<sup>2</sup>

**Average length of stay in days for live born infants, by opioid exposure status, for Vermont residents at Vermont hospitals**



## Conclusion

While the Vermont rates of adult opioid misuse and overdose are similar to the U.S. average, the rate of infants born exposed to opioids is much higher. However, the length of stay for infants born exposed to opioids is 36% of the U.S. average and the cost of their care, per infant, is 22% 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. Data were limited to Vermont hospitals because data for 2010-2014 are not yet available from all bordering states. Opioid exposed infants were identified by any mention of ICD-9 CM diagnosis code 779.5 or 760.72. Cases of iatrogenic NAS (ICD-9 CM 772.1x, 779.7, 777.5x, 777.6, 770.7) were excluded from the NAS rate, but included in the non-NAS rate. Live born infants weighing less than 1500 grams or missing birth weight were excluded from all analyses. Charges were adjusted to the 2012 U.S. dollar.

## References

- <sup>1</sup>Vermont Medicaid Claims data analysis and Vermont Vital Records data analysis show that four out of five infants with ICD-9 codes for 779.5 or 760.72 were born to women in treatment.
- <sup>2</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>3</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.