ACOG ANNUAL CLINICAL & SCIENTIFIC MEETING

MAY 19-21, 2023 | BALTIMORE, MD

Long Term Developmental Outcomes of Infants with Neonatal Abstinence Syndrome

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INTRODUCTION

Opioid use in pregnancy and rates of neonatal abstinence syndrome (NAS) are rising in the United States.[1] The number of babies born with NAS increased by 82% nationally from 2010 to 2017.[2] Increased risk of developmental, behavioral, educational, and psychological/mental health issues later in life have been linked to prenatal opioid-exposure.[3] Neonates with NAS requiring pharmacotherapy may be more vulnerable due to in utero and postnatal exposures,[4] however there is limited information on long-term developmental outcomes in infants with neonatal abstinence syndrome (NAS).

AIM

To evaluate the infant outcomes of women with opioid disorder based on newborn pharmacologic treatment of neonatal abstinence syndrome (NAS) following birth.

METHOD

- Retrospective, single center, cohort study
- Identified patients with opioid use disorder (active or in remission on maintenance therapy) presenting for delivery
- **Timeline:** January 2017 through July 2022.
- Newborns were divided based on pharmacologic treatment of NAS following birth.
- Infants were included if follow-up data was available.
- Pregnancy information, newborn demographics, and standard infant wellness visits up to four years of age were collected.
- Standardized developmental milestones along with any developmental delays were noted
  - Social-emotional; Language-communication; Physical-motor; Cognitive

https://www.cdc.gov/ncbddd/actearly/pdf/LTSAE-Checklist_COMPLIANT_30MCorrection_508.pdf

- Statistical analysis included Chi square and student t tests
- Significance levels of p <0.05 using SPSS

Table 1. Newborn outcomes of neonates with Neonatal Abstinence Syndrome (NAS) divided based on newborn pharmacologic treatment following birth

Outcomes	Treatment (n=170)	No Treatment (n=217)	P-value
Gestational age at delivery (wks.)	38 (22.4)	28 (12.9)	0.79
Birth weight (grams)	2923 ± 582	2959 ±645	0.02
Birthweight <2500 grams	75 (44.1)	94 (44.3)	0.06
Cesarean birth	141 (83.4)	138 (64.2)	0.68
Newborn toxicology positive	137 (80.6)	144 (66.7)	<0.001
Use of non-pharmacologic treatment	36/104 (34.6)	86/178 (48.3)	0.02
BF when appropriate	9.0 (4 – 41)	7.0 (1 – 27)	0.03
Length of stay (days) *PTB removed	167 (98.2)	215 (99.1)	<0.001
POSC on discharge	38 (22.4)	28 (12.9)	0.47

Data presented as n (%), mean ±SD, or median (range)
BF: breastfed, PTB: preterm birth, POSC:Plan of Safe Care

Table 2. Maternal characteristics of neonates with Neonatal Abstinence Syndrome (NAS) divided based on newborn pharmacologic treatment following birth

Characteristics	Treatment (n=170)	No Treatment (n=217)	P-value
Age (years)	32.8 ± 23.9	32.7 ± 21.3	0.471
BMI (kg/m2)	29.9 ± 6.3	30.8 ± 6.2	0.142
Active use in pregnancy	74 (43.8)	54 (25.2)	<0.001
Psychiatric medications	73 (42.9)	90 (41.5)	0.667
Buprenorphine	92 (54.1)	142 (65.4)	0.036
Methadone	57 (33.5)	39 (18.0)	0.002
Cesarean	75 (44.1)	94 (44.3)	0.672
Preterm birth <37 weeks	38 (22.4%)	28 (12.9%)	0.044

Data presented as n (%), mean ±SD, or median (range)

RESULTS

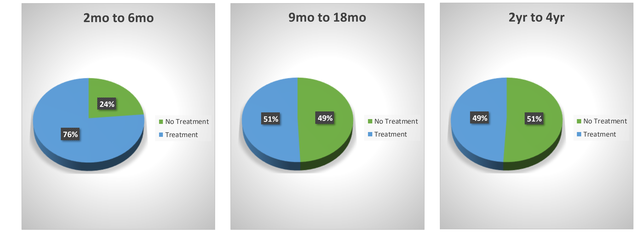
- *387 infants with 170 (44%) requiring pharmacologic treatment of NAS and 217 (56%) not requiring treatment.*
- *The gestational age at delivery, mode of delivery, birth weight, and rate of Plan of Safe Care (POSC) on discharge were similar between groups. (Table 1)*
- *Those newborns receiving treatment were more likely to experience preterm birth, have a positive toxicology, and a longer delivery hospitalization length of stay.*
- *Higher percentage of neonates with NAS required pharmacologic treatment if on methadone for maintenance therapy versus buprenorphine (Table 2)*
- *Developmental outcomes related to social-emotional delay, language-communication delay, cognitive delay, and physical-motor delay were similar between groups (Table 3)*
  - *2-6 months (n=177)*
  - *9-18 months (n=138)*
  - *2-4 years (n=94)*
- *The most frequent developmental delay across groups was physical delay (2 months to 4 months) and language delay (9 months to 4 years)*

Table 3. Developmental outcomes of neonates with Neonatal Abstinence Syndrome (NAS) divided based on newborn pharmacologic treatment following birth

Assessments	Visit 2m to 6m		Visit 9m to 18m		Visit 2yr to 4yr	
	Tx (n=78)	No Tx (n=99)	Tx (n=59)	No Tx (n=79)	Tx (n=34)	No Tx (n=60)
Social-emotional delay (n)	1	0	4	8	4	12
Language delay (n)	1	0	16	19	14	18
Cognitive delay (n)	2	0	6	8	4	11
Physical delay (n)	6	4	13	16	5	8
Early referral (n)	2	1	16	17	12	14
Specialist referral (n)	4	2	7	9	9	11

NAS: neonatal abstinence syndrome, Tx: treatment, m: month, yr: year
All comparisons between Tx and No Tx are non-significant (P>0.05)

Figure 1. Frequency of any developmental delay across age groups of neonates with Neonatal Abstinence Syndrome (NAS) depending on newborn pharmacologic treatment following birth



CONCLUSIONS

Infants of mother's with opioid use disorder that experienced neonatal abstinence syndrome (NAS) have similar long-term outcomes regardless of pharmacologic treatment for NAS following birth.

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ACKNOWLEDGEMENTS

Maternal Opioid Management Support (MOMS) Team & the Regional Perinatal Center of Suffolk County

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