Neonatal Abstinence Syndrome in Kansas: A rising public health issue we must address

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Introduction

- The opioid prescription epidemic has impacted all age, race, sex, economic and social populations in the United States. It has even affected the most vulnerable population- pregnant women and their unborn child.[1-3]

- Neonatal Abstinence Syndrome (NAS) is a postnatal drug withdrawal syndrome that results from in utero exposure to addictive prescription or illicit drugs. Between 2000 and 2012 the incidence of NAS increased nearly 500% nationwide.[3]

- High burdened states are experiencing associated fiscal and strained health care consequences. On average, the cost of delivering a baby diagnosed with NAS is much higher and the hospital length of stay is significantly longer, compared to a newborn without NAS.[2-3]

- The distribution of NAS in Kansas is not yet known. Therefore the purpose of the current study is to assess the trend of NAS incidence in Kansas and the associated medical conditions among delivery hospitalizations.

Objective

- To determine the incidence of NAS and the geographic variability would inform state and local government in targeting public health response in Kansas.

Methods

- The Kansas hospital discharge data were used to estimate the incidence of NAS diagnosis.

- Numerator: Cases of NAS were identified with International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes 779.5 (drug withdrawal syndrome in a newborn). Cases of possible iatrogenic withdrawal, resulting from complications related to prolonged neonatal intensive care stay were excluded (ICD-9-CM codes: 765.01-765.05, 770.7, 772.1X, 779.7, 777.5X, 777.6).[2-3]

- Denominator: In-hospital single or multiple live births were identified via ICD-9-CM codes V30.X-V39.X ending in 00 or 01 between 2000 and 2014. Discharge records that did not have a primary or secondary diagnosis code indicating a hospital birth, or that indicated a transfer from another acute care hospital or health care facility, were excluded.[4]

- Trends were assessed using Poisson joinpoint regression model with NAS incidence as the outcome variable and infant birth year as the independent variable between 2000 and 2014.

- Five years of data (2010-2014) were combined and analyzed to identify selected characteristics and health outcomes of infants diagnosed with NAS.

References

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Results

- In Kansas, NAS incidence increased from 0.3 per 1,000 hospital births in 2000 (95% confidence interval (CI): 0.1, 0.5) to 2.9 per 1,000 hospital births in 2014 (95% CI: 2.3, 3.4). Kansas NAS incidence rate significantly increased between 2000 and 2014 (Annual Percent Change = 18.9%; 95% CI: 16.6%, 21.3%).

- The average length of hospital stay for an infant with NAS increased significantly by 44.0% from 2000 to 2014 (from 8.4 to 12.1 days), widening the gap between length of stay for those with NAS and unexposed infants.

Figure 1. Average Length of Stay (Days) in the Hospital for Kansas Infants, 2000 - 2014

APC = 3.9^ (95% CI: 1.6, 6.2)
APC = 0.5^ (95% CI: 0.3, 0.7)
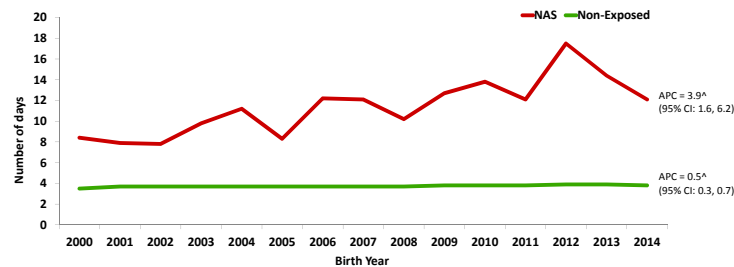
^ Indicates that the Annual Percent Change (APC) is significantly different from zero at the alpha = 0.05 level.
Source: Kansas hospital discharge data, 2000-2014

- Between 2010 and 2014, 433 infants were diagnosed with NAS in Kansas. Within this five year period, infants with NAS were more likely than other hospital births to be Caucasian, non-Hispanic ethnicity and insured by Medicaid.

- Infants diagnosed with NAS were more likely to have complications compared to other hospital births, including transient tachypnea of the newborn (12.9% vs 3.3%), meconium aspiration syndrome (2.8% vs 0.3%), respiratory distress syndrome (3.7% vs 1.5%), other neonatal respiratory diagnoses (14.8% vs 5.0%), jaundice (33.3% vs. 16.5%), feeding difficulty (15.2% vs 4.1%), seizures (0.9% vs 0.1%) and sepsis (6.2% vs 1.5%).
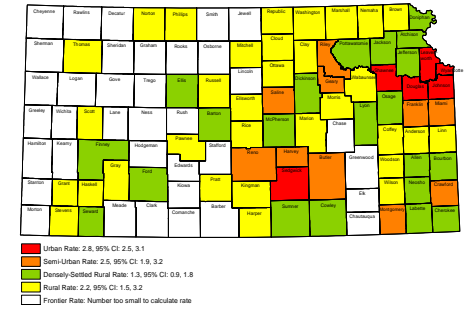
Table 1. Characteristics of infants with neonatal abstinence syndrome vs all other hospital births in Kansas, 2010 - 2014

Characteristics	Neonatal Abstinence Syndrome (N = 433)		All Other Hospital Births (N = 179,704)		P-value
	N	%	N	%	
Race					<0.0001
White	319	83.1	114,851	73.6	
Black or African American	32	8.3	11,721	7.5	
Other	33	8.6	29,441	18.9	
Ethnicity					0.0001
Non-Hispanic	365	96.3	147,005	90.4	
Hispanic	14	3.7	15,533	9.6	
Morbidity					
Transient tachypnea	56	12.9	5,887	3.3	<0.0001
Meconium aspiration syndrome	12	2.8	537	0.3	<0.0001
Respiratory distress syndrome	16	3.7	2,627	1.5	<0.0001
Other neonatal respiratory diagnoses	64	14.8	8,918	5.0	<0.0001
Jaundice	144	33.3	29,567	16.5	<0.0001
Feeding difficulty	66	15.2	7,306	4.1	<0.0001
Seizures	4	0.9	215	0.1	<0.0001
Sepsis	27	6.2	2,684	1.5	<0.0001
Insurance					<0.0001
Private	102	23.6	98,688	55.1	
Medicaid	283	65.4	59,883	33.4	
Uninsured	14	3.2	7,992	4.5	
Other	34	7.9	127,08	7.1	

Source: Kansas hospital discharge data, 2010-2014

- Significant geographic variation in the incidence of NAS was observed. High rates of NAS was observed in Urban counties (Douglas, Johnson, Leavenworth, Sedgwick, Shawnee, and Wyandotte; 2.8, 95% CI: 2.5, 3.1) and Semi-Urban counties (Butler, Crawford, Frankly, Geary, Harvey, Miami, Montgomery, Reno, Riley and Saline; 2.5, 95% CI: 1.9, 3.2).

Figure 2. Neonatal Abstinence Syndrome Incidence Rate* by Peer Group[§] in Kansas, 2010 - 2014

Urban Rate: 2.8, 95% CI: 2.5, 3.1
Semi-Urban Rate: 2.5, 95% CI: 1.9, 3.2
Densely-Settled Rural Rate: 1.3, 95% CI: 0.9, 1.8
Rural Rate: 2.2, 95% CI: 1.5, 3.2
Frontier Rate: Number too small to calculate rate

*NAS cases per 1,000 hospital births. [§]Peer groups are defined as those with similar population density based on the 2010 census. CI: confidence interval
Source: Kansas hospital discharge data, 2010-2014

Conclusions

- Between 2000 and 2014, the incidence of NAS in Kansas increased almost 900%. Although the incidence rate is lower in Kansas compared to other states, the increase in incidence for Kansas is much higher than national estimates (i.e., 300%).[2-4] This means that the occurrence of NAS diagnoses are steadily increasing among newborns in Kansas.

- Results link NAS diagnoses with serious comorbid conditions such as respiratory complications including meconium aspiration and respiratory distress syndrome, feeding difficulties, possible sepsis and seizures, and racial/ethnic and economic disparities. This is consistent with the literature.

Limitations

- For the purpose of this analysis, only live singleton and multiple births that were delivered at a Kansas hospital were included in the study. Additionally, only Kansas residents were included. Therefore, state estimates are not generalizable to births that occur outside of the hospital (e.g., home births).

- Although statistically significant NAS incidence rates were observed, these rates might not represent large increases. For example, given that there are 35,000 to 40,000 newborns each year in Kansas, an annual NAS rate of 2.6 per 1,000 hospital births could equate to 91 to 104 NAS diagnosed infants.

Public Health Implications

- Public health prevention efforts are necessary in curbing the sharp increase in the incidence of NAS. For example, standardized use of Kansas Tracking and Reporting of Controlled Substances (KTRACS) among clinicians and dispensers could help reduce inappropriate prescribing of addictive opioids.

- Collaborative efforts at the state- and local-level can help address gaps and provide education, counseling and referral services to help prevent adverse effects of drug use among pregnant women and their babies.