Neonatal Abstinence Syndrome Management From Prenatal Counseling to Postdischarge Follow-up Care: Results of a National Survey

AUTHORS
Aakriti Mehta, BA,[1] Kathryn Dawn Forbes, MD, MS, FAAP,[2] Venkata Sasidhar Kuppala, MD, FAAP[2]

[1]*University of Louisville School of Medicine, Louisville, Kentucky; and*
[2]*Kosair Children's Hospital Neonatal Specialists/ Norton Health Care, Louisville, Kentucky*

KEY WORDS
drug abuse/use, neonatal abstinence syndrome, opiate-dependent neonate, survey

ABBREVIATIONS
AAP: American Academy of Pediatrics
NAS: neonatal abstinence syndrome

The material presented here is original research, has not been previously published and has not been submitted for publication elsewhere while under consideration.

www.hospitalpediatrics.org
doi:10.1542/hpeds.2012-0079

Address correspondence to Kathryn Dawn Forbes, MD, MS, FAAP, 4121 Dutchmans Ln, Suite 301, Louisville, KY 40207. E-mail: kdawnforbes@gmail.com

HOSPITAL PEDIATRICS (ISSN Numbers: Print, 2154 - 1663; Online, 2154 - 1671).

FINANCIAL DISCLOSURE: The authors have indicated they have no financial relationships relevant to this article to disclose.

FUNDING: This study was funded by the Premature & Sick Infants Fund, Inc; Helping At-Risk Pregnancies Succeed; and Kosair Children's Neonatal Specialists.

POTENTIAL CONFLICT OF INTEREST: The authors have indicated they have no potential conflicts of interest to disclose.

abstract

OBJECTIVE: The goal of this study was to assess the current status of neonatal abstinence syndrome management from prenatal counseling to postdischarge follow-up care.

METHODS: An anonymous electronic survey of 26 questions was sent to the medical directors or charge nurses at 383 NICUs. Contact information was obtained by using the American Medical Association's FREIDA online database and the 2011 American Hospital Association Guide Book. Responses were gathered by using the SurveyMonkey online portal, which was designed to grant responders 1-time access.

RESULTS: There were 179 responses (47%), and 0.6%, 16.2%, and 83.2% identified themselves as level I, level II, and level III units, respectively. Prenatal counseling for at-risk mothers is offered by 56.5% of responders. Written protocols for neonatal abstinence syndrome management were reported by 72.5%. All but 3 institutions used toxicology screening in cases of suspected in utero drug exposure. Formalized scoring is used by 98.7%. Breastfeeding is recommended by 74.1%. Morphine (56.1%), methadone (24.8%), and tincture of opium (12.7%) are the most common first-line agents reported in opiate withdrawal, whereas morphine (51.0%), methadone (19.7%), and phenobarbital (13.6%) are used in polydrug withdrawal. Less than 20% of NICUs use clonidine. Home treatment programs are offered by 34.0% of responders, and long-term developmental follow-up is offered by 71.3%.

CONCLUSIONS: There is considerable diversity in the management of neonatal abstinence syndrome. Alternative management strategies, including prenatal counseling and home treatment programs, need to be explored to improve overall patient care.

Neonatal drug withdrawal can occur with in utero exposure to a multitude of medications, including central nervous system stimulants and depressants, hallucinogens, narcotics, cocaine, caffeine, or tobacco, whereas neonatal abstinence syndrome (NAS) traditionally refers to an array of symptoms associated with in utero opioid exposure. The National Survey of Drug Use and Health recently estimated that 4.4% of female subjects between the ages of 15 and 44 years used illicit substances during their pregnancy.[1]

In 2012, the American Academy of Pediatrics (AAP) reviewed their guidelines concerning the management of NAS.[2] Previous surveys of practice have demonstrated that morphine is the most commonly used first-line drug in opiate and

polydrug withdrawal; however, some variability exists in the pharmacologic treatment of NAS.[3,4] Although other guidelines have discussed other aspects of care, such as prenatal counseling, home treatment options, and postdischarge follow-up, the 2012 AAP guidelines made little mention of these topics that could play a significant role in the management of these infants.[2,5,6] We hypothesized that just like the variations in pharmacologic treatment, there is disparity among NICUs in the overall management of NAS patients from prenatal counseling to post-NICU discharge follow-up. The current survey attempted to assess variation in current clinical practice to identify areas in which clinical care could be improved.

METHODS

We performed an anonymous electronic survey of NICUs across the United States regarding overall management of infants with NAS from September 2011 through November 2011. The survey was directed to 383 NICU medical directors or charge nurses; their contact information was obtained by using the American Medical Association's FREIDA online database and the 2011 American Hospital Association Guide Book. Responses were gathered by using the SurveyMonkey online portal, which was designed to grant responders 1-time access. E-mail reminders were sent at 3 and 6 weeks to encourage participation.

RESULTS

Demographics of Participants

A total of 179 (47%) participants responded. Not all respondents answered each question. Table 1 highlights the demographic characteristics of participants, as well as provides a general overview of our results from prenatal counseling through outpatient follow-up. Of the participants, 149 (83.2%) were level III, 29 (16.2%) were level II, and 1 (0.6%) was a level I NICU. More than one-half of the responders (n = 91 [50.8%]) indicated affiliation with an academic institution.

Prenatal Counseling

More than one-half of the responders (n = 90 [56.5%]) reported availability of prenatal counseling for pregnant drug-abusing women. Of these, 57 (63.3%) offer counseling in the first trimester. The majority of the responders (n = 85 [50.6%]) reported an association with community addiction treatment centers that primarily use opiate maintenance treatment.

NICU Management

The majority of respondents (n = 155 [92.8%]) reported treating an average of ≤5 infants with NAS per day. The most common average length of hospital stay was reported between 11 and 15 days (n = 44 [29.5%]). The most common management strategy reported (n = 85 [54.1%]) was combined use of supportive care and pharmacotherapy. Use of a standardized protocol for NAS management was reported by 121 responders (72.5%). Finnegan scoring was the most common tool reported (n = 150 [95.5%]) to assess severity of symptoms. Formal training on scoring tools for the nursing staff was offered by 113 (66.9%) of responders, with 55 (32.5%) offering no formal training. The majority of responders (n = 109 [74.1%]) recommend breastfeeding for mothers who are receiving opiate replacement therapy.

Pharmacotherapy

As shown in Table 2, morphine was reported as the most commonly used first-line treatment of both opiate and polydrug withdrawal (56.1% and 51.0%, respectively). Methadone was reported as the second most commonly used drug (24.8% for opiate withdrawal and 19.7% for polydrug withdrawal). Phenobarbital was the most commonly reported adjunct treatment (48.4% in opiate withdrawal and 43.1% in polydrug withdrawal). Clonidine was reported as a first-line medication by 1 responder, and 30 responders (19.4%) reported its use in adjunct therapy.

Toxicology Screening

All but 3 respondents used toxicology screening in cases of suspected in utero drug exposure. Almost one-half (n = 84 [49.1%]) reported using a combination of maternal urine, infant urine, and infant meconium. The remainder used other screening tools (Table 3). Umbilical cord tissue was used as a part of screening by 18 responders (10.6%).

Post-NICU Discharge Management

At-home pharmacologic treatment options for infants with NAS were reported by 51 (34.0%) respondents (Table 4). Methadone (n = 20 [39.2%]), phenobarbital (n = 17 [32.7%]), and morphine (n = 9 [17.3%]) were the most commonly reported medications used in home treatment programs. Patients are seen by physicians at least once per week during home treatment in 32 (62.6%) institutions. The most common average length of at-home treatment is between 11 and 30 days (n = 25 [54.3%]). Long-term developmental follow-up after discharge for NAS patients is offered by 107 (71.3%) responders.

DISCUSSION

Although other studies have focused primarily on supportive care and pharmacotherapy, ours was the first

TABLE 1 NAS Management Survey Results

Category	Response	%	No. of Institutions
NICU level, *n* = 179	Level I	0.6	1
	Level II	16.2	29
	Level III	83.2	149
Academic affiliation, *n* = 179	Yes	50.8	91
	No	49.2	88
Geographical setting, *n* = 178	Urban	40.4	72
	Metropolitan	20.2	36
	Suburban	31.5	56
	Rural	7.9	14
Average daily NAS census, *n* = 167	≤5	92.8	155
	6–10	6.0	10
	11–15	1.2	2
	16–20	0.0	0
	≥21	0.0	0
Average NAS hospital stay, *n* = 149	≤10 d	14.8	22
	11–15 d	29.5	44
	16–20 d	13.4	20
	21–25 d	12.8	19
	26–30 d	15.4	23
	31–35 d	6.7	10
	36–40 d	4.7	7
	41–45 d	1.3	2
	46–50 d	1.3	2
	≥51 d	0.0	0
Written protocol for NAS management, *n* = 167	Yes	72.5	121
	No	27.5	46
Prenatal counseling, *n* = 159	Yes	56.5	90
	Begins in first trimester	63.3	57
	Begins in second trimester	16.7	15
	Begins in third trimester	11.3	18
	No	43.4	69
Protocol of community drug abuse treatment centers, *n* = 168	Primarily maintenance treatment	50.6	85
	Primarily detoxification	0.0	0
	Equal emphasis on maintenance and detoxification	14.3	24
	No centers available	2.4	4
	Unsure	32.7	55
Toxicology screening, *n* = 171	No	1.8	3
	Yes	98.2	168
	Single agent	7.0	12
	Combined agents	91.2	156
NAS symptom scoring tool, *n* = 157	Finnegan scoring	95.5	150
	Lipsitz tool	1.9	3
	Ostrea system	0.0	0
	Rivers scoring scale	1.3	2
	Riley infant pain scale	0.6	1
	None used	1.3	2
	Other	8.3	13
Formal training on scoring tool use, *n* = 169	In-house training program	66.9	113
	External training program	0.0	0
	None provided	32.5	55
	NA; no scoring tool used	0.6	1
Primary modality of NAS management, *n* = 157	Primarily pharmacotherapy, with adjunct supportive care	19.7	31
	Primarily supportive care, with adjunct pharmacotherapy	26.1	41
	Equal reliance on both supportive care and pharmacotherapy	54.1	85
	Other	2.5	4
Use of clonidine, *n* = 155	Yes	19.4	30
	No	80.6	125
Support breastfeeding during opiate maintenance, *n* = 147	Yes	74.1	109
	No	25.9	38

TABLE 1 Continued

Availability of home treatment, $n = 150$	Yes	34.0	51
	No	66.0	99
Availability of long-term developmental follow-up, $n = 150$	Yes	71.3	107
	Provided for all NAS/in utero drug exposure	41.3	62
	Scheduled as needed	30.0	45
	No	28.6	43

NA, not applicable.

comprehensive survey, to our knowledge, to evaluate the management of infants with NAS in the United States from prenatal counseling to long-term developmental follow-up. Although our survey was conducted before the publication of the 2012 AAP guidelines, our results show areas of variation between current practice and the new recommendations. We hope that highlighting these discrepancies will aid in the change of physician practices toward the new standard of care according to evidence-based guidelines.

Prenatal Counseling

Our survey found that, at present, only 57% of NICUs surveyed provide prenatal counseling for at-risk mothers. Prenatal counseling addressing substance abuse issues in a nonjudgmental environment can serve as a valuable educational and community outreach tool, and it may reduce NAS-related complications. Pregnancy serves as strong motivation to change risky behaviors; the presentation of clear recommendations, weaning and detoxification options, and emphasis on the patient's freedom of choice may result in positive change.[7,8]

In 1999, Kukko and Halmesmäki[9] studied the effect of prenatal substance abuse counseling in 120 drug-abusing women in Finland. Through intensive supportive treatment, including psychiatric consultation, hospital management of withdrawal, and social worker interaction, 61% ($n = 73$) of the women were able to significantly reduce or eliminate drug use. Perinatal outcomes were improved in terms of increased gestational age and increased birth weight. Tremor, irritability, and floppiness were also less prevalent in the infants born to women who eliminated or reduced their drug use (19%) compared with women who continued drug use (48%). Because early attention to substance abuse issues may improve fetal, neonatal, and maternal outcomes,[7] we hope that more institutions adopt structured prenatal counseling.

Toxicology Screening

Our results indicate that a majority of respondents prefer the use of multiple modalities of toxicology screening over a single agent in cases of suspected in utero drug exposure (91.2% vs 7%, respectively) (Table 3). The 2012 AAP guidelines recommend using multiple methods to screen for maternal substance abuse, including history, maternal urine testing, and newborn urine and/or meconium specimens.[2] Umbilical

TABLE 2 Preferred Pharmacologic Management of NAS

Medication	First-Line Opiate Withdrawal		Adjunct Opiate Withdrawal		First-Line Polydrug Withdrawal		Adjunct Polydrug Withdrawal	
	%	No. of Institutions	%	No. of Institutions	%	No. of Institutions	%	No. of Institutions
Morphine	56.1	88	11.0	17	51.0	75	11.8	17
Methadone	24.8	39	11.6	18	19.7	29	9.7	14
Tincture of opium	12.7	20	1.3	2	11.6	17	0.7	1
Phenobarbital	5.1	8	48.4	75	13.6	20	43.1	62
Other	1.9	3	1.3	2	7.5	11	6.9	10
None	1.3	2	20.0	31	3.4	5	25.0	36
Clonidine	0.0	0	5.8	9	0.7	1	4.9	7
Paregoric	0.0	0	0.6	1	0.0	0	0.7	1
Chlorpromazine	0.0	0	0.6	1	0.0	0	0.7	1
Buprenorphine	0.0	0	0.0	0	0.0	0	0.0	0
Diazepam	0.0	0	0.6	1	0.0	0	3.5	5
Chloral hydrate	0.0	0	0.0	0	0.0	0	0.0	0
	$n = 157$		$n = 155$		$n = 147$		$n = 144$	

TABLE 3 Toxicology Screening for in utero Drug Exposure

Modality	%	No. of Institutions ($n = 171$)
Single agent	7.0	12
Maternal urine	1.8	3
Infant urine	1.2	2
Meconium	2.9	5
Umbilical cord	1.2	2
Combined agents	91.2	156
Maternal urine + infant urine	16.4	28
Maternal urine + meconium	5.8	10
Maternal urine + infant urine + meconium	49.1	84
Infant urine + meconium	10.5	18
Umbilical cord + maternal urine	1.8	3
Umbilical cord + infant urine + meconium	2.3	4
Umbilical cord + maternal urine + infant urine + meconium	5.3	9
No toxicology screening	1.8	3

cord tissue may also be considered a viable screening tool because it yields comparable results to meconium testing[2] and has the added benefit of easier collection and earlier send-out, considering all meconium must be passed before sample analysis.[10,11] CordStat is the umbilical tissue screen measure offered by United States Drug Testing Laboratory, Inc; it stores positive samples for 1 year and negative samples for 1 week to diagnose late-onset NAS. Despite an increased cost compared with meconium testing ($230 vs $150), CordStat offers equal or improved sensitivity, quicker results (1–2 days vs 2–3 days), and longer storage.[12] Our survey indicates that despite reliable results and potential advantages to meconium screening, umbilical cord testing remains an infrequently used screening modality.

Pharmacotherapy

Our results also indicate that morphine and methadone are the most commonly used pharmacologic agents in both opiate (56% and 25%, respectively) and polydrug (51% and 20%, respectively) withdrawal. Unfortunately, the majority of our knowledge regarding pharmacotherapy comes from common practice surveys instead of from much-needed, well-designed clinical trials. Currently, methadone is the only medication approved by the US Food and Drug Administration for use in treating NAS, although physicians use a variety of off-label medications for withdrawal management.[13] Based on the aforementioned limited evidence from controlled clinical trials, the 2012 AAP guidelines recommend the use of oral morphine and methadone for opioid withdrawal when pharmacologic treatment is indicated.[2]

Recent small trials have shown that use of clonidine, an α_2-receptor agonist, is more effective at decreasing duration of treatment and period of hospitalization in NAS patients when used as monotherapy or in conjunction with chloral hydrate than morphine when used as monotherapy or in conjunction with phenobarbital.[14] Adjunct use of clonidine with diluted tincture of opium also showed significant reduction in length of therapy over diluted tincture of opium alone.[15] However, our results show limited use of clonidine as either first-line treatment ($n = 1$ [0.7%]) or adjunct therapy ($n = 19$ [30%]). The 2012 AAP guidelines state that, based on limited evidence, clonidine is also effective as primary or adjunct therapy, but further prospective trials are warranted.[2]

TABLE 4 Characteristics of Home Treatment Programs

Category	Response	%	No. of Institutions
Pharmacotherapy, $n = 51$	Methadone	39.2	20
	Phenobarbital	32.7	17
	Morphine	17.3	9
	Tincture of opium	7.7	4
	Clonidine	1.9	1
Frequency of physician visits, $n = 51$	Daily	0.0	0
	2—3 times per week	11.7	6
	Once per week	50.9	26
	Once every other week	7.8	4
	As-needed	23.5	12
	Home health nursing only	5.9	3
Length of at-home treatment, $n = 46$	≤10 d	6.5	3
	11—30 d	54.3	25
	31—60 d	34.8	16
	≥1 d	4.3	2

Breastfeeding of NAS Infants

Although small amounts of methadone are able to enter breast milk, several trials have indicated that trace amounts of opiate analgesics do not significantly precipitate withdrawal-like effects in infants,[16,17] and the AAP recommends that mothers receiving methadone maintenance treatment breastfeed, if not otherwise contraindicated.[2] Despite this recommendation, >25% of our respondents do not advocate breastfeeding in this

population. In addition to promoting positive early infant attachment, breastfeeding has been shown to reduce NAS scores, treatment duration and dose, and duration of hospitalization.[18] In a study of infants born to drug-dependent mothers, Abdel-Latif et al[18] found that the mean Finnegan scores for the first 9 days of life were considerably lower in breastfed infants than in formula-fed infants. In addition, breastfed infants were less likely to require pharmacologic treatment of withdrawal than formula-fed infants (52.9% vs 79%, respectively), and overall treatment duration was 22.8 days less in the breast milk group. Due to these proven benefits and the support of the AAP, more institutions should advocate breastfeeding to mothers participating in opiate maintenance programs.

Home Treatment Programs

Traditional strategies for NAS and neonatal withdrawal have focused on inpatient management, although several studies have examined the safety and efficacy of home treatment programs. Home treatment programs for NAS were offered by 34.0% ($n = 51$) of our survey respondents. Our results display significant variability among institutions in terms of pharmacologic management, duration of treatment, and frequency of physician follow-up (Table 4).

Home treatment programs have been shown to decrease duration of treatment, expedite hospital discharge,[19,20] and reduce costs associated with NICU stay.[21] Although inpatient management speeds recovery and weaning of drug therapy in these infants, less severe withdrawal symptoms have been identified with close maternal—infant contact, especially away from the disturbances of an ICU.[20] Saiki et al[22] examined outcomes after a change in hospital protocol that shifted care from the NICU (2002—2005) to postnatal wards (2006—2007). Their study concluded that infants with in utero drug exposure have overall improved outcomes if cared for exclusively on the postnatal ward with their mothers (rather than admitted to the neonatal unit). Compared with infants managed in the NICU, postnatal ward care was associated with significantly fewer infants requiring pharmacologic treatment (11% vs 45%), a shorter duration of treatment (~7 vs 13 days), and a shorter average hospital stay (~16 vs 20 days). In 2011, Backes et al[21] reported that the average cost of treatment entirely in a hospital inpatient setting was $27 546 per patient versus $13 729 for treatment in an inpatient setting followed by a methadone treatment outpatient program. The 46 patients who completed their treatment in the outpatient setting collectively resulted in a reduction of in-hospital costs of $635 582. In addition, there were no increased risks of short-term adverse outcomes, emergency hospitalizations, or readmissions associated with outpatient treatment.

Home treatment programs place a great deal of responsibility on the infant's caretaker. Drug-abusing caregivers often have poor compliance with outpatient appointments and provision of treatment, however. Therefore, it is crucial that both the home environment and the family's parenting abilities be investigated before hospital discharge. In the study by Backes et al,[21] factors favoring success in home treatment include the infant tolerating feeding, stable pharmacologic doses, average NAS scores <10 for 2 to 3 days, approval by a social worker, and mothers enrolled in an opiate management program. To decrease the safety risks inherent with home treatment programs, formal guidelines need to be established for outpatient monitoring to ensure patient safety while minimizing hospital visits and costs.

Developmental Follow-up

The AAP recommends early outpatient follow-up and education to monitor for late withdrawal signs and long-term follow up for complications such as developmental delays.[2] Our survey showed 41.3% ($n = 62$) required all infants with NAS or in utero drug exposure to follow-up postdischarge, whereas 30% ($n = 45$) only schedule follow-up visits on an as-needed basis and 28.6% ($n = 43$) do not offer developmental follow-up. Although there are limited studies documenting the benefits of long-term follow-up, NAS reflects a complex social environment which may be associated with comorbidities in the developing child that could warrant such programs.

Limitations of Study

Our study was restricted by a response rate of only 47% ($n = 179$) and thus was not a complete representation of NICUs across the United States. Not all institutions responded to each question, thus further limiting our sample size. Finally, the study used a nonvalidated questionnaire, which may limit the reproducibility of results.

CONCLUSIONS

Our study highlights the significant diversity in the comprehensive management of NAS among NICUs nationwide. The newly published AAP guidelines may serve to further standardize care among institutions, but they do not address the importance of

targeted prenatal counseling or home treatment programs. Few of the programs surveyed place emphasis on prenatal counseling and home treatment programs, which are evidence-based interventions that may improve patient care.

REFERENCES

1. National Survey of Drug Use and Health. Substance use during pregnancy: 2009 and 2010 update. Substance Abuse and Mental Health Services Administration. US Department of Health and Human Services. Available at: https://nsduhweb.rti.org/. Accessed November 10, 2011.
2. Hudak ML, Tan RC; Committee on Drugs; Committee on Fetus and Newborn; American Academy of Pediatrics. Neonatal drug withdrawal. *Pediatrics*. 2012;129(2). Available at: www.pediatrics.org/cgi/content/full/129/2/e540.
3. O'Grady MJ, Hopewell J, White MJ. Management of neonatal abstinence syndrome: a national survey and review of practice. *Arch Dis Child Fetal Neonatal Ed*. 2009;94(4):F249–F252.
4. Sarkar S, Donn SM. Management of neonatal abstinence syndrome in neonatal intensive care units: a national survey. *J Perinatol*. 2006;26(1):15–17.
5. Jansson LM, Velez M. Neonatal abstinence syndrome. *Curr Opin Pediatr*. 2012;24(2):252–258.
6. Dow K, Ordean A, Murphy-Oikonen J, et al; Neonatal Abstinence Syndrome Work Group. Neonatal abstinence syndrome clinical practice guidelines for Ontario. *J Popul Ther Clin Pharmacol*. 2012;19(3):e488–e506.
7. Chang JC, Dado D, Frankel RM, et al. When pregnant patients disclose substance use: missed opportunities for behavioral change counseling. *Patient Educ Couns*. 2008;72(3):394–401.
8. Herzig K, Danley D, Jackson R, Petersen R, Chamberlain L, Gerbert B. Seizing the 9-month moment: addressing behavioral risks in prenatal patients. *Patient Educ Couns*. 2006;61(2):228–235.
9. Kukko H, Halmesmäki E. Prenatal care and counseling of female drug-abusers: effects on drug abuse and perinatal outcome. *Acta Obstet Gynecol Scand*. 1999;78(1):22–26.
10. Montgomery D, Plate C, Alder SC, Jones M, Jones J, Christensen RD. Testing for fetal exposure to illicit drugs using umbilical cord tissue vs meconium. *J Perinatol*. 2006;26(1):11–14.
11. Montgomery DP, Plate CA, Jones M, et al. Using umbilical cord tissue to detect fetal exposure to illicit drugs: a multicentered study in Utah and New Jersey. *J Perinatol*. 2008;28(11):750–753.
12. United States Drug Testing Laboratory, Inc. Newborn drug and alcohol testing. Available at: www.usdtl.com/newborn_drug_and_alcohol_testing.html. Accessed February 25, 2012.
13. American Academy of Pediatrics Committee on Drugs. Neonatal drug withdrawal. *Pediatrics*. 1998;101(6):1079–1088.
14. Esmaeili A, Keinhorst AK, Schuster T, Beske F, Schlösser R, Bastanier C. Treatment of neonatal abstinence syndrome with clonidine and chloral hydrate. *Acta Paediatr*. 2010;99(2):209–214.
15. Agthe AG, Kim GR, Mathias KB, et al. Clonidine as an adjunct therapy to opioids for neonatal abstinence syndrome: a randomized, controlled trial. *Pediatrics*. 2009;123(5). Available at: www.pediatrics.org/cgi/content/full/123/5/e849.
16. Wojnar-Horton RE, Kristensen JH, Yapp P, Ilett KF, Dusci LJ, Hackett LP. Methadone distribution and excretion into breast milk of clients in a methadone maintenance programme. *Br J Clin Pharmacol*. 1997;44(6):543–547.
17. Jansson LM, Choo R, Velez ML, et al. Methadone maintenance and breastfeeding in the neonatal period. *Pediatrics*. 2008;121(1):106–114.
18. Abdel-Latif ME, Pinner J, Clews S, Cooke F, Lui K, Oei J. Effects of breast milk on the severity and outcome of neonatal abstinence syndrome among infants of drug-dependent mothers. *Pediatrics*. 2006;117(6). Available at: www.pediatrics.org/cgi/content/full/117/6/e1163.
19. Oei J, Feller JM, Lui K. Coordinated outpatient care of the narcotic-dependent infant. *J Paediatr Child Health*. 2001;37(3):266–270.
20. Abrahams RR, Kelly SA, Payne S, Thiessen PN, Mackintosh J, Janssen PA. Rooming-in compared with standard care for newborns of mothers using methadone or heroin. *Can Fam Physician*. 2007;53(10):1722–1730.
21. Backes CH, Backes CR, Gardner D, Nankervis CA, Giannone PJ, Cordero L. Neonatal abstinence syndrome: transitioning methadone-treated infants from an inpatient to an outpatient setting. *J Perinatol*. 2012;32(6):425–430.
22. Saiki T, Lee S, Hannam S, Greenough A. Neonatal abstinence syndrome—postnatal ward versus neonatal unit management. *Eur J Pediatr*. 2010;169(1):95–98.

Neonatal Abstinence Syndrome Management From Prenatal Counseling to Postdischarge Follow-up Care: Results of a National Survey

Aakriti Mehta, Kathryn Dawn Forbes and Venkata Sasidhar Kuppala

Hospital Pediatrics 2013;3;317
DOI: 10.1542/hpeds.2012-0079

Neonatal Abstinence Syndrome Management From Prenatal Counseling to Postdischarge Follow-up Care: Results of a National Survey

Aakriti Mehta, Kathryn Dawn Forbes and Venkata Sasidhar Kuppala

Hospital Pediatrics 2013;3;317
DOI: 10.1542/hpeds.2012-0079