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Association between feeding difficulties and length of hospital stay among infants diagnosed with neonatal opioid withdrawal syndrome

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Background and Purpose

- The opioid epidemic in the United States has affected various populations, including women
- Opioid use disorder among pregnant women increased from 1.5 cases/1000 deliveries to 6.5 cases/1000 deliveries from 1999 to 2014
- The incidence of neonatal opioid withdrawal syndrome (NOWS), a drug withdrawal syndrome mainly associated with opioid exposure in-utero has significantly increased in the United States over the last decade
- Tennessee has one of the highest rate of NOWS birth in the United States
- The aim of this study is to determine if feeding tube use while on admission is associated with length of hospital stay among infants diagnosed with NOWS
- We also compared the differences between infants with NOWS who required the use of feeding tubes while on admission, and those that did not, based on infant and maternal characteristics

Methods

- Retrospective analysis of infants delivered between July 1, 2011 and June 30, 2016 at Ballad Health System
- Inclusion criteria were infants who were exposed to opioids in-utero and received a diagnosis of NOWS based on 2 consecutive Finnegan scores of 10, or 3 consecutive scores of 8, or treatment with morphine
- 294 infants who met these criteria were reviewed for infant and maternal characteristics
- Outcome variable was infant length of hospital stay and the predictor variable was feeding tube use an indicator for feeding difficulties
- Multiple linear regression was used to explore associations

Results

- Of the 294 infants diagnosed with NOWS
- Mean length of hospital stay was 15.1± 11.5 days
- 65 infants (22.11%) had feeding difficulties that necessitated use of feeding tubes
- Infants who used feeding tubes were significantly more likely to be born preterm (20.31% vs 8.73%, p=0.0096), admitted into the NICU (98.46% vs 51.09%, p= <0.0001), and require treatment with morphine (96.92% vs 58.08%, p= <0.0001) than infants who did not use feeding tubes
- After adjusting for confounders, infants that required feeding tube stay 4.2 days longer than those that did not require feeding tube (95% confidence interval 4.2-6.94, p=0.0029)

	Feeding tube (n=65), N (%)	No feeding tubes (n=229), N (%)	t/χ2	P
Age (years)	26.7±4.9	28.0±5.5	1.86	0.0642
Marital status				
Unmarried	47(73.44)	165(73.33)	0.000	0.9867
Married	17(26.56)	60(26.67)	3	
Medical insurance				
Medicaid or none	58(89.23)	219(95.63)	3.809	0.0681
Private, non-income dependent	7(10.77)	10(4.37)	4	
Number of prenatal care visits	8.76±4.02	8.10±4.0	0.88	0.3777
Parity	1.54±1.31	1.51±1.4	0.14	0.8918
Pregnancy tobacco use				
Yes	60(92.31)	200(87.34)	1.22	0.2687
No	5(7.69)	29(12.66)		
Pregnancy benzodiazepine use				
Yes	18(27.69)	55(24.02)	0.37	0.5450
No	47(72.31)	174(75.98)		
Pregnancy marijuana use				
Yes	11(16.92)	44(19.21)	0.17	0.6759
No	54(83.08)	185(80.79)		

Table 1. Maternal Characteristics of Opioid exposed newborns who developed NOWS

	Feeding tube (n=65)	No feeding tube (n=229)	t/χ2	P
Gestational age (weeks)	38.9±1.35	38.4±2.2	2.03	0.0436
Preterm birth < 37 weeks	13(20.31)	20(8.73)	6.71	0.0096
Birth weight (gm)	51(79.69)	209(91.27)	0.98	0.3270
Low birth weight <2500 gm	11(16.92)	31(13.54)	0.47	0.4911
≥ 2500 gm	54(83.08)	198(86.46)		
Gender				
Male	38(58.46)	125(54.59)	0.31	0.5789
Female	27(41.54)	104(45.41)		
Appgar score at 1 minute	7.84±1.24	8.1±0.8	1.74	0.0833
Appgar score at 5 minutes	8.9±0.48	8.96±0.47	1.08	0.2800
Admitted to NICU				
Yes	64(98.46)	117(51.09)	48.0	<.0001
No	1(1.54)	112(48.91)	1	
Treatment with morphine				
Yes	63(96.92)	133(58.08)	34.3	<0.000
No	2(3.08)	96(41.92)	8	1
Highest NAS score	14.46±3.07	13.99±2.62	1.24	0.2163
Mode of Delivery				
Vaginal	41(63.08)	146(63.76)	0.01	0.9201
C-section	24(36.92)	83(36.24)		
Infant received breastmilk				
Yes	36(55.38)	114(49.78)	0.63	0.4252
No	29(44.62)	115(50.22)	6	

Table 2. Infants Characteristics of newborns with NOWS

	unadjusted regression coefficient (95% C.I.)	P-value for unadjusted	Adjusted regression coefficient (95% C.I.)	P-value for adjusted
Feeding tube	B = 9.9 (6.92-12.87)	<0.0001	B=4.2 (1.44-6.95)	0.0029
Pre-term birth vs term birth	B = -1.31	0.5389	***	
NICU admission (Yes vs No)	B = 11.27	<0.0001	4.16 (1.61-6.7)	0.0015
Treated with Morphine (Yes vs no)	B = 14.55	<0.0001	10.78 (8.22-13.34)	<0.001
C-section vs vaginal delivery	B = -0.86	0.5404	***	
Received breastmilk (Yes vs No)	B = -0.81	0.5454	***	
Mother took Benzodiazepine during pregnancy (Yes vs No)	B = 5.72	0.0002	3.35 (0.99-5.72)	0.0056

Table 3. Linear regression model predicting Infant Hospital length of stay
*** removed from model

^a adjusted for maternal age, race, socioeconomic status, NICU admission, Benzodiazepine intake during pregnancy, and treatment with morphine

Conclusions

- Infants born with NOWS and with feeding difficulties are more likely to be born preterm, admitted into NICU, and require treatment with morphine
- Feeding difficulties are associated with increased length of hospital stay among infants diagnosed with NOWS.
- Health care providers should pay close attention to the feeding difficulties of babies with NOWS.