

NEONATAL ABSTINENCE SYNDROME CLINICAL PRACTICE GUIDELINES FOR ONTARIO

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ABSTRACT

Ontario's clinical practice guidelines for neonatal abstinence syndrome (NAS) provide evidence-informed recommendations that address the needs of substance using pregnant women and newborns at risk of NAS. NAS is a complex and multifaceted issue that is escalating along with rapidly rising opioid use in Ontario. Reducing the incidence and impact of NAS requires immediate action in order to improve the care of affected women and infants. This includes optimizing and standardizing treatment strategies, assessing and managing social risk, better monitoring of prescribing practices and facilitating the implementation of better treatment and prevention strategies as they become available. These clinical practice guidelines provide the framework to inform and support the development of a coordinated strategy to address this important issue and to promote safe and effective care.

Key Words: *Opioid, methadone, drug withdrawal, neonate, abstinence syndrome*

The impact of drug addiction on a pregnant woman has profound effects, not only on her health and wellbeing but also on her newborn baby whose drug withdrawal manifests itself as neonatal abstinence syndrome (NAS). The growing incidence of NAS across Canada is directly impacting scarce resources in the Level II and III neonatal units due to prolonged length of hospital stay for specialized care and support of both the baby with NAS and the mother.

The Provincial Council for Maternal and Child Health (PCMCH), in its Report on Access to Care (2010), identified the growing incidence and challenges associated with managing newborns experiencing NAS and recommended that an expert panel be organized to address the needs of this population.

NAS is experienced by infants who were exposed to opioids such as morphine, methadone, codeine, oxycodone and heroin in utero. This exposure creates a physical dependence on those substances that often results in withdrawal in the infant after birth. NAS presents with neurological, gastrointestinal, and respiratory signs including

increased tone, a high pitched cry, poor feeding, sleep-wake abnormalities, poor weight gain, tremors and seizures. Treatment of NAS often requires care in a special care nursery (SCN) setting for a prolonged hospitalization.

Demand for maternal-newborn services, which are already under pressure, is expected to increase as a result of population growth, increasing maternal age, infertility treatments resulting in multiple births and the inherent risks of prematurity. This growing demand places escalating pressure on the already strained maternal and newborn care system. Many Level III Obstetrical Units and Neonatal Intensive Care Units (NICUs) are operating at levels that make it difficult to respond to surges. Increases in NAS add one more pressure on the system.

Women become dependent on opioids for different reasons. There are women who require opioids for pain management, women who abuse substances including opioids, and women who seek methadone treatment for addiction to prescribed or non-prescribed opioids. Despite the reason for opioid dependency, the majority of

infants exposed in utero are born dependent on opioids. Withdrawal occurs in 55-94% of infants exposed to opioids in utero and up to 85% of those exposed to methadone.¹

A high proportion of opioid using mothers also smoke tobacco, use alcohol, and other drugs including cocaine. NAS is not simply a neonatal issue; it is also a marker for life long issues related to social and environmental risks that may include Fetal Alcohol Spectrum Disorder, behaviour problems or developmental delays that may require further assessment and intervention from a treatment team.

Early detection of substance exposure in newborns leads to timely assessment for NAS and subsequent treatment to reduce symptoms in newborns.² Substance using women and infants with NAS benefit from a coordinated circle of care that includes both community and hospital supports. Services exist to support people with addictions in the community and should be aligned with hospital-based services. Resource availability should not be dependent on the size of a community and it is essential that access strategies address geographic challenges.

The management of substance use and NAS is particularly problematic in Northern Ontario. Many First Nations communities have identified a state of emergency regarding abuse of prescription narcotics.³ The vast geographical area of the North encompasses multiple remote communities, many of which have a population of less than 1000 and rely on a nursing station for health care support. These communities have few, if any, local family physicians and rely on distant regional hospitals for their acute healthcare needs. The need to receive healthcare away from home contributes to isolation, lack of support, and limited resources. Although methadone maintenance treatment is considered the standard of care for opioid addiction in pregnancy, many of the remote communities lack access to methadone and therefore, women continue to struggle with opioid addiction throughout pregnancy. When methadone is not available, alternative options need to be explored on an individual basis. These may include other opioids or opioid tapering. In addition to the remote communities, regional facilities lack resources to support the high prevalence of substance-using women and infants with NAS.

METHODS

The Neonatal Abstinence Syndrome Work Group was convened in May 2010 at the request of the Provincial Council for Maternal and Child Health's (PCMCH) Maternal Newborn Advisory Committee (M-NAC). It was composed of experts in the clinical care and social support of pregnant women, families and infants at risk of NAS who came together for the purpose of developing recommendations regarding both harm reduction and the optimal management of NAS, resulting in these clinical practice guidelines.

This report focuses primarily on NAS resulting from opioid dependence and does not address the management of NAS resulting from the use of selective serotonin reuptake inhibitors (SSRIs), benzodiazepines, barbiturates, ethanol, sedatives and hypnotics. Initial work focused on gathering data in the form of a survey which was sent to Ontario hospitals. The survey results indicated that management of NAS varies across the province.

A literature search provided background information on the issues. Three themes emerged that prompted the formation of three subgroups focused on:

1. Prenatal and discharge management
2. Screening and scoring
3. Treatment management including environment.

Data were provided by The Canadian Institute for Health Information (CIHI) and the Ontario Ministry of Health and Long-term Care (MOHLTC). Clinical experts made recommendations after careful review of available literature based on quality of the evidence and classification of the recommendations according to the Canadian Task Force on Preventive Health Care definitions.⁴

Trends and Current State

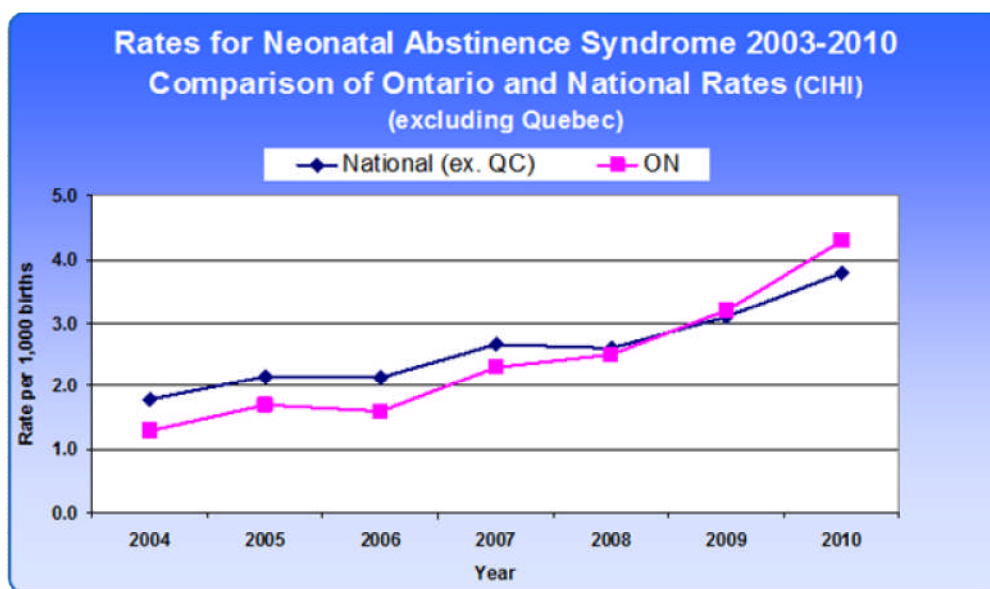
Ontario has the highest rate of narcotic use in Canada⁵ as well as one of the highest rates of prescription narcotic use in the world. Between 1991 and 2009, the number of prescriptions for oxycodone rose by 900% in Ontario.⁶ The College of Physicians and Surgeons of Ontario (CPSO) established a methadone maintenance treatment

MMT) program in 1996 and in 2009, reported that almost 26,000 Ontario patients were enrolled in the program.⁷ Narcotic abuse-related admissions to publicly funded treatment and addiction services in Ontario are on the rise, as evidenced by rates that doubled in Ontario from 2004-2008.⁸ Concomitant with the increased narcotic use, there was an increase in the rate of in utero drug

exposure, resulting in an increased incidence of NAS.

The incidence of NAS in Ontario, as reported by the Canadian Institute for Health Information (CIHI), has increased from 1.3 cases per 1,000 births in 2004, to 4.3 cases per 1,000 births in 2010. Ontario surpassed the national average in 2009 (Figure 1).

FIG. 1



Canadian data on maternal substance use and NAS⁹ are limited. Most studies are based on maternal self-reporting. Concern about stigmatization may prevent honest reporting resulting in an underestimation of the prevalence of substance use and addiction.

Data from the Canadian Maternity Experience Survey¹⁰ found that approximately 7% of women had used street drugs in the 3 months prior to their pregnancy or before being aware of their pregnancy. This proportion was reduced to 1% once pregnancy was confirmed. Street drugs included use of cocaine, heroin, marijuana and amphetamines. This study excluded women living on reserves or in institutions and only included

women who were residing with their infants at the time of the survey (5-14 months postpartum). Therefore, the survey excluded a population of women who are more likely to have significant substance use disorders.

In Ontario, the Centre for Addiction and Mental Health's CAMH Monitor¹¹, a longstanding survey of adult substance use, demonstrated that 23% of women reported using prescription-type opioid pain relievers in 2009 and 1% of these women used the medication for non-medical purposes. The 2010 US National Household Drug Survey¹² reported higher rates of substance use during pregnancy in a US population. Among pregnant women aged 15 to 44, 4.4% were

described as current illicit drug users with rates as high as 16.2% among pregnant women aged 15-17 years old. Illicit drug use included marijuana, cocaine, heroin, and others, as well as nonmedical use of prescription-type pain relievers and other sedating medications.

In 2009, Ontario established the Narcotics Advisory Panel which is comprised of family physicians, pain and addiction specialists, pharmacists, representatives from the coroner's office, professional regulatory bodies and members of law enforcement. Ontario now has a Narcotics Strategy¹³, which includes a narcotic tracking system and also works with medical and pharmacy regulatory colleges to develop educational and training initiatives about pain management and appropriate prescribing practices.

Opioid-dependent pregnant women require a comprehensive, integrated circle of care that links physicians, hospitals, public health, community health centres, pharmacies, addiction and mental health agencies, pain and methadone clinics, social services and child protection agencies. The needs of the substance using pregnant woman do not end when she gives birth, since she and her infant will also require long term care and support.

There are very few comprehensive substance use programs for pregnant women in Canada. Ontario has a small number of residential addiction treatment programs that offer services to pregnant women, but they are not available in most communities. A major barrier exists since current residential programs do not address the unique needs of pregnant women who may have other children at home. In addition, geographic barriers may prevent pregnant and parenting women from obtaining addiction treatment.

As opioid use is increasing across Ontario, antenatal opioid exposure, both illicit and prescribed, is also increasing, leading to a rise in the incidence of NAS and associated social risks and therefore a resultant gap in services and available resources. A coordinated, streamlined plan is required to address needs across the continuum of care from preconception to postpartum as well as over the long term.

Clinical Practice Guidelines

Screening

Routine screening of women of childbearing age normalizes the conversations about the sensitive topic of substance use. The primary goal of routine screening among this population is to encourage a change in substance use prior to pregnancy in an effort to promote health and reduce the incidence of NAS. Routine alcohol and substance use screening of pregnant women is essential for early intervention aimed at reducing the effects of alcohol and substance use including the risk of premature birth, low birth weight and poor initiation of prenatal care.¹⁴

There is no optimal screening tool for substance use. However, given that pregnancy provides a “window of opportunity” for women to engage in lifestyle changes to improve the outcomes for newborns¹⁵, primary healthcare providers are encouraged to follow the Society for Obstetricians and Gynecologists of Canada (SOGC) *Alcohol Use and Pregnancy Consensus Guidelines* (SOGC, 2010) and the *Substance Use in Pregnancy Guidelines (SOGC 2011)*¹⁶ to routinely screen for alcohol and substance use. Accurate reporting of substance use in pregnancy may mitigate fetal and neonatal effects of substance exposure through improved prenatal care¹⁷ and secure early treatment such as opiate replacement therapy to promote harm reduction for both mother and developing fetus.^{18,19} To assist in accurate disclosure of substance use, communities are encouraged to develop education strategies to prevent adverse neonatal outcomes and educate women of childbearing age, as well as practitioners about the impact of substance use in pregnancy. These campaigns should serve to raise awareness about the adverse health effects of substance use in pregnancy, including the risk of NAS in substance-exposed newborns.

Methadone Maintenance Therapy

Methadone maintenance therapy (MMT) is the current standard of care for the management of opioid addiction in pregnancy.¹⁶ Several research studies address the multiple benefits of this treatment including improved neonatal outcomes^{20,21,22,23} and the potential for a strengthened maternal-infant relationship immediately following the infant's birth.

Where available, urgent referrals to methadone maintenance programs during the course of pregnancy are recommended with careful attention to ensure adequate dosage adjustments in an effort to eliminate withdrawal and cravings for illicit opioids.

Methadone is administered daily under the care of a physician and pharmacist and, as such, offers consistent opportunities for engagement and intervention for medical and social risk factors. Within a harm-reduction framework, MMT also facilitates improved access for methadone maintained pregnant women to prenatal care, addiction treatment services, and psychosocial supports. Comprehensive care consisting of MMT and obstetrical care for pregnant women has been shown to improve maternal and neonatal outcomes when compared to continued illicit substance use.

Contraception Counseling

Many women experience amenorrhea secondary to substance use. Also, women on opioid agonist treatment falsely believe that they cannot get pregnant and therefore do not use contraception which increases the risk of unplanned

pregnancies. Initiation to methadone or buprenorphine maintenance treatment can result in improved fertility and contraception counseling should be included as part of this treatment or referral for women's health counseling should be offered.²⁴

Alternatives to MMT

Buprenorphine is an effective alternative treatment to methadone for opioid dependence during pregnancy. Studies have shown decreased duration and severity of NAS and decreased need for treatment resulting in shorter hospital stays as compared with methadone.^{25,26} Therefore, access to buprenorphine maintenance treatment during pregnancy should be readily available. Currently buprenorphine is not available in Canada except by special access through Health Canada. The monoprodut buprenorphine is recommended for use during pregnancy instead of the readily available combination product with naloxone. It is recommended that the MOHLTC consider improving access to buprenorphine for the treatment of pregnant opioid users as an alternative to methadone.

Methadone is the treatment of choice for opioid dependent women in pregnancy. An urgent referral mechanism for pregnant opioid dependent women should be created to initiate Methadone Maintenance treatment (MMT) and for comprehensive care including prenatal care, addiction services, and psychosocial support. (II-1B)

Contraception counseling is essential to prevent unplanned pregnancy. (III-B)

Collaboration among various health care providers of pregnant substance-using women and their families is critical to improved outcomes. (III-B)

Buprenorphine should be available and supplied for opioid dependent women during pregnancy. (I-A)

Education

Substance-using pregnant women are often unprepared for the neonatal effects resulting from in utero exposure to substances such as opioids, including methadone.²⁷ Early preparation for the neonatal effects of substance exposure (NAS) and opportunities for parental involvement in the care of affected newborns create opportunities for success of the family. Given the fears and stigma associated with substance use in pregnancy, the primary goal of early preparation is to build the therapeutic relationship and engage parents in the

needs and care of their infants. Through education of women and their partners regarding the infant's hospital experience, including NAS, length of hospital stay, role of the parent and resource contacts, families may be more prepared to effectively care for infants with NAS. Strategies for engagement with families extend from written education, to direct education and support from the healthcare team to both encourage and empower parental involvement with affected infants. The overall goal is to link with hospital staff and initiate a therapeutic relationship as well

as to build trust and reduce anxiety for the parents about newborn care. This also provides an opportunity to assess potential parenting capacity and commence a risk assessment for any potential child protection concerns. Even when child protection concerns are evident, a harm reduction approach can make a difference in neonatal outcomes. Implementation of a parental partnership contract is valuable to enhance communication with parents and support their

involvement in the care of their infant. This contract could include plans for feeding and skin-to-skin care, expected visiting commitments and modes of communication with the team. It is recognized that not all birth parents are positioned to provide direct care to their infants. The healthcare team should endeavor to be inclusive of extended family and foster parents in the care of infants with NAS.

The substance-using woman and her partner/family should be prepared and educated in advance for their baby's hospital experience and management of NAS. (II-1B)

Every substance using woman should receive written materials explaining NAS, hospital stay expectations, role of the parent, and resource contacts, including the healthcare team. (II-1B)

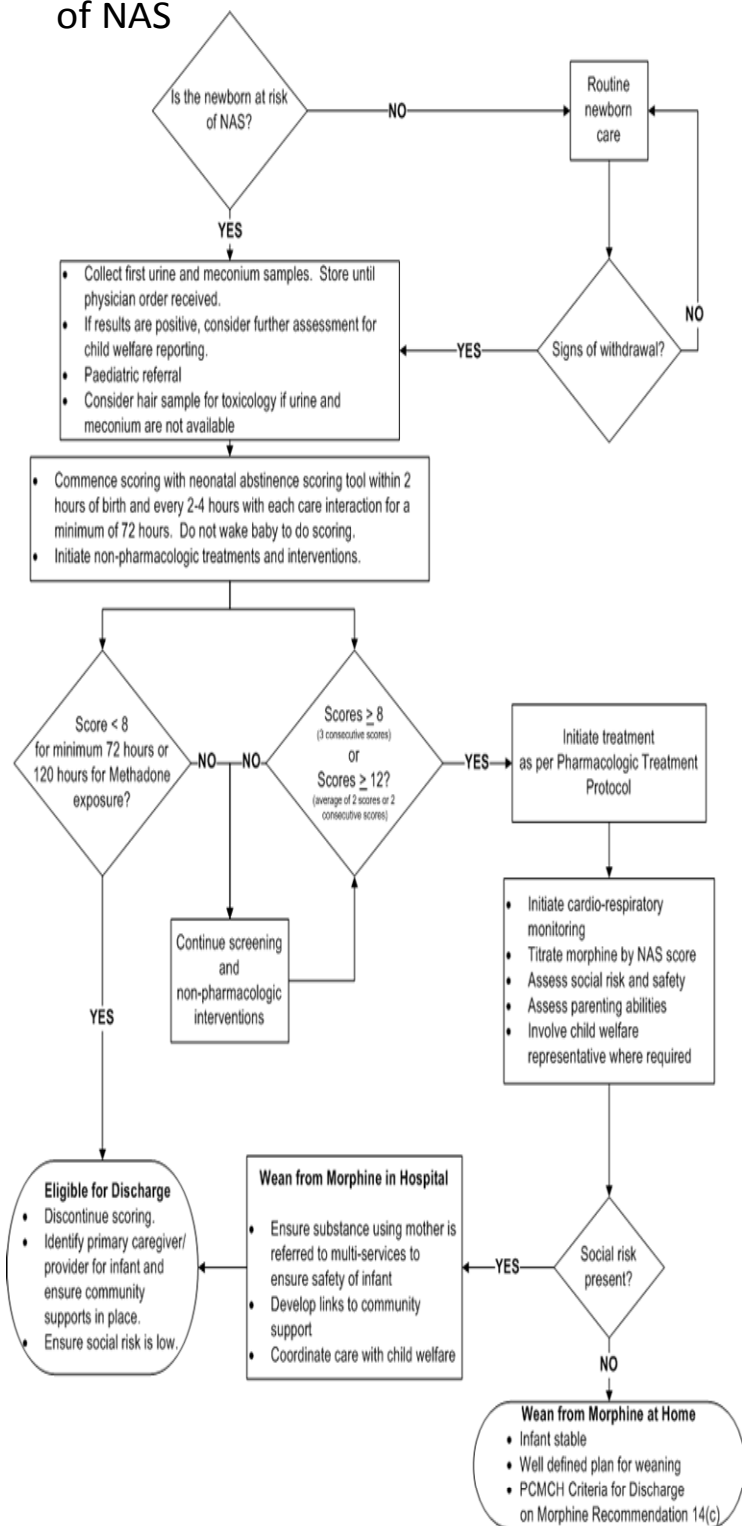
Postnatal Screening and Scoring

The goal of screening is to achieve an accurate diagnosis for the purpose of treatment planning. Neonatal toxicology testing may be considered on all known and suspected cases of NAS²⁸. These cases include infants of mothers identified by primary or obstetrical caregivers, mothers engaged in high risk behaviours, mothers identified by child protection agencies or other community agencies, mothers who disclose illicit drug use in pregnancy, mothers who act in an intoxicated manner on admission or during office visits, and mothers with a positive history of alcohol and/or drug use/abuse. Screening in known and suspected cases of NAS is a highly effective way to identify drugs of abuse.²⁹ Results are critical to guide treatment, diagnose polydrug use, determine long term follow-up needs, and identify social risks and referrals. Toxicology testing should supplement maternal self-report and therefore may not be needed in cases of maternal disclosure of substance use. A medical directive facilitates early sample collection by nurses. It is important that practitioners be educated to understand the need for a physician order, the importance of the first sample for urine and meconium, the proper collection method and storage of samples and the consent requirements of the specific organization. Practitioners should

be supported to develop a comfort level and confidence in discussing toxicology testing with women and their families. An algorithm for the assessment and care of infants at risk of NAS is provided in Figure 2.

1. Toxicology screening includes the following, but does not limit additional testing deemed necessary by the physician.³⁰
2. Urine and meconium testing, ideally using the first sample passed as later samples may not be positive.
3. Test urine for: cocaine (and its major metabolite benzoylecgonine), methamphetamine, amphetamine, cannabinoid, benzodiazepines and opioids. In many centres testing for oxycodone requires a specific order. Confirmatory tests may also not be routine for positive tests and need to be ordered if required.
4. If the urine is positive, do not repeat same tests on meconium. Test meconium only for fatty acid ethyl esters (FAEE)³¹ to document antenatal alcohol use.
5. If urine is negative, consider testing meconium for all substances listed in 1 b) and also for FAEE.
6. Hair testing, at the discretion of the physician, after 2 days of life if the opportunity to collect first urine and meconium samples has been missed. Hair testing may be done up to 3 months of age, at which time neonatal hair sheds.

Figure 2: Algorithm for Assessment and Care of Infants at Risk of NAS



Urine testing detects recent exposure to maternal drugs. The infant's first urine sample is best. A negative result should not be interpreted as lack of exposure because the drugs remain only for a short time in the urine. Knowledge of window periods for detection should be considered in proper interpretation of any test results.

Meconium and neonatal hair tests are highly effective in identifying fetal exposure to drugs of abuse beginning in the second trimester. Meconium testing detects longitudinal drug use. The infant's first meconium is best. It may be collected and stored for later analysis when a physician's order is obtained. The range of substances that meconium is tested for are important, not only to guide current treatment but also long term treatment since not all long term effects may be known at the time of testing. Infants with NAS are at high risk for in-utero exposure to alcohol and other drugs of abuse. Objective assessment and identification of infants at risk for Fetal Alcohol Spectrum Disorder (FASD) is very important for infants with NAS because women with drug addictions are substantially more likely to consume multiple substances including alcohol.³² Meconium analysis of FAEE is a biomarker for heavy maternal drinking. Positive results put the child at high risk (40%) for FASD. Positive FAEE indicates the need for neurocognitive follow-up of the infant.

Screening may create a conflict between maternal and neonatal interests. Positive test results for illicit substances necessitate a referral to inpatient social work for further psychosocial assessment of the family. Although positive toxicology screens are indicative of potential risk to the child, further psychosocial assessment is needed to determine the level of risk and strengths in the family. All healthcare professionals have a duty to report potential risk to child protection services for further assessment. However, collaborative consultation amongst the team providing care to the mother-infant dyad is recommended to establish the psychosocial care plan for the infant. Positive toxicology results may indicate risk; however, factors such as MMT exposure in infants must be assessed prior to referral. MMT in the absence of additional risk factors does not require child protection

involvement. However, professionals must report that a child is or may be in need of protection, even when the information is otherwise confidential or privileged. The duty specifically prevails over any provision of the Personal Health Information Protection Act (PHIPA) CFSA's.

Several scoring tools are available for quantifying the severity of neonatal withdrawal and one of these should be used to assess suspected or known cases of NAS. A modification of the Finnegan's Neonatal Abstinence Scoring Tool³⁴ is recommended by the American Academy of Pediatrics and may be found in a recent publication.³⁵ an adaption of another tool³⁶ is provided in Figure 3 as an example and includes a descriptive guide to assist with its use in the clinical setting.

Scoring should be initiated upon suspicion of NAS. The purpose of using a scoring tool is to enable a systematic, objective, periodic and thorough evaluation of the infant to support their care needs and identify the need for pharmacological therapy. The duration of initial scoring should be based on the half life of opioid used. In cases of methadone exposure, the infant should be monitored with the scoring tool for 120 hours since onset of withdrawal may be delayed. In cases of exposure to short-acting opioids, scoring for 48 to 72 hours is recommended. Scoring should be done with each care interaction, typically every 2-4 hrs. Pharmacological treatment should be initiated if 3 consecutive scores are ≥ 8 or the average of two scores or two consecutive scores are ≥ 12 . Scoring is continued during treatment and weaning. After treatment has been discontinued, scoring should continue for an additional 48-72 hours.

Mother-baby dyad care should be supported with rooming-in, if possible, until the infant requires pharmacological treatment. In some centres where cardiorespiratory monitoring is available on pediatric units, rooming-in may still be possible after the commencement of pharmacological treatment. If an opioid exposed infant does not withdraw in hospital, they will require referral to a knowledgeable care provider for ongoing monitoring for NAS as an out-patient. The mother and caregivers should be educated about observing for signs of withdrawal after discharge. All mother-baby nurses will require instruction to effectively use the scoring tool so

that disruption of mother baby dyad care will be minimized. The infant should be awake and calm for scoring to be done. He/she should be observed undisturbed for approximately 1 minute, undressed to continue observations then redressed, swaddled and observed again for approximately 1 minute. The score given should include general observations of infant behaviour in the preceding time period since the last feed or care intervention. In the face of rising scores, scoring should occur more frequently, and corroboration with an expert resource person should occur, as revisions to the plans for care may be necessary. Consideration for workload on the mother baby unit will be required when nurses are caring for infants with NAS. It is important to identify a resource person with extensive knowledge and experience to respond to questions and difficult cases on a consultation basis. Participation of parents, family and other care providers should continue to be encouraged, even when the baby is in the NICU/SCN. During the weaning process, and when family or facility circumstances permit, all efforts should be made to promote care-by-parent and rooming-in opportunities. Pediatric units may be utilized, where available, to promote such opportunities. If parents wish to discharge their infant against medical advice, the child protection agency should be notified to complete a risk assessment. This action is not unique to the NAS population. However the risk to an infant with NAS may be considerably greater than in other clinical situation

Non-pharmacological Intervention

Non-pharmacological interventions should be utilized prior to the initiation of pharmacological therapy. Practitioners in both the SCN/NICU and the postpartum unit should be educated in the use of such interventions. In RCTs^{37,38,39} of healthy infants, swaddling has been shown to decrease startle responses, lessen arousals and prolong sleep. In excessively crying infants with cerebral injury, swaddling significantly decreases the amount of crying compared with massage. It has also been shown to decrease the response to painful procedures but does not show any influence on breastfeeding parameters such as number and duration of feeds, amount of milk ingested or total duration of breastfeeding time. No RCT has specifically looked at swaddling in

the treatment of infants with NAS but it has been suggested that it may be used as an effective strategy to support infants with NAS. Some studies^{40,41,42} indicate that the act of breastfeeding by mothers taking methadone is associated with reduced NAS scores, delayed onset of NAS and decreased need for pharmacologic treatment. Short term safety has been confirmed in the small number of patients studied but long term developmental questions have not been adequately answered. Staff must be skilled in meeting the support needs of the breastfeeding mother of an infant with NAS. Pumping equipment and supplies need to be accessible and affordable for the mother.

Breastfeeding is not recommended for women using illicit drugs until sobriety is reached. These women should pump and discard their breast milk to establish and maintain their milk supply. All substances of abuse have been detected in breast milk and can lead to additional exposure to these substances and potential for harm. Mothers who choose to continue their substance use or who are unable to stop should seek individual advice on the risks and benefits of breastfeeding depending on their specific circumstances.

Care of infants with NAS in NICU/SCNs is best provided in space that has been adapted or modified to decrease sensory stimulation including limiting visitors, minimizing overhead lighting, decreasing noise, using gentle handling and kangaroo care. There is very little support based on well designed studies specifically looking at this population. However, given the current state of knowledge with regards to neonatal physiology and adaptive behaviours, it would seem appropriate to continue to promote the implementation of these supportive measures.^{43,44,45,46}

Use of pacifiers, hands-to-mouth, self-clinging and other self-soothing behaviours should be supported in the management of neonates with NAS and their beneficial implications taught to care providers. Specific holding/constraining techniques, proper positioning and use of gentle firm pressure, and gentle vertical rocking can all support the neonates self-regulation. Rocking beds or mechanical swings should be used with caution as there is evidence that for some neonates this may result in over-stimulation during the acute

period of withdrawal and may not be appropriate.⁴⁷ Frequent, smaller volume, hypercaloric feeds are generally recommended for those infants who have feeding difficulties due to regulatory control issues and/or poor weight gain due to excessive caloric expenditure, gastroesophageal reflux and diarrhea. Dietician support is part of the multidisciplinary approach to care of the neonate with NAS. It is paramount to involve the mother and her support person(s) in

all infant care unless there are safety concerns that may interfere with the therapeutic relationship. Even when child protection concerns are evident, a harm reduction approach can make a difference in neonatal outcomes. There should be a commitment to continue to educate the mother, her partner and family caregivers so that they are prepared to effectively care for the infant in the unit.

**Non-pharmacological interventions should be utilized prior to pharmacological interventions. (III-B)
Swaddling is beneficial to lessen arousals and prolong sleep. (III-B)**

Breastfeeding is recommended and safe for methadone-maintained mothers. Breastfeeding is not recommended for illicit drug-using women until sobriety is reached. (II-2B)

The baby's environment should be modified to reduce sensory stimulation. Soothing behaviours, positional support and frequent, smaller volume, hypercaloric feeds should be considered. (III-B)

Pharmacological Treatment

Medication should be considered for the treatment of NAS when supportive measures fail to adequately ameliorate withdrawal. When pharmacologic treatment is necessary the baby with NAS should be admitted to the SCN/NICU or pediatric unit where cardio-respiratory monitoring is available. Local variations may dictate the location of the infant for monitoring. Level I centres should consider transfer to a Level II unit. Parental interaction should continue to be encouraged and observed to assess social risk and safety issues.

Morphine should be considered the first line pharmacologic treatment for NAS when supportive measures fail to adequately ameliorate the signs of withdrawal. All 17 respondents in the survey of Ontario hospitals reported using morphine. Seven/eight of the practice guidelines submitted describe only dosing regimens for morphine. In a survey of 235 neonatal units in the UK and Republic of Ireland, 92% reported using morphine.⁴⁸ an alternate approach used by one unit in Ontario that has also been reported in the US³⁶ does not include a weight-based treatment protocol. Rather, a fixed dose of morphine is initiated every 3-4 hours for each range of scores. Although there is evidence to support symptom dosing, generally accepted standards are for weight and symptom management. Other drugs that contain morphine include diluted tincture of

opium (DTO) and paregoric. Neither preparation is recommended for use today since both contain alcohol and paregoric also contains camphor and benzoic acid. Methadone is not currently recommended for use in newborns due to its long half-life. It is used by some hospitals in the US to treat neonatal opioid withdrawal with length of stays similar to those for morphine-treated infants being reported^{49,50} however published experience is lacking compared with that for morphine.

Morphine is indicated when the average of three consecutive scores is greater than or equal to 8 on the scoring tool or when the average of two scores or the scores for two consecutive intervals is greater than or equal to 12. Dosing guidelines are presented in Table 1.

Cardio-respiratory monitoring is recommended for all infants started on morphine for at least 4 days and/or until the dose is reduced. Further monitoring should be at the discretion of the physician. Little has been written or investigated with respect to cardio-respiratory monitoring for infants with NAS being weaned on morphine. However, the expert panel recommends that this is the most prudent approach.

Using barbiturates alone to treat NAS is not generally recommended unless there is a mixed withdrawal syndrome. The use of morphine in combination with phenobarbital has been reported in the treatment of infants whose symptoms are not well-controlled with morphine alone but

strong evidence of its efficacy is lacking.⁵¹ A recently updated Cochrane Review⁵² concludes that where a sedative is used, it should be phenobarbital in preference to diazepam, particularly when there has been polydrug abuse.

Clonidine has been explored as a possible therapeutic option in combination with morphine.

One small randomized controlled trial demonstrated that clonidine in addition to standard opioid therapy reduced the duration of pharmacotherapy for neonatal abstinence^{53,54} but evidence is currently insufficient to support its widespread use.

FIG. 3 Sample Neonatal Abstinence Syndrome Scoring Tool

SAMPLE 1: Neonatal Abstinence Scoring System

DOB _____
 Birth Weight _____ grams (x 10% = _____)
 Today's Weight _____ grams
Start new scoring sheet daily.

Signs		Score							
Date:	Time:								
Excessive Cry	2								
Excessive cry (inconsolable)	3								
Sleeps <1 hour after feeding	3								
Sleeps 1-2 hours after feeding	2								
Sleeps 2-3 hours after feeding	1								
Hyperactive Moro Reflex	1								
Markedly hyperactive Moro reflex	2								
Mild tremors: disturbed	1								
Moderate/severe tremors: disturbed	2								
Mild tremors: undisturbed	1								
Moderate/severe tremors: undisturbed	2								
Increased muscle tone	1 - 2								
Excoriation: skin red, intact	1								
Excoriation: skin broken	2								
Generalized Seizure	8								
Hyperthermia: axilla temperature $\geq 37.3^{\circ}\text{C}$	1								
Frequent yawning (≥ 4 / interval)	1								
Sweating	1								
Nasal stuffiness	1								
Sneezing (≥ 4 / interval)	1								
Tachypnea (rate > 60/minute)	2								
Poor feeding	2								
Vomiting	2								
Loose Stools	2								
Weight loss / Failure to thrive	2								
Excessive irritability	1 - 3								
Total Score									
Initials of Scorer									

Name of Scorer	Initials	Signature/Title	Name of Scorer	Initials	Signature/Title

Adapted from: Jansson L, Velez M, Harrow C. (2009). The Opioid Exposed Newborn: Assessment and Pharmacologic Management. *J. Opioid Manag.* 2009; 5(1), 54

FIG. 3 Continued Sample Neonatal Abstinence Syndrome Scoring Tool Guideline

GUIDE TO USING THE NEONATAL ABSTINENCE SYNDROME (NAS) SCORING TOOL	
<small>Jansson L, Velez M, Harrow C. (2009). <i>The Opioid Exposed Newborn: Assessment and Pharmacologic Management</i>. <i>J. Opioid Manag.</i> 2009; 5(1), 54</small>	
Instructions	
<ul style="list-style-type: none"> Designed for use with full term opioid exposed newborns Initiate scoring at 2 hours of age and repeat every 2-4 hours prior to a feeding. Do not wake baby to do scoring. Total scores for each interval at bottom of column Calculate & record 90% of birth weight to use as a reference for weight loss 	<ul style="list-style-type: none"> Initiate pharmacologic treatment when the average of 3 scores is ≥ 8 or the average of 2 scores, or 2 consecutive scores is ≥ 12 Score for minimum of 72 hours, 120 hours for methadone exposure. Continue scoring during treatment and weaning. Discontinue scoring 48-72 hours after treatment discontinued.
Excessive Cry	Generalized Seizure
<ul style="list-style-type: none"> Cry is usually high pitched Score 2: Infant cries often and is difficult to console Score 3: Infant is inconsolable, even with a pacifier, swaddling or rocking 	<ul style="list-style-type: none"> Seizure activity requires notification of the paediatrician immediately Score 8: The incidence of seizures as a symptom of NAS is low, but if present
Sleeping	Hyperthermia
<ul style="list-style-type: none"> Use the longest continuous sleeping time between feedings and scoring periods Score 0: Sleeps more than 3 hours continuously Score 1: Sleeps 2-3 hours continuously Score 2: Sleeps 1-2 hours continuously Score 3: Sleeps less than 1 hour continuously 	<ul style="list-style-type: none"> If hyperthermia is present, rule out infection Score 1: Axilla temperature of 37.3°C or higher
Moro Reflex	Yawning
<ul style="list-style-type: none"> Avoid doing while infant is irritable or crying to insure that the jitteriness, if present, is due to withdrawal, not agitation Score 1: Hyperactive Moro Reflex: hyperactive response with excessive abduction at shoulder and extension at elbow with or without tremors Score 2: Markedly Hyperactive Moro Reflex: Above response plus marked adduction flexion at elbow with arms crossing to the midline 	<ul style="list-style-type: none"> Score 1: Yawning 4 times or more in a scoring interval
Tremors	Sweating
<ul style="list-style-type: none"> Involuntary movements that are rhythmical and of equal amplitude. Myoclonic jerks are not tremors Undisturbed tremors occur in the absence of stimulation Disturbed tremors occur with stimulation, i.e. unwrapping a swaddled infant Score 1: Mild tremors involve hands or feet only & occur frequently in fussy or crying states and occasionally in quiet alert states Score 2: Moderate - severe tremors involve arms or legs and occur consistently and repeatedly in all states 	<ul style="list-style-type: none"> Score 1: Dampness of the infant's forehead or upper lip providing the infant is not over dressed
Increased Muscle Tone	Nasal Stuffiness
<ul style="list-style-type: none"> Elicit by passively extending and releasing the infant's arms and legs to assess recoil Assess infant at rest and with gentle handling, in quiet alert and mildly fussy states Infants experiencing NAS may have fluctuating tone Score 1: Increased tone with handling or increased resistance to extension or flexion of limbs with head lag on pull to sit Score 2: Increased tone without handling or increased resistance to straightening or bending limbs with or without head lag 	<ul style="list-style-type: none"> Score 1: Nasal noise with breathing, not associated with illness
Excoriation	Sneezing
<ul style="list-style-type: none"> Results from excessive and uncontrolled movements, such as tremors, rubbing. Diaper area excoriation is not included Score as long as the excoriation is present Score 1: Skin is red, but intact or healing Score 2: Skin is broken 	<ul style="list-style-type: none"> Score 1: Sneezing 4 times or more in a scoring interval
	Tachypnea
	<ul style="list-style-type: none"> Score 2: Respiratory rate greater than 60 breaths per minute at rest and not fussy or crying Rule out other medical conditions
	Poor Feeding
	<ul style="list-style-type: none"> Score 2: Uncoordinated suck/swallow resulting in: <ul style="list-style-type: none"> inefficient suck inefficient sucking pattern: short bursts with weak suck despite excessive sucking prior to feeding maladaptive tongue position: tongue thrusting, tongue above nipple, formula loss at sides of mouth gulping or clicking noise with sucking takes frequent breaks from feeding to breathe, burp or spit up
	Vomiting
	<ul style="list-style-type: none"> Score 2: Vomits a whole feed, or two or more times during a feed, not associated with burping
	Loose Stools
	<ul style="list-style-type: none"> Score 2: ½ liquid ½ solid stool or liquid stool with or without a water ring on diaper
	Weight Loss / Failure to Thrive
	<ul style="list-style-type: none"> Use work space at top of form. Weight infant once a day Score 2: <ul style="list-style-type: none"> Current weight loss is greater than 10% of birth weight Failure to regain birth weight by 10 days of age Daily weight gain of less than 20 gms/day after birth weight regained
	Irritability
	<ul style="list-style-type: none"> Infant is irritable or fussy, particularly with light touch or handling despite attempts to console, but may not cry excessively or at all. Observe for grimacing, sensitive to touch, light or sound, gaze aversion, etc. with or without crying. Score 2: Displays 2-3 signs of irritability and is consoled only with intervention after time Score 3: No amount of consoling reduces the symptoms of irritability

Non-pharmacological interventions should be utilized prior to pharmacological interventions. (III-B)

Swaddling is beneficial to lessen arousals and prolong sleep. (III-B)

Breastfeeding is recommended and safe for methadone-maintained mothers. Breastfeeding is not recommended for illicit drug-using women until sobriety is reached. (II-2B)

The baby's environment should be modified to reduce sensory stimulation. Soothing behaviours, positional support and frequent, smaller volume, hypercaloric feeds should be considered. (III-B)

Pharmacological Treatment

Medication should be considered for the treatment of NAS when supportive measures fail to adequately ameliorate withdrawal. When pharmacologic treatment is necessary the baby with NAS should be admitted to the SCN/NICU or pediatric unit where cardio-respiratory monitoring is available. Local variations may dictate the location of the infant for monitoring. Level I centres should consider transfer to a Level II unit. Parental interaction should continue to be encouraged and observed to assess social risk and safety issues.

Morphine should be considered the first line pharmacologic treatment for NAS when supportive measures fail to adequately ameliorate the signs of withdrawal. All 17 respondents in the survey of Ontario hospitals reported using morphine. Seven/eight of the practice guidelines submitted describe only dosing regimens for morphine. In a survey of 235 neonatal units in the UK and Republic of Ireland, 92% reported using morphine.⁴⁸ An alternate approach used by one unit in Ontario that has also been reported in the US³⁶ does not include a weight-based treatment protocol. Rather, a fixed dose of morphine is initiated every 3-4 hours for each range of scores. Although there is evidence to support symptom dosing, generally accepted standards are for weight and symptom management. Other drugs that contain morphine include diluted tincture of opium (DTO) and paregoric. Neither preparation is recommended for use today since both contain alcohol and paregoric also contains camphor and benzoic acid. Methadone is not currently recommended for use in newborns due to its long half-life. It is used by some hospitals in the USA to treat neonatal opioid withdrawal with length of

stays similar to those for morphine-treated infants being reported^{49,50} however published experience is lacking compared with that for morphine.

Morphine is indicated when the average of three consecutive scores is greater than or equal to 8 on the scoring tool or when the average of two scores or the scores for two consecutive intervals is greater than or equal to 12. Dosing guidelines are presented in Table 1.

Cardio-respiratory monitoring is recommended for all infants started on morphine for at least 4 days and/or until the dose is reduced. Further monitoring should be at the discretion of the physician. Little has been written or investigated with respect to cardio-respiratory monitoring for infants with NAS being weaned on morphine. However, the expert panel recommends that this is the most prudent approach.

Using barbiturates alone to treat NAS is not generally recommended unless there is a mixed withdrawal syndrome. The use of morphine in combination with phenobarbital has been reported in the treatment of infants whose symptoms are not well-controlled with morphine alone but strong evidence of its efficacy is lacking.⁵¹ A recently updated Cochrane Review⁵² concludes that where a sedative is used, it should be phenobarbital in preference to diazepam, particularly when there has been polydrug abuse.

Clonidine has been explored as a possible therapeutic option in combination with morphine. One small randomized controlled trial demonstrated that clonidine in addition to standard opioid therapy reduced the duration of pharmacotherapy for neonatal abstinence^{53,54} but evidence is currently insufficient to support its widespread use.

TABLE 1 NAS Pharmacologic Treatment Protocol: Dosing guidelines

Morphine	Dosing guidelines										
<p>Morphine is indicated when three consecutive scores are ≥ 8 according to the Modified Finnegan Scoring System or when the average of two scores or the score for two consecutive intervals is ≥ 12.</p> <p>If the scores remain ≥ 8 for 3 consecutive scores or ≥ 12 on 2 occasions, the morphine dose is increased to the next range i.e. by 0.16 mg/kg/day. If 0.80 mg/kg/day fails to control signs of withdrawal, morphine may be increased to 0.96 to 1.0 mg/kg/day. Clonidine (see below) should be considered at this point.</p> <p>Weaning</p> <p>Weaning is initiated when scores are <8 for 24 to 48 hours and ordinarily occurs by 10% of the total daily dose with each wean occurring no more frequently than every 48 hours to 72 hours. When the total daily dose is <0.2mg/kg/day, consideration may be given to weaning every 24 hours at the discretion of the physician.</p> <p>An alternate approach used by some centres is to wean by 0.05mg/kg/day every 48 to 96 hours as tolerated.</p> <p>In both approaches, morphine is discontinued when scores are stable for 48 to 72 hours on a dose of 0.05 to 0.1 mg/kg/day.</p>	<table border="1"> <thead> <tr> <th>Score</th> <th>Oral Morphine Dose</th> </tr> </thead> <tbody> <tr> <td>8-10</td> <td>0.32 mg/kg/day divided q4-6h</td> </tr> <tr> <td>11-13</td> <td>0.48 mg/kg/day divided q4-6h</td> </tr> <tr> <td>14-16</td> <td>0.64 mg/kg/day divided q4-6h</td> </tr> <tr> <td>17+</td> <td>0.80 mg/kg/day divided q4-6h</td> </tr> </tbody> </table>	Score	Oral Morphine Dose	8-10	0.32 mg/kg/day divided q4-6h	11-13	0.48 mg/kg/day divided q4-6h	14-16	0.64 mg/kg/day divided q4-6h	17+	0.80 mg/kg/day divided q4-6h
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Medication should be considered for the treatment of NAS when supportive measures fail to adequately ameliorate withdrawal. (III-B)

When pharmacological treatment is necessary, the baby should be admitted to the SCN/NICU or pediatric unit where cardiorespiratory monitoring is available. (III-B)

Parental interaction should be encouraged and observed to assess social risk and safety issues.

Morphine should be considered the first line pharmacologic treatment for NAS when supportive measures fail.

Morphine is indicated when the average of three scores is greater than or equal to 8 on the scoring tool or when the average of two scores or the scores for two consecutive intervals is greater than or equal to 12. (III-B)

Cardiorespiratory monitoring is required for all infants started on morphine and continued for 4 days and/or until the dose is reduced. Further monitoring should then be at the discretion of the physician. (III-B)

Discharge Planning

Although the condition of NAS is confined to the immediate neonatal period, the needs of infants and families extend beyond the confines of inpatient hospital care to the larger social and community context. Due to the multiple medical and psychosocial needs of mothers and infants with NAS, careful discharge planning should be initiated early in the admission and be inclusive of both primary health care and psychosocial supports for families. To avoid gaps in care and monitoring of affected infants, the primary care provider of the infant should be identified prior to discharge from the hospital, with a care plan established for the ongoing assessment of developmental milestones. It is important that practitioners be educated about the importance of ongoing care and monitoring of both medical and social risk factors, and expected and supported to create community partnerships that can facilitate transitions through a seamless referral process to comprehensive community supports. Neonates are at risk for neurodevelopmental impairment⁵⁵ and thus must receive follow-up assessment from primary care providers on discharge. Psychosocial follow up for both mother and infant may include addiction services, counseling and support programs and home visitors to assist in ensuring positive outcomes for both and to ensure the safety of the infant. A professional home visitor such as a public health nurse specializing in assessing parenting capacity should be part of the circle of care at discharge to continue to address any risk factors that would compromise the wellness of the infant and family unit. The goal of this type of community involvement is to support child development and relapse-prevention and to address risks associated with co-sleeping, SIDS, smoking, and shaken baby syndrome. Of equal importance, the discharge plan should also ensure that the substance abusing mother is linked to required psychosocial, medical and addiction services that promote safety and wellness for the infant and family in a community context.

Where the baby is discharged into the care of child welfare, it is essential to develop links between foster parents and local primary care providers that have expertise and experience in NAS. Teaching foster parents to recognize

withdrawal symptoms in a formerly asymptomatic infant is vital to ensure that timely medical advice and intervention is attained.

Given that many pregnancies are unplanned⁵⁶, education and resources should be provided about birth control, addiction services, MMT, and public health on an ongoing basis to promote positive decision-making. Discharge from the hospital offers a unique opportunity to discuss and educate the mother about planning or preventing future pregnancies that may present with risk of NAS.

Discharging the infant home on morphine should only be undertaken if the clinical team is confident that the social risk is low, the infant is stable and that there is a clear and comprehensive plan for weaning the infant. A designated supervisor is required who will monitor the infant closely, at a minimum with a weekly visit. Following consultation with the clinical team, the final decision to discharge an infant on pharmacologic treatment is at the discretion of the physician. When assessing a family for discharge prior to weaning, the following criteria should be met:

- Stable supportive home environment
- Satisfactory psychosocial assessment documented
- No identified risk to planned neonatal follow-up
- Identified physician familiar with NAS and medication weaning for post discharge care who will follow the infant as often as necessary but no less frequently than weekly until the medication has been discontinued.
- A clearly identified plan for weaning
- An ability to monitor the appropriateness of timing of prescription renewals (maximum 7 day prescriptions is recommended)
- Care provider competence in measuring and administering the medication should be observed and documented while in hospital
- Care provider education about signs of NAS and the need to contact the physician if signs increase
- Care provider education regarding avoidance of co-sleeping
- Post-discharge follow-up with Public Health, CAS, addiction services or identified community support worker as required
- Pre-discharge case conference to identify and document the discharge plan.

The primary care provider for the infant should be identified prior to discharge. (III-B)

A professional home visitor should be provided to continue to address risk factors and provide support . (III-B)

Every baby exposed to opioids should have ongoing assessment by a clinical expert in assessing developmental milestones. (II-3B)

Links between child protection services and the primary health care provider should be developed. (III-B)

The substance abusing mother should be linked to psychosocial, medical, addiction and social services to ensure safety for the baby at home. (III-B)

Future pregnancies should be planned or prevented through education about risks of future pregnancy and NAS. (III-B)

Discharging the infant home on morphine should only be undertaken if the clinical team is confident that the social risk is low, the infant is stable and that there is a clear, comprehensive plan for weaning. (III-B)

CONCLUSION

Although the impetus for the formation of the NAS Work Group was concern regarding the volume of neonatal beds occupied by infants with NAS across Ontario, the deliberations of the Work Group did not result in recommendations that would shorten length of stay directly or support infants with NAS being weaned at home unless the criteria detailed under Discharge Planning are met. It is the view of the experts in this Work Group that standardizing clinical management of the substance using woman and the infant at risk for NAS will result in improved outcomes. These improved outcomes will be the direct result of early recognition of symptoms, expeditious diagnosis and prompt initiation of treatment resulting in shortened length of stay. It is also hoped that improved education of the risks of opioid use during pregnancy will lead to a decreased incidence of NAS, through reduced use of opioids and/or contraception counseling.

Development of collaborative working relationships between hospital and community clinicians, pain clinics, child protection agencies,

public health and social services will enhance the circle of care and provide a supportive, holistic approach to prenatal care and addiction management that will not only benefit the woman and her family, but most importantly her unborn baby. It will also form a long term support network for these high risk families. Cultural sensitivity is essential in order to engage First Nations communities in partnership so that solutions can be identified to address the unique needs in their communities.

NAS is a complex and multifaceted issue that is escalating along with rapidly rising opioid use in Ontario. Reducing the incidence and impact of NAS requires immediate action in order to improve the care of affected women and infants. This includes optimizing and standardizing treatment strategies, assessing and managing social risk, better monitoring of prescribing practices and facilitating the implementation of better treatment and prevention strategies as they become available. These guidelines provide the framework to inform and support the development of a coordinated strategy to address this important issue.

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We accept that the views expressed herein are those of the authors and do not necessarily reflect the views of our partners. All errors and omissions are our own.

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