



Penn Medicine

Lancaster General Hospital

Hot Topics in Family Medicine, Obstetrics & Pediatrics II

Neonatal Opioid Withdrawal Syndrome (NOWS)

Valerie Martin, DO

martinva@chop.edu

Valerie.martin@pennmedicine.upenn.edu

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Objectives

- ▶ Describe the opioid epidemic as it relates to infants
- ▶ List methods to support infants with NOWS





Neonatal Opioid Withdrawal Syndrome

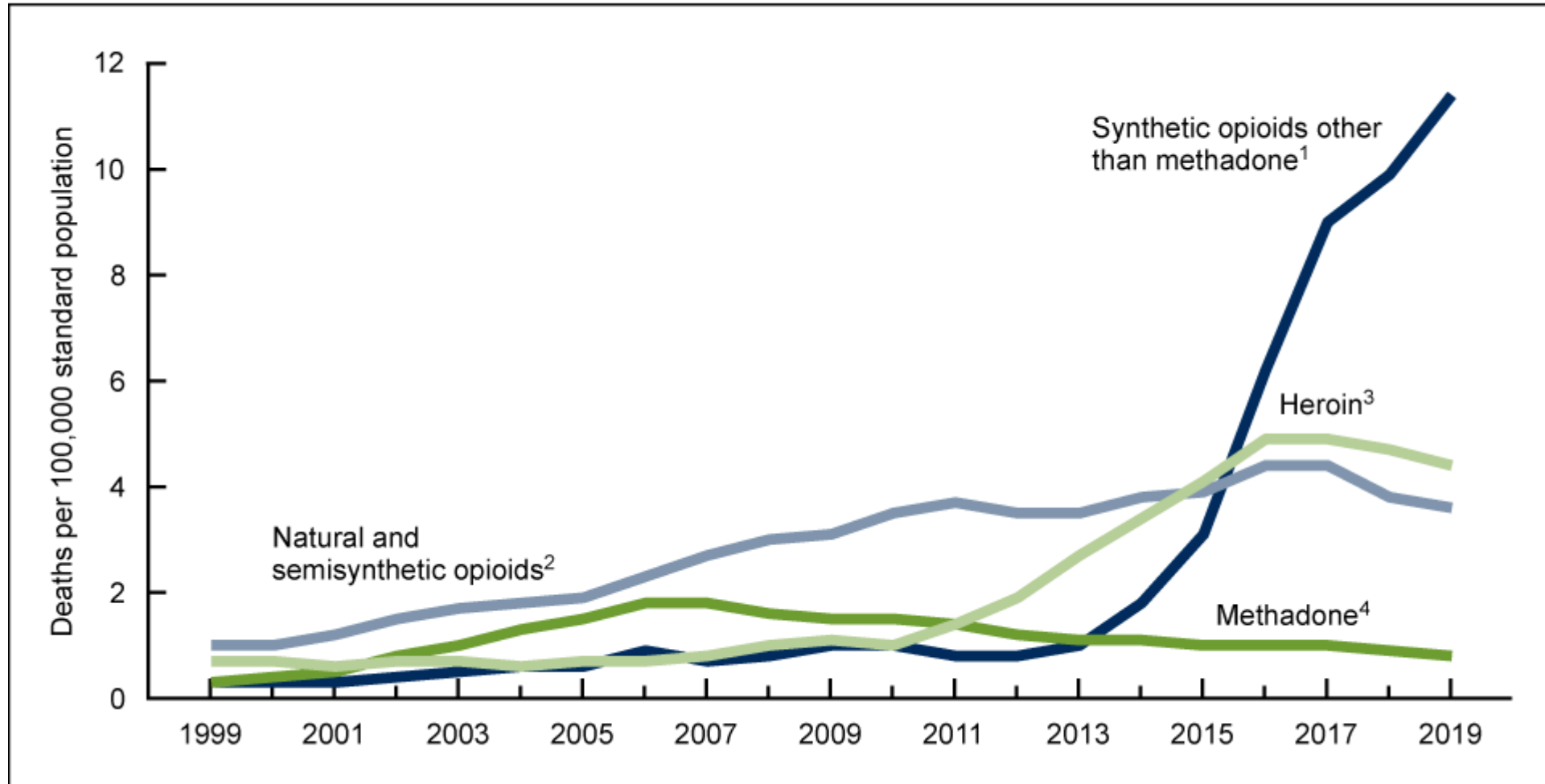
(NOWS):

withdrawal experienced by a newborn due to prenatal opioid exposure



Opioid Crisis 2019

Figure 3. Age-adjusted rates of drug overdose deaths involving opioids, by type of opioid: United States, 1999–2019



National Center for Health Statistics, National Vital Statistics System, Mortality



1 infant is diagnosed with NOWS every 15 minutes

Patrick and Lorch 2021



PA's NOWS incidence increased >1000% in 10 years

Patrick and Lorch 2021

NOWS: Case Presentation

- ▶ **35 week gestation** infant born by repeat c-section to a 26 year old G4P3 female on **Suboxone for MAT**.
 - Limited prenatal care
 - Daily **cigarette** smoker
 - **Paroxetine (Paxil)** for anxiety/depression



NOWS: Treatment Support

- ▶ What to treat
 - Opioids
 - Non-narcotic drugs
- ▶ When to treat

- ▶ How to treat

Non-narcotic Withdrawal

Drug	Signs
Alcohol	Poor sleeping pattern, hyperphagia, diaphoresis
Barbiturates	Irritability, severe tremors, hyperacusis, diarrhea, increased tone, hyperphagia, vomiting
Caffeine	Jitteriness, vomiting, bradycardia, tachypnea
Diazepam (Valium®)	Hypotonia, poor suck, hypothermia, apnea, hypertonia, hyperreflexia, tremors, vomiting, tachypnea
SSRIs – (e.g. Celexa®, Lexapro®, Prozac®, Paxil®, Zoloft®)	Irritability, tremors, poor suck, feeding difficulty, hypertonia, tachypnea, sleep disturbance, hypoglycemia, seizures

Hudak ML and Tan RC et al. 2012



NOWS: Co-exposure

- ▶ The risk of NOWS increases 30-60%
 - Antidepressants
 - Benzodiazepines
 - Gabapentin

- ▶ Marijuana co-exposure increases NOWS

Sanlorenzo et al 2018



NOWS: Treatment Support

- ▶ What to treat
- ▶ When to treat
 - Onset of drug withdrawal
 - Patient specific factors
- ▶ How to treat

Non-narcotic Withdrawal

Drug	Onset	Duration
Alcohol	3-12 h	18 mo
Barbiturates	1-14 d	4-6
Caffeine	At birth	1-7 d
Diazepam (Valium®)	Hours-weeks	8 mo
SSRIs – (e.g. Celexa®, Lexapro®, Prozac®, Paxil®, Zoloft®)	Hours-days	1-4 wk

Hudak ML and Tan RC et al. 2012



Opioid Withdrawal

Drug	Onset	Duration
Heroin	24 hr	6 months
Methadone	24-72 hr (5-7 days)	

Hudak ML and Tan RC et al. 2012

NOWS: Case Presentation

- ▶ **35 week gestation** infant born by repeat c-section to a 26 year old G4P3 female on Suboxone for MAT.





NOWS: Preterm Infants

- ▶ Preterm infants have less severe withdrawal symptoms
 - Immature P450 systems
 - Limited dendritic connections
 - Decreased opiate exposure
 - Decreased placenta transfer

Dysart K et al 2007



NOWS: Treatment Timing

- ▶ NOWS treatment must begin before the infant is born
 - MAT
 - Pregnancy counseling and monitoring
 - Links to community resources
 - Breast feeding support
 - Parental education



NOWS: Case Presentation

- ▶ 35 week gestation infant born by repeat c-section to a 26 year old G4P3 female on Suboxone for MAT.
 - Limited prenatal care
 - Daily cigarette smoker
 - Paroxetine (Paxil) for anxiety/depression





NOWS: Non-pharmacological Care

- ▶ Keeping mother/infant dyad together
 - Rooming-in
- ▶ Breastfeeding support
- ▶ Location of therapy
 - Limit light exposure
 - Limit noise
 - Cluster care

Wachman et al. 2018





NOWS: Non-pharmacological Care

- ▶ Keeping mothers and infants together should be the mainstay of non-pharmacological care
 - Decreases duration of opioid therapy
 - Decreases length of stay
 - Decreases hospital costs

Wachman et al. 2018





NOWS: Non-pharmacological Care

- ▶ Keeping mothers and infants together should be the mainstay of non-pharmacological care
 - Providing quiet spaces
 - Providing parental sleep spaces
 - Providing meals
 - Providing MAT medications
 - Lactation support
 - Parental education
 - Alternate care givers

Wachman et al. 2018



Osteopathic Tenet	NOWS Support
The body is a unit	Maintaining Mother/infant dyad
The body is capable of self-regulation, self healing and health maintenance	Priority for non-pharmacological care and breast feeding support
Structure and function are reciprocally interrelated	Reproducing the environment of the womb: Swaddling, white noise, dark environment
Rational treatment is based upon an understanding of the basic principles of body, unity, self-regulation, and the interrelationship of structure and function	



NOWS: Case Presentation

- ▶ 35 week gestation infant born by repeat c-section to a 26 year old G4P3 female on Suboxone for MAT.
 - Initial hospital course complicated by:
 - poor feeding
 - high tone
 - hypoglycemia





NOWS: Pharmacological Support

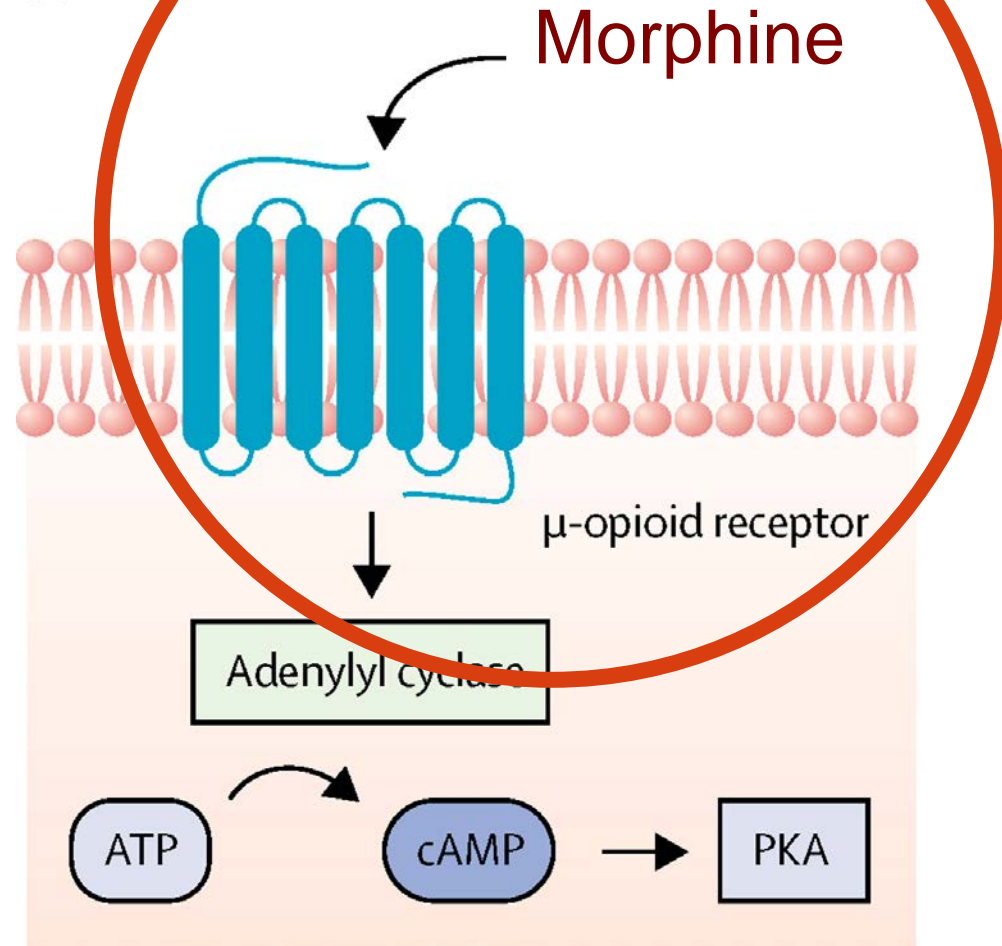
- ▶ Morphine
- ▶ Buprenorphine
- ▶ Methadone
- ▶ Clonidine
- ▶ Phenobarbital



NOWS: Pharmacological Support

A

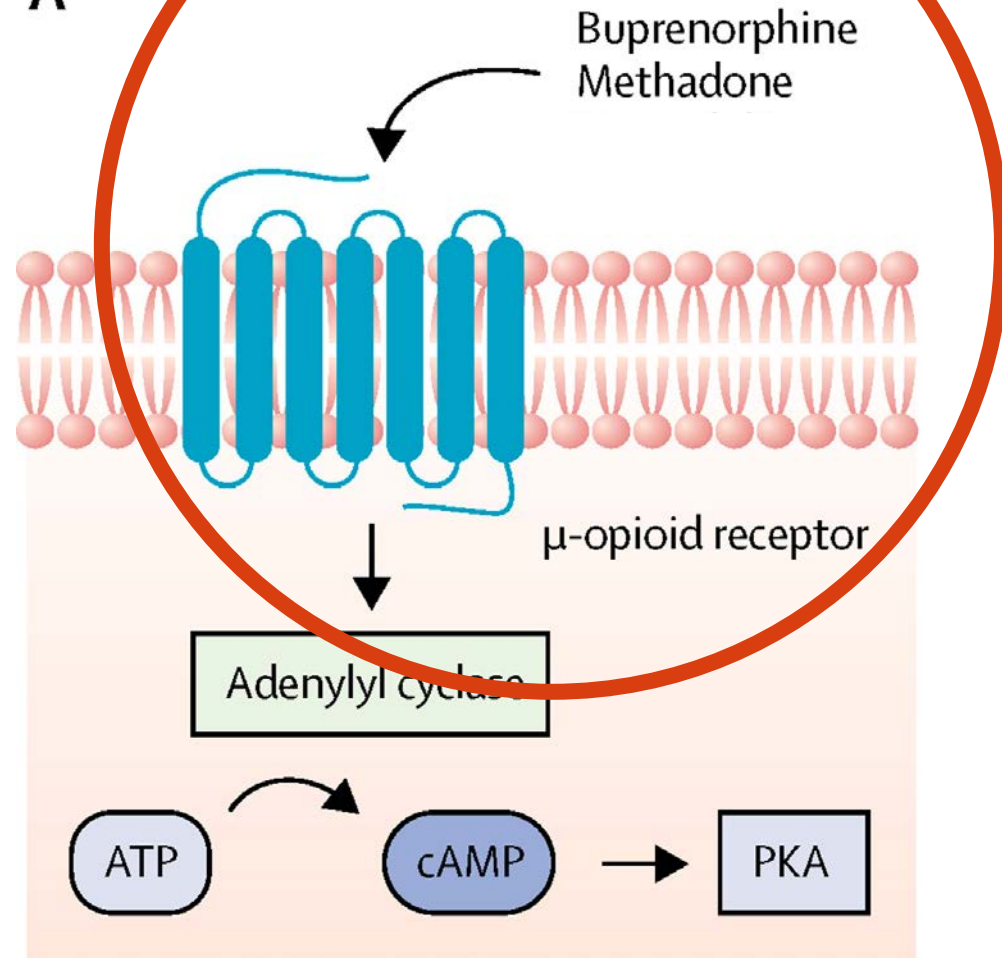
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NOWS: Pharmacological Support

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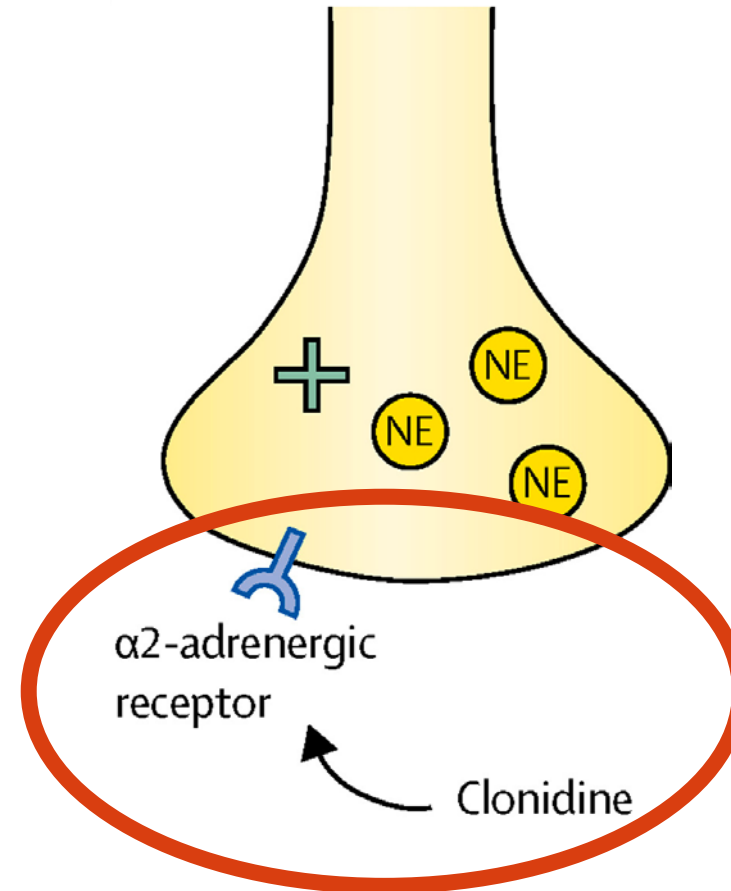
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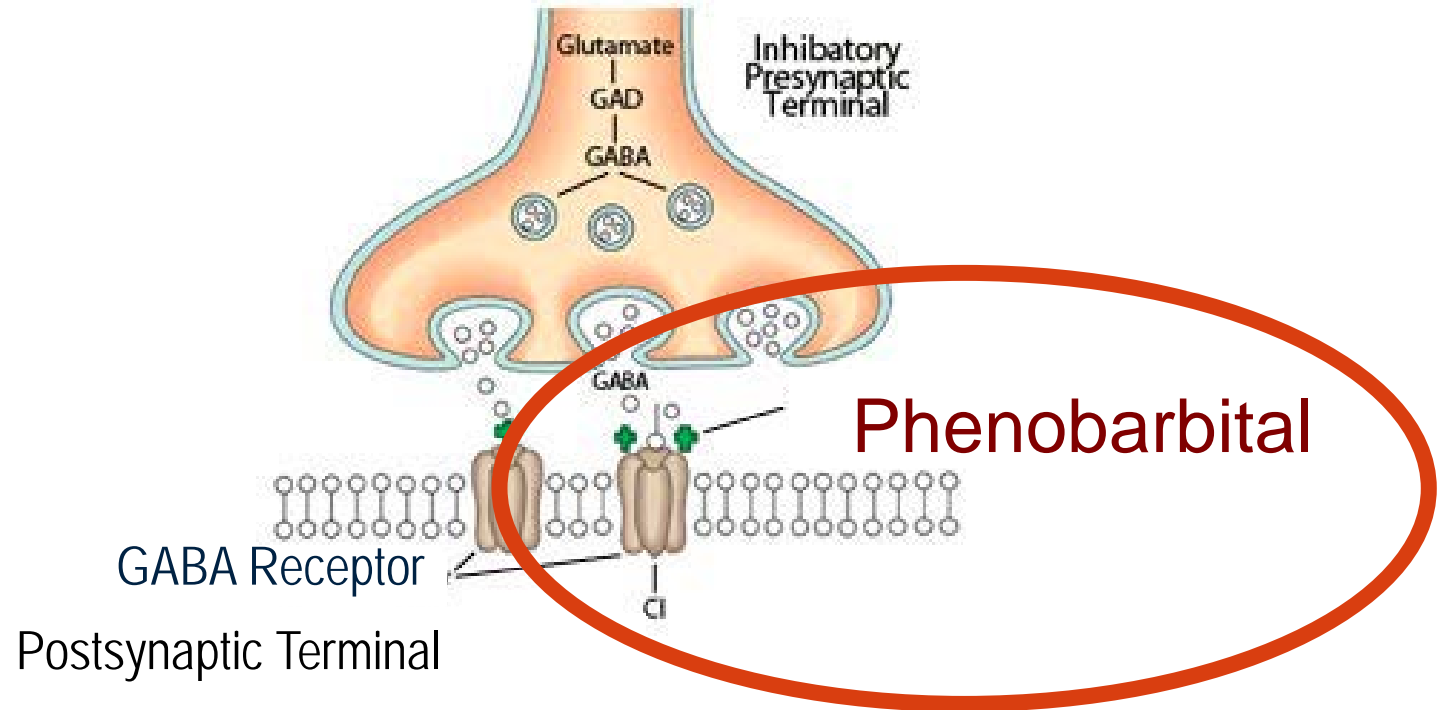
NOWS: Pharmacological Support

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NOWS: Pharmacological Support

- ▶ Morphine
- ▶ Buprenorphine
- ▶ Methadone
- ▶ Clonidine
- ▶ **Phenobarbital**



NOWS: Case Presentation

- ▶ 35 week gestation infant born by repeat c-section to a 26 year old G4P3 female on Suboxone MAT
 - Readmitted 1 week later to pediatrics unit for excessive weight loss



NOWS: Knowledge Gaps

- ▶ Standard definition
- ▶ Standard scoring system
 - Finnegan scoring system
 - Eat, Sleep, console
- ▶ Preferred pharmacological therapy
- ▶ Evidence based quality measures

Patrick and Lorch 2021

Summary

- ▶ Support for NOWS begins prior to the infant being born
- ▶ Successful NOWS therapy prioritizes the Mother/Infant dyad
- ▶ Ongoing research is needed to understand optimal care for infants with NOWS

References

- ▶ Dysart K, Hsieh H, Kaltenbach K and Greenspan JS. “Sequela of preterm versus term infants born to mothers on a methadone maintenance program: differential course of neonatal abstinence syndrome.” *Journal of Perinatal Medicine*. March 2007 35 (4); 344-346. DOI 10.1515?JPM.2007.063.
- ▶ Hudak ML and Tan RC. THE COMMITTEE ON DRUGS, AND THE COMMITTEE ON FETUS AND NEWBORN. “Neonatal Drug Withdrawal” *Pediatrics*. Feb 2012 129 (2). doi:10.1542/peds.2011-3212.
- ▶ Patrick SW, Barfield WD, and Poindexter BB. COMMITTEE ON FETUS AND NEWBORN, COMMITTEE ON SUBSTANCE USE AND PREVENTION. “Neonatal Opioid Withdrawal Syndrome”. *Pediatrics*. Nov 2020, 146 (5). DOI: <https://doi.org/10.1542/peds.2020-029074>.
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- ▶ Hedegaard H, Miniño AM, Warner M. Drug Overdose Deaths in the United States, 1999-2019. Hyattsville, MD: National Center for Health Statistics. December 2020.
- ▶ Wachman EM, Schiff DM, and Silverstein M. Neonatal Abstinence Syndrome Advances in Diagnosis and Treatment. *JAMA Pediatrics*. 2018;319(13):1362-1374.



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